Volume 37 | e-Supplement 58 | June 2020
www.ejanaesthesiology.com

European Society of Anaesthesiology ESA

EJA

European Journal of Anaesthesiology

Euroanaesthesia 2020
The European Anaesthesiology Congress

Abstracts Programme

Wolters Kluwer

European Journal of Anaesthesiology
Volume 37 | e-Supplement 58 | June 2020

Abstracts

EUROANAESTHESIA 2020

The European Anaesthesiology Congress

Wolters Kluwer

European Journal of Anaesthesiology

European Journal of Anaesthesiology is the official publication of the European Society of Anaesthesiology. The Journal publishes original scientific work. Preference is given to experimental work or clinical observations in man, and to laboratory work of clinical relevance.

Information for contributors
Papers should be submitted online at: www.editorialmanager.com/eja.

European Journal of Anaesthesiology (ISSN: 0265-0215) is published monthly by Wolters Kluwer Health, Inc. and distributed in the US by Mercury Airfreight International, Inc., 365 Blair Road, Avenel, NJ 07001. Periodicals postage paid at Rahway, NJ. POSTMASTER: send address changes to European Journal of Anaesthesiology, PO Box 1610, Hagerstown, MD 21740, USA.

All correspondence should be addressed to the Editorial Office: European Journal of Anaesthesiology, Lippincott Williams & Wilkins, Citi Building, 41st Floor, 25 Canada Square, London E14 5LQ, UK
Publisher Daniel Hyde
Production Editor Duncan Martin-Holloway

Printed on chlorine-free, recyclable paper from sustainable forests meeting the requirements of ISO 9706, ISO 14001 and ISO 9001 in Singapore by Markono Print Media Pte Ltd. Typeset by Thomson Digital Ltd., Noida Special Economic Zone, Noida, India.

Disclaimer
Although every effort is made by the publisher and editorial board to see that no inaccurate or misleading data, opinion or statement appear in this journal, they wish to make it clear that the data and opinions appearing in the articles and advertisements herein are the responsibility of the contributor or advertiser concerned. Accordingly, the publisher, the editorial board and their respective employees accept no liability for the consequences of any such inaccurate or misleading data, opinion or statement.

Drugs and drug dosages
Readers are advised that new methods and techniques described involving drug usage should be followed only in conjunction with drug manufacturers' own published literature.

2020 Subscription rates
Individual $648 (USA); $648 (Rest of the World). Institutional $2,148 (USA); $2,482 (Rest of the World). On-line only subscriptions for Institutions are available through Ovid (www.ovid.com).
Prices include handling and shipping, but not sales tax, e.g. VAT, GST, MVG, MWS, AST and regional sales tax. Where applicable, please add sales tax to the listed prices at the appropriate rate. (The Canadian GST of 7% will be added to the subscription price of all orders shipped to Canada. Wolters Kluwer Health, Inc. GST Identification Number is 895524239.) Copies will be replaced without charge if the publisher receives a request within 90 days of the mailing date, both in the USA and worldwide.

Subscription information
European Journal of Anaesthesiology, Subscription Department, Wolters Kluwer Health, Inc., 14700 Citicorp Drive, Bldg 3, Hagerstown, MD 21742, USA, tel: + 1 800 638 3030. In Japan, contact Wolters Kluwer Health Japan Co, Ltd, 1-28-36 Hongo, Bunkyo-ku, Tokyo 113, Japan, tel: + 81 3 3817 5675; fax: + 81 3 3815 6776.

Call for abstracts

The ESA solicits the submission of abstracts for the Euroanaesthesia 2021 Congress
Munich, Germany
29 - 31 May 2021

All abstracts must be submitted online via the Euroanaesthesia Website

The submission module will be available to submitters as from November 2020

Submission Conditions

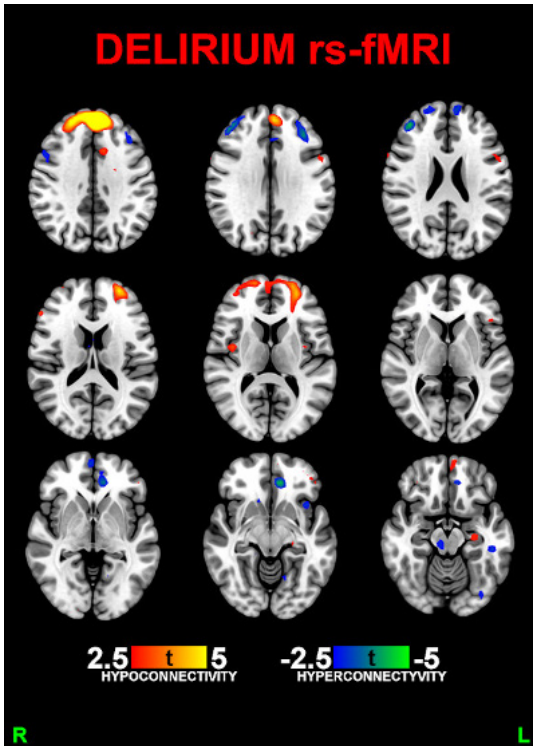
When submitting your abstract, you will be prompted to accept the submission conditions that will be made available on the Euroanaesthesia website at least one month before the submission starts.

6077

Functional brain alterations during delirium in ICU: a nested case-control resting-state fMRI study

Guadrini L.[1], Librizzi A.[1], Gitti N.[1], Rasulo F.[2], Latronico N.[2], Piva S.[2]
[1]ASST Spedali Civili di Brescia - Brescia (Italy), [2]Department of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia - Brescia (Italy)

Background and Goal of Study: Delirium is a severe complication in critically ill patients, associated with unfavorable clinical outcomes; although nosologically and clinically well-characterized, its pathophysiology is still under investigation. In order to fill the gap in the literature about the pathophysiology of delirium, we investigated the alteration of brain resting-state network dysconnectivity [1] and its possible correlation with delirium.
Materials and Methods: We have enrolled 11 ICU patients with delirium diagnosed by CAM-ICU (2 consecutive positive evaluations performed by two different observers). The patients underwent functional resting-state fMRI (rsfMRI); the functional connectivity was assessed with Independent Component Analysis. Data were compared with rsfMRI of 11 healthy controls matched for sex and age.
Results and Discussion: Preliminary results showed mixed connectivity alterations in resting-state networks (RSN) (Figure 1). Cortical alterations were present in caudal dorsolateral prefrontal cortex (cDLPFC) and anterior prefrontal cortex (aPFC) (Brodmann Areas (BA) 10 and 8, respectively), with reduced connectivity in Default Mode Network (DMN), Salience Network (SN) and Executive Control Network (ECN), while in mid dorsolateral PFC (mDLPFC) (BA 9) we found hyper-connectivity in SN and ECN. Subcortical alterations included: hyper-connectivity in Pedunculopontine Nucleus (PPN), Laterodorsal Tegmental Nucleus (LDT), Ventral Tegmental Area (VTA) and Substantia Nigra on the right, and hypoconnectivity in the left hippocampus and insula (bilaterally).



Conclusion: The preliminary results support our hypothesis on delirium genesis: the subcortical hyperconnectivity of PPN, LDT, VTA, and Substantia Nigra could induce functional alteration in the frontal lobes that involves the anterior component of different RSNs.

References:
1. Numan T et al. Functional connectivity and network analysis during hypoactive delirium and recovery from anesthesia. Clin Neurophysiol. 2017 Jun;128(6):914–24.

4801

Proseal laryngeal mask attenuates haemodynamic response and coughing during awakening in Transesphenoidal Pituitary surgery: A randomized Clinical Trial

Hurtado P.[1], Tercero J.[2], Garcia-Orellana M.[2], Reyes L.[2], Valero R.[2], Fabregas N.[2]
[1]Hospital Clinic de Barcelona - Barcelona (Spain), [2]Hospital Clinic - Barcelona (Spain)

Background and Goal of Study: The aim of this clinical trial was to compare systemic and cerebral hemodynamic variable and cough incidence during the emergence of pituitary surgery from general anaesthesia either according to standard procedure (ETT extubation) or after replacement of the ETT with an LMA.
Materials and Methods: Patients undergoing pituitary surgery under general anaesthesia were included in a randomized open-label parallel trial. Patients were randomized to awaken with the ETT in place or after its replacement with a ProSeal LMA (Bailey technique). We recorded mean arterial pressure (MAP) as the primary endpoint, heart rate, middle cerebral artery flow velocity (MCAv), regional cerebral oxygen saturation (SrO2), cardiac index during the whole emergence period, and norepinephrine plasma concentrations, need for vasoactive drugs, coughing and incidence of postoperative cerebrospinal fluid (CSF) leaks.
Results and Discussion: Forty-four patients were included in the study. MAP was higher, although without clinical relevance; nonetheless, ETT group required more often antihypertensive drugs (34.8% vs 14.3%; p=0.17). MCAV was higher (ex. at 15 min: 103.2; 95% CI: 96.3-110.1 vs. 89.6; 95% CI: 82.6-96.5) (p=0.003), but SrO2 did not differ between groups. Cardiac index and Norepinephrine plasma levels were similar in both groups. Incidence of coughing was significantly worse in the ETT group (15% vs 81%; p<0.001). CSF leakage was present in 3 patients (13%) in the ETT group and none in the LMA group.
Conclusion: Replacing the ETT with the LMA before neurosurgical patients emerge from anaesthesia results in a more favourable hemodynamic profile, less cerebral blood flow velocities and a lower incidence of cough. Incidence of CSF leakage suggest for a further study.
References:
1. Nair I, Bailey PM. Anaesthesia 1995;50:174-5.
2. Perello L. J Neurosurg Anesthesiol 2015; 27(3):194-202.

5251

Does our use of marginal liver grafts for liver transplantation adversely affect our liver transplant recipients? A 5 year retrospective review comparing marginal versus non-marginal liver grafts in a large transplant centre in Melbourne

Desmond F.[1], Barber K.[1]
[1]Austin Health - Melbourne (Australia)

Materials and Methods: Suitable orthotopic liver grafts for liver transplantation (LT) are a finite resource and are decreasing in quantity. Therefore, the use of 'marginal' liver grafts for LT has increased. Marginal livers grafts include those from older donors, steatotic donors, donors with prolonged ICU stays and on high doses of vasoactive agents. All split grafts and grafts from DCD (direct cardiac death) donors are marginal. Suitable non-marginal grafts have declined over the years, and we have rapidly increased our use of marginal grafts. At Austin Health, 25% of our donors are considered non-marginal, with 75% of all liver grafts coming from marginal donors. We decided to explore and investigate if there the outcomes were different between the two groups. We conducted a retrospective cohort study, comparing those recipients that received a marginal versus those that received a non-marginal graft. Our primary outcome was primary non function (PNF) of the graft, secondary end points were: hospital length of stay (LOS), intensive care (ICU) LOS, functionality of the organ (INR, peak AST day 1), and the need for renal replacement therapy (RRT) post op. We looked at the MELD (Model for End-Stage Liver Disease) scores of the 2 groups to ensure that we were comparing comparable groups. Univariate analysis was performed using Stata.
Results and Discussion: A total of 327 LTs were performed at Austin health from 2013-18. 75% (245) came from marginal donors, 25% from non-marginal. Statistical analysis showed that there was no association between the type of graft and PNF (p=0.702). There was no statistically significant difference between the 2 groups with regards to hospital (p=0.73) or ICU LOS (p=0.33). INR did not differ between the 2 groups (p=0.22) but peak AST on day 1 did show a statistically significance difference, with those receiving a non-marginal liver having a lower AST on day 1 post op (p=0.027). There was no association between the 2 groups with regards to needing RRT post op (p=0.565) and no difference in the MELD scores between the

2 groups pre-op (p=0.82).
Conclusion: Despite 75% of our liver grafts coming from marginal donors, it does not seem to have a negative impact on the outcome of the LT or the recipient, despite the difference in AST. This could lead to greater enthusiasm using marginal organs, given their now proven safety profile, reducing waiting lists times and mortality on the LT waiting list.

5995

Lidocaine increases the inhibitory effect of ex vivo lung perfusion on the inflammatory response in lungs obtained from asystole donors

Calvo A.[1], Rancan L.[2], Zamorano J. Á.[3], Garutti I.[3], Simón C.[3], Vara E.[2]
[1]Fundación para la Investigación Biomédica Hospital General Universitario Gregorio Marañon. - Madrid (Spain), [2]Universidad Complutense de Madrid - Madrid (Spain), [3]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: The shortage of donors is the most important limiting factor for the clinical application of lung transplantation. Ex vivo lung perfusion (EVLP) procedure is a known method to promote lung recovery. However, it results could be even better if modulatory treatments of lung injury secondary to ischemia-reperfusion (IRLI) were applied. Regarding to novel therapies that modulate lung injury, growing interest has been aroused for the anti-inflammatory and cytoprotective properties of local anesthetics such as lidocaine (LIDO). The objective of this study was to investigate a possible role of EVLP in the viability of transplanted lungs derived from asystole donors and its possible modulation by lidocaine addition.
Materials and Methods: The surgical procedure consisted on a left lung transplantation model: 1- Hypoxic cardiac arrest is induced in donor pigs and lungs harvested; 2- After 60 min of warm ischemia, left lung was stored in cold preservation solution for 3 hours; 3- Left lung was evaluated and reconditioned exvivo in a lung perfusion machine for 3h (with different protocols); 4- Left pneumonectomy was performed in the recipient pig followed by transplantation of the donor lung; 5- Assessment of lung function during 3 hours after reperfusion; 6- Lung byopsies were performed and pigs were euthanized. Animals were divided into 3 groups: 1 (EVLP): exvivo lung reconditioning with O2/air ventilation and perfusion with Steen solution; 2 (LIDO): exvivo lung reconditioning with lidocaine and perfusion with Steen solution; 3 (CONTROL): same procedure without exvivo lung reconditioning. mRNA expression of pro-inflamatory cytokines and apoptotic markes were determined by RT-PCR.
Results and Discussion: Ischemia-reperfusion increased mRNA expression of the pro-inflammatory cytokines (TNFα, IL1β, IL6, IL8 and IL12) and apoptotic (caspase 3, AIF) markers. mRNA expression of all inflammatory and apoptotic markers decreased significantly ($p<0.01$) in the EVLP Group relative to the Group without EVLP. The effect of EVLP was enhanced by LIDO ($p<0.001$).
Conclusion: EVLP may allow recovery of lungs obtained from asystole donors, considered non-viable, turning them into valid candidates for transplantation. This beneficial effect of EVLP may be enhanced by the addition of lidocaine.

5824

The minimum effective volume (MEV90) of ropivacaine for ultrasound-guided caudal block in anorectal surgery

Anaesthetics local

Li X.[1], Zhang P.[2], Wang R.[1]
[1]West China Hospital of Sichuan University - 成都市 (China), [2]Shangjin Nanfu Hospital of Chengdu - 成都市 (China)

Background and Goal of Study: Caudal epidural block (CB) provides reliable anesthesia and analgesia of lumbosacral nerve roots, which has been widely used in adult anorectal surgery. Despite the widely utilization, the minimum effective volume (MEV90) of ropivacaine for CB remains unknown, which is of the essence for determination of unnecessary administration of potentially toxic doses. Moreover, the volume of caudal block might show a gender difference because of the anatomical structure difference in gender. Hence, the present study was designed to explore MEV90 of 0.5% ropivacaine for ultrasound (US)-guided CB in male and female adult subjected to anorectal surgery.
Materials and Methods: A minimum of 45 patients scheduled for anorectal surgery were included in each gender group. All the patients received US-guided CB using ropivacaine 0.5%. The study was based on a biased coin design (BCD) up-and-down method (UDM) (BCD-UDM), where the volume of ropivacaine administered to each patient depended on the response of the previous one. The first participant received 10ml. In case of failure, the ropivacaine volume was increased by 2ml in the next subject. If the previous patient had a successful block, the next subject was randomized to a lower volume (with a decrement of 2ml), with a probability of 0.11, or the same volume, with a probability of 0.89. Success was determined at 5-minute intervals for 20 minutes after the administration of the local anesthetic by pinprick testing of the perineal area and the presence of a lax anal sphincter.
Results and Discussion: In this double-blind, prospective study, a total of 98 ASA physical status I~II patients (50 male and 48 female) were included, and none of them had severe complications. The MEV90 of ropivacaine for CB were estimated to be 11.8mL (95% CI 10.3-13.5mL) for female and 12.9mL (95% CI 11.3- 14.7mL) for male, respectively, and no significant difference of MEV90 was presented between male and female patients. By extrapolation to minimum effective volume in 99%of subjects (MEV99) and pooled adjacent violators algorithm (PAVA) adjusted responses, it would be optimal to choose ropivacaine 14.0mL for all patients.
Conclusion: We concluded that US-guided CB using 0.5% w/v ropivacaine 14 ml can provide successful block in 99% of middle-aged adults subjected to anorectal surgery.

6288

Comparison of nasal midazolam and nasal dexmedetomidine premedication in children undergoing circumcision

Romdhani C.[1], Naas I.[1], Yahya M.[1], Elaskri H.[1], Labbene I.[1], Ferjani M.[1]
[1]Military hospital of Tunis - Tunis (Tunisia)

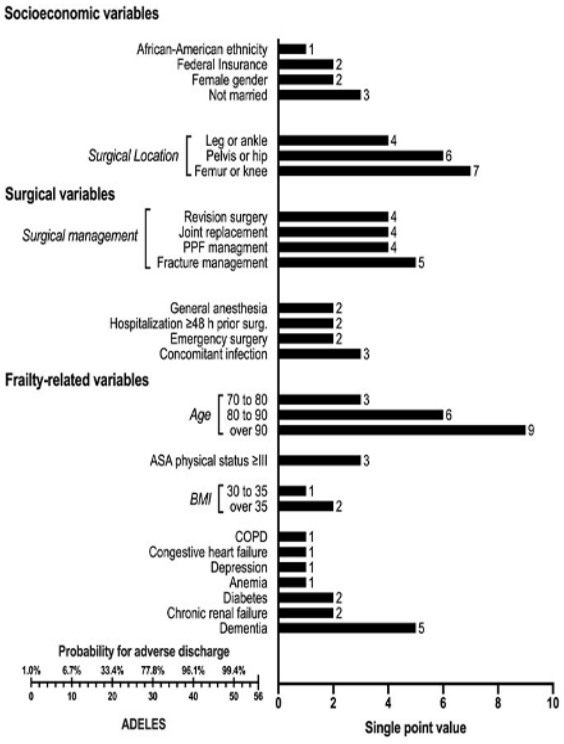
Background and Goal of Study: Preoperative anxiety is a common feeling in children. Reducing this anxiety is one of the goals of premedication. We aimed to compare the effect of midazolam to that of dexmedetomidine on preoperative anxiety.
Materials and Methods: We conducted a randomized, double-blind, prospective study that included ASA class I patients over two years of age undergoing circumcision. We randomized patients into two groups: a Group M receiving 0.2 mg/kg of midazolam and a Group D receiving 1 µg/kg of dexmedetomidine. Anxiety was assessed by the modified Yale Preoperative Anxiety Scale (m-YPAS). Sedation and facial mask acceptance scales, Paediatric Anaesthesia Emergence Delirium (PAEDS), and WATCHA scores were assessed. General anesthesia with a penile block was performed. Hemodynamic parameters were collected.
Results: We included 140 children. Nine patients were excluded. We analyzed 66 children in Group M and 65 children in Group D. Demographic characteristics were comparable. The mean age was 3.2±0.9 years old. The mean weight was 16.2±3 Kg. The mean delay between premedication and admission in the operating room was comparable between the two groups. The m-YPAS scale before premedication was comparable between the two groups. Before induction, m-YPAS was significantly higher in group M ($p < 0.05$). The number of children with an m-YPAS lower than 30 was significantly higher in group M. Sedation and facial mask acceptance were comparable. Emergence agitation was higher in group M. Patient emergence agitation scales were higher in group M versus group D. Systolic blood pressure, and heart rate were significantly lower in Group D than in Group M after administration of sedative drugs until children left PACU ($p < 0.001$). Nevertheless, no adverse hemodynamic events occurred.
Conclusion: These results showed that dexmedetomidine provided lower preoperative anxiety scores than midazolam with less emergence agitation. Sedation and mask acceptance were comparable in the two groups. There was no significant difference in terms of adverse effects in both groups.
References:
1. Paediatr Aneaesth 2014 Aug;24(8):863-74.
2. Paediatr Anaesth 2007 Jul;17(7):667-74.
3. Paediatr Anaesth 2019 Aug;29(8):843-9.

6298

Development and Validation of a Score for Prediction of Adverse Discharge in Elderly Patients after Lower Extremity Surgery (ADELES)

Schaefer M.[1], Hammer M.[1], Houle T.[2], Rodriguez E.[1], Barnett S.[1], Eikermann M.[1]
[1]Beth Israel Deaconess Medical Center - Boston (United States), [2]Massachusetts General Hospital - Boston (United States)

Background and Goal of Study: Adverse discharge - death in hospital or discharge to a skilled nursing facility - is frequent [1] and devastating [2] in elderly patients undergoing lower extremity surgery. Predicting individual patient risk allows initiation of preventive measures and allocation of critical resources. We developed and validated a prediction score for adverse discharge disposition in a high-risk cohort of elderly patients after lower extremity surgery (ADELES).
Materials and Methods: This was a retrospective, multi-center cohort study in two academic hospital networks in New England, USA using hospital registry data. 20,172 patient cases >60 years previously living at home and undergoing lower extremity surgery were included. We tested preoperatively available candidate predictors for their predictive value for adverse discharge disposition using a stepwise backward elimination process and developed a score from significant predictors (threshold p<0.10)
Results and Discussion: 7,544 patients (37.4 %) experienced adverse discharge. The final score comprised 20 variables depicting socioeconomic characteristics, surgical management and frailty-related factors (Figure 1). Achievable score values ranged from 0 to 56. Assessment of C-statistics showed an area under the receiver operating characteristic curve of 0.85 [95% CI 0.84-0.85] (Brier score 0.16) in the development and 0.72 [0.71-0.73] (Brier score 0.20) in the independent validation cohort, confirming good predictive performance. Decision curve analysis confirmed a positive net benefit of up to 84% and 57% risk threshold in the development and validation cohort, respectively.



Conclusion: These results showed that dexmedetomidine provided lower preoperative anxiety scores than midazolam with less emergence agitation. Sedation and mask acceptance were comparable in the two groups. There was no significant difference in terms of adverse effects in both groups.
References:
1. Paediatr Aneaesth 2014 Aug;24(8):863-74.
2. Paediatr Anaesth 2007 Jul;17(7):667-74.
3. Paediatr Anaesth 2019 Aug;29(8):843-9.

General Anaesthesiology

5332

The effect of Plethysmographic Variability Index Monitoring on volume replacement in geriatric patients

Orhon Ergün M.[1], Zengin S. Ü.[2], Bilgili B.[2], Saraçoğlu A.[2], Umuroğlu T.[2]
[1]Marmara University Pendik Training and Research Hospital - Istanbul (Turkey), [2]Marmara University Pendik Training and Research Hospital - Istanbul (Turkey)

Background and Goal of Study: It is not always possible to determine organ function reserves in geriatric surgical patients. Therefore; in this age group, intraoperative administration of the ideal amount of intravenous fluids and/or blood products is extremely important in order to prevent potential organ damages. The aim of this study is to determine the effect of Pleth Variability Index (PVI) monitoring on the intraoperative volume replacement in geriatric patients undergoing surgery.
Materials and Methods: Following Ethics Committee approval and the obtaining of written informed consents, hundred patients over the age of 65 years, ASA class 2-3, undergoing elective surgery were enrolled into the study. In addition to standard monitoring, PVI monitoring was performed in all patients. After randomization with the sealed envelope method, fluid resuscitation was performed based on PVI data (threshold value being 13%) in Group PVI (n=50). In the control group (Group C, n=50), anesthesiologists were blinded to the PVI values; fluids being administered based on the hemodynamic parameters. Heart rates, arterial blood pressures, the amount of the administered fluids and blood products, vasopressor agent requirements were recorded with 15-min intervals.
Results and Discussion: Compared to group PVI, PVI values were significantly higher in group C at all time intervals, intraoperatively (p <0.01). There were no significant differences between groups in terms of blood loss, blood transfusion and fluid administration, as well as in terms of mean arterial pressure values. Heart rate was significantly higher in group C after 15 min (p <0.05). The number of patients receiving vasopressor agent was statistically higher in group C (p <0001).
Conclusion: PVI monitoring in geriatric surgical patients may ensure optimal intravascular volume replacement and the administration of unnecessary vasopressor agents may be prevented.

5259

Intraoperative monitoring of Stroke volume variation versus central venous pressure during liver resection among cirrhotics. A randomized controlled trial

Yassen K.[1], Lotfy M.[1], Hussien R.[2], Abdou A. M.[2], Tawif T. A.[2], Mamdouh A.[3]
[1]Liver Institute Menoufia University - Shebeen Elkom (Egypt), [2]Faculty of Medicine Alexandria University - Alexandria (Egypt), [3]Liver Institute, Menoufia University - Shebeen Elkom (Egypt)

Background and Goal of Study: Non-invasive monitoring can improve safety during liver resection. Primary goal is to investigate the inter-relationship and agreement of stroke volume variation (SVV) (%) and invasive central venous pressure (CVP) (mmHg) during surgery and secondary the fluid volume intake as guided by each.
Patients and Methods: Ethics committee approval. 44 Cirrhotic adults (Child A, (2 excluded). 42 randomized into: SVV (n=21) of Electric Cardiometery (EC, Osypka Germany) and continuous CVP (n=21) groups (gp). SVV (%), CVP (mmHg), Invasive blood pressure (IBP) (mmHg) recorded at 10 min post-anaesthesia induction (T0), during dissection (T1), following resection. (T2), Surgery end prior to relaxant reversal. (T3). In SVV group, CVP was blinded to Anaethesist and vice versa. Before and during dissection 0-4 ml/kg/h crystalloids were infused to keep SVV >12% and CVP < 5 cmH2O. Following resection 0-10 ml/kg/h to maintain SVV <12% and CVP 5-10 cmH2O. Post-resection 250 ml albumin 5% (max 20 ml/kg) if SVV is still >12% and CVP < 10 cmH2O. Maintain IBP (>60 mmHg). Blood units if Hb < 8 g/dl.
Results: Median (IQR) for SVV vs. CVP respectively. Age 58[55-63] vs. 56 [52-59] y, males: 15/21 (71.4%) vs. 18/21 (85.7%), p=0.452, BMI 26.1[24.2-27.7] vs. 25.95[23.3-29.3] kg/m2, p=0.87. A negligible correlation existed between SVV and CVP (n=252), t=0.102, p=0.03 with a poor degree of reliability between their paired readings (n=252) (Intra-class correlation (ICC) = 0.172 [95% CI -0.061-0.354], P =0.06. Crystalloids 3000 [2580-3100] ml vs. 3000 [3000-3500], p=0.26 and albumin 5% p=0.81. Blood for only 5/21 patients (23.81%) in SVV gp 1000[1000-1000] ml vs.

6/21 (28.57%) in CVP 1250 [1000-1500] ml p=0.42. SVV% trend at T0: 12[10-13] %, T1:13[11-13] %, T2: 11 [10-12] %, T3: 11[10-12]. (X2(Fr)(df=5)=12.40, p=0.03). SVV % comparable (p>0.05), except post-resection, it was higher within CVP gp (p=0.014). CVP trend (+PEEP 5 cmH2O) at T0: 11[10-12] mmHg, T1: 10[9-13] mmHg during dissection, T2:10[9-12] mmHg, T3: 11[9-12] mmHg at end of surgery (X2(Fr)(df=5)=44.27, p=0.000). Comparable CVP readings between both gps.
Conclusion: A negligible correlation and poor reliability existed between SVV and CVP, despite guiding equal fluid volumes. SVV readings were able in contrast to CVP to reflect the fluid restriction phase during resection despite of PEEP. Studies among larger hepatic populations are still needed to validate SVV as a sole monitor.

4540

Prediction of fluid responsiveness by means of stroke volume variation measured by pulse wave transit time -based cardiac output monitoring

Sakamoto N.[1], Ochiai R.1, Terada T.[1]
[1]Toho University Omori Hospital - 大田区 (Japan)

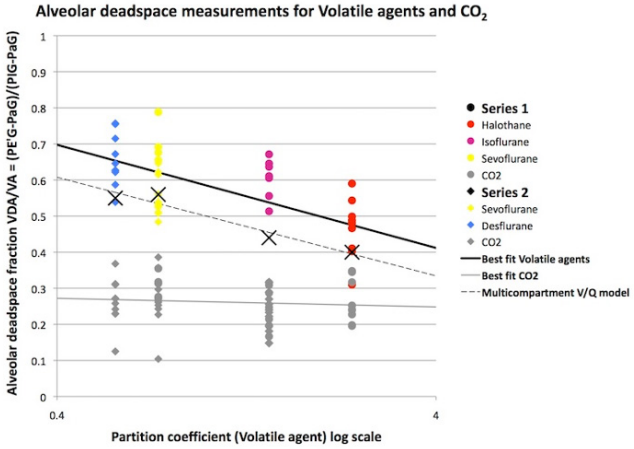
Background and Goal of Study: Evaluation of the stroke volume (SV) and stroke volume variation (SVV), which could predict fluid responsiveness, is important for perioperative cardiovascular management. In this study, we evaluated fluid responsiveness using a non-invasive pulse-wave transit time(PWTT)-based cardiac output monitor, the estimated Continuous Cardiac Output (esCCO).
Materials and Methods: Forty-six adult patients undergoing open abdominal surgery were included. Fluid loading with 300 mL of a colloidal solution in 15 min was performed during surgery under general anesthesia. Fluid responsiveness was defined as a 10% or more increase in Stroke Volume Index(SVI) measured by the esCCO. Several parameters were measured before and after fluid loading, and an SVV cut-off value for fluid responsiveness was calculated using the receiver operating characteristic (ROC) curve analysis.
Results and Discussion: Fluid responsiveness was observed in 27 of the 46 patients. SVV and cardiac index exhibited significant changes in the responsive group. In addition, the area under the ROC curve was 0.904 (range, 0.819–0.988) for a 10% or more increase in SVI after fluid loading. The cut-off SVV value was 6.4%.
Conclusion: In this study, we successfully used the non-invasive monitor esCCO to show fluid responsiveness during general anesthesia for open abdominal surgery and the esCCO derived-SVV has an excellent diagnostic value which is evidence by the high AUC of ROC curve analysis.

5238

Alveolar-arterial gradients and alveolar deadspace for anaesthetic agents

Peyton P.[1], Hendrickx J.[2]
[1]Austin Health - Melbourne (Australia), [2]OLV Hospital - Aalst (Belgium)

Background and Goal of Study: Significant ventilation-perfusion (V/Q) scatter develops under general anaesthesia, with widened Alveolar-arterial (A-a) gradients for respired gases. In the traditional "3-compartment" model, this is reflected in an increase in alveolar deadspace fraction (VDA/VA) estimated using PCO2 measurements, as well as in shunt fraction. However, large discrepancies between CO2 and isoflurane in both A-a gradients and alveolar deadspace have been described but not explained.[1] We compared A-a gradients and VDA/VA for four volatile agents to those simultaneously measured for CO2 in ventilated patients.
Materials and Methods: 42 cardiac surgery patients in two series were recruited. The first series allocated patients to halothane, isoflurane or sevoflurane maintenance anaesthesia; the second series to sevoflurane or desflurane. Simultaneous sampling of tidal gases and arterial and mixed venous blood was done 30-60 minutes post-induction. Partial pressures were measured in blood of O2 and CO2, and volatile agent using headspace equilibration and gas chromatography. Primary endpoint was comparison by linear regression of VDA/VA for CO2 and volatile agent using the Bohr-Enghoff principle from inspired, end-expired and arterial partial pressures.
Results and Discussion: VDA/VA for CO2 was not related to blood gas partition coefficient (slope [CIs] = -0.024 [-0.105 to 0.058], p = 0.564. VDA/VA for volatile agents was significantly related to partition coefficient (slope [CIs] = -0.261 [-0.372 to -0.149], p < 0.0001). A multicompartment model of V/Q scatter using physiologically realistic "log normal" distributions of V/Q ratios predicted this relationship accurately (Figure 1).



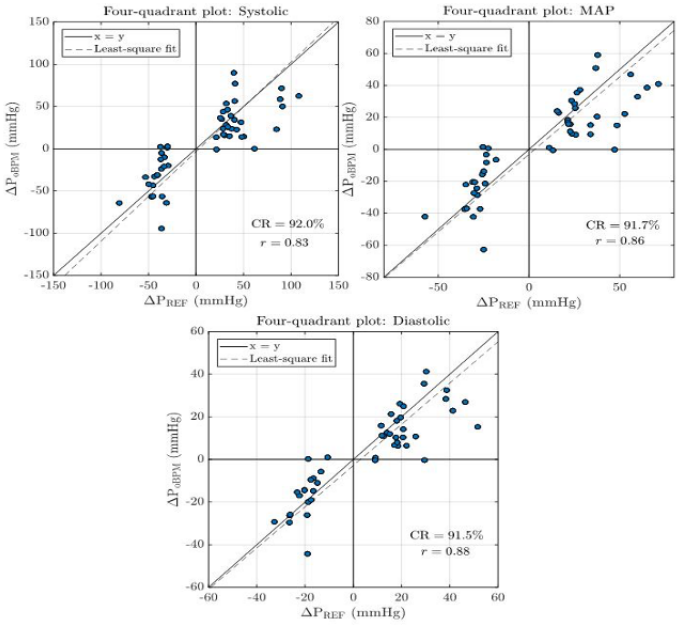
Conclusion: Our data show there is no internal validity to the concept of a «definitive» pulmonary alveolar deadspace, which is much greater for less soluble anaesthetic gases than for CO2. This discrepancy is predicted by models using physiologically realistic distributions of V/Q ratios.
References:
1. Landon MJ, Nunn JF et al. Components of the Inspiratory-Arterial Isoflurane Partial Pressure Difference. Br. J. Anaesth. 1993; 70: 605-11.

4316

Smartphone-based optical blood pressure monitoring in the acute care setting: Accuracy compared to invasive blood pressure measurement

Hofmann G.[1], Degott J.[1], Schorer R.[2], Bonnier G.[3], Proença M.[3], Schoettker P.[1]
[1]Lausanne University Hospital (CHUV) - Lausanne (Switzerland), [2]Geneva University Hospital (HUG) - Genève (Switzerland), [3]Swiss Center for Electronics and Microtechnology (CSEM) - Neuchâtel (Switzerland)

Background and Goal of Study: Arterial pressure (AP) monitoring is mandatory in the acute care setting. Technological improvements are opening new paths beyond oscillometric or invasive solutions. Smartphones may play a role, providing access to simplified and accurate monitoring beyond the operating room, thus impacting the management of hypertensive diseases. The main goal of this study was to assess the performance of a smartphone-based optical AP measurement to estimate and track changes of AP compared to invasive measurements.
Materials and Methods: Study population consisted of 120 patients aged >17 years, scheduled for an elective surgery requiring general anesthesia and invasive AP monitoring at the Lausanne and Geneva University Hospitals. Blood pressure values were acquired simultaneously through a radial arterial catheter and a smartphone camera positioned at the patient's finger. Signals were recorded during induction of general anesthesia and compared offline by a dedicated pulse wave analysis algorithm (oBPM®) designed to estimate AP values on optical signals following an initial 1-point calibration procedure.
Results and Discussion: We provide the preliminary results from the first 100 patients for systolic (SAP), diastolic (DAP) and mean AP (MAP) (Figure 1). We observe strong coherence of our estimations with a concordance rate (CR) over 90% (CRSAP = 92.0%, CRDAP = 91.5%, CRMAP = 91.7%). Pearson's correlation reflects a good trending ability with coefficients over 0.80 (P < 0.001) (SAP: 0.83, DAP: 0.88, MAP: 0.86).
Conclusion: This study demonstrates the potential for accurate estimation of AP through a smartphone-acquired optical signal in adults undergoing induction of general anesthesia. These preliminary results compared to invasive measurements could lead the way for mobile devices to leverage the monitoring AP in the near future. Such results may impact health assessment capabilities in developed and third world countries with devices widely available.



5315

Role of echocardiography during liver transplantation: benefits and potential complications

Monsalve X.[1], Tormos P.[1], Chocrón I.[1], Galan P.[1], Camio E.[1], Gonzalez-Suarez S.[1]
[1]Hospital Vall D'hebron - Barcelona (Spain)

Background and Goal of Study: Transesophageal echocardiography during liver transplantation is still underused; the rapid hemodynamics changes that occur in this surgery can make interpretation difficult, and the risk of rupture of esophageal varices is a fearsome complication. The goal of this study is to describe the safety and impact of TEE during each stage of liver transplantation.
Materials and Methods: We collected 24 patients in whom TEE was used as a monitoring system, performed by anesthesiologists with regular training. Before beginning of surgery, a complete TEE scan was performed. During each stage of the surgery, an assessment of cardiac filling volumes and contractility, were obtained at two levels: 1) the mid-esophageal four-chamber view (ME 4C) to evaluate the interaction of left and right ventricles and detect possible venous air embolism, and 2) the trans-gastric short axis view (TG SAX), using mid papillary muscles as land marks, to evaluate left ventricular size and segmental wall motion. Complications of TEE were registered: dental trauma, variceal bleeding, esophageal trauma and recurrent laryngeal nerve injury.
Results and Discussion: In 6 patients, cardiac monitoring was not possible in the TG SAX view due to subsequent retraction of the stomach produced by surgical separators. And, in 2 patients, surgeons were bothered by the presence of the probe in a deep TG view. The main findings are shown in table 1.

Table1. *Number of findings with TEE during each stage of liver surgery.*

	Predissection	Dissection	Anhepatic	Reperfusion	Neohepatic
Pulmonary hypertension	1 PASP 58mmHg No surgery	0	0	0	0
Thrombus	0	1 Attached to SG catheter	0	0	0
LVOTO	0	0	1 Clamping IVC	0	0
Pleural effusion	2	0	0	0	0
Hypovolemia	0	1	4	1	0
Embolisms Not paradoxical	0	0	0	24	0
Abnormal IVSWM	0	0	0	7	0
Right ventricular dilation	0	0	0	1 Moderate and temporary	0
Left ventricular hypokinesis	0	0	0	1 Inferior hypokinesis	0

LVOTO: left ventricular outflow tract obstruction. IVSWM: interventricular septal wall motion. PASP: pulmonary arterial systolic pressure. SG: Swan-Ganz. IVC: inferior vena cava

According to the previous literature, the TEE has a low complication rate. The hemodynamic instability after graft reperfusion could be justified by the common phenomenon of pulmonary embolism; so, is a priority to perform a proper washing of the liver graft before reperfusion, to decrease air embolism, and avoid hemodynamic disturbance.
Conclusion: In summary, the benefits of using TEE in LT outweigh the risks of potential complications. Monitoring with TEE guides us in the diagnosis, treatment and clinical decision-making in LT surgery.
References:
1. Burger-Klepp U. et al. Transesophageal echocardiography during orthotopic liver transplantation in patients with esophagogastric varices. Transplantation 2012; 94: 192-6.

5323

Transcutaneous carbon dioxide monitoring during apnoeic oxygenation: not always correct

Schweizer T.[1], Hartwich V.[2], Lareida M.[1], Theiler L.[1], Greif R.[1]
[1]Inselspital, Bern University Hospital - Bern (Switzerland), [2]Independent Researcher - Bern (Switzerland)

Background and Goal of Study: High-flow nasal cannula (HFNC) oxygenation gained substantial importance during the last years and is increasingly used during deep sedation or general anaesthesia. As end tidal carbon dioxide (CO2) measurement during HFNC-oxygenation is not feasible, continuous transcutaneous CO2 (ptcCO2) monitoring might be used to prevent hypercapnia. This study tests if ptcCO2 is as accurate as paCO2 measured by arterial blood gas samples (ABG) in apnoeic oxygenated patients under general anaesthesia.
Materials and Methods: With ethic committee approval and written informed consent, we included 98 patients under general anaesthesia for elective surgeries in an apnoeic oxygenation study [1]. We collected simultaneous pairs of ptcCO2 and ABG measurements every 2 minutes during apnoeic oxygenation. A TCM 5 with a "tc sensor 84" (Radiometer, Copenhagen, Denmark), placed in the subclavicular area according to manufacturer's recommendation, measured ptcCO2 and ptcO2. ABG was analysed by a Radiometer ABL800 flex blood gas analyser. Agreement between both CO2 measurements was analysed by the Bland-Altman method.
Results and Discussion: We compared 914 pairs of ABG and transcutaneous CO2 measurements. While in linear regression analysis they correlated significantly (R2 = 0.79, p<0.001), Bland-Altman analysis revealed a statistically significant bias of -20.8 ± 6.6 (mean ± SD) mmHg. 95% limits of agreement were -33.7 mmHg and -7.8 mmHg.
Conclusion: One of the factors for the limited accuracy might be the type of the sensors. The O2-electrode probably influences ptcCO2 measurements during apnoeic HFNC-oxygenation with 100% O2. As ptcCO2 measurements are applied for continuous monitoring of CO2 accumulation during apnoeic HFNC-oxygenation, a combined sensor using electrodes for measurement of O2 and CO2 underestimates CO2-levels and is therefore less suitable in that setting. Sensors solely measuring CO2, might monitor ptcCO2 more correctly during apnoeic oxygenation.
References:
1. Theiler, L., et al., Apnoeic oxygenation with nasal cannula oxygen at different flow rates in anaesthetised patients: a study protocol for a non-inferiority randomised controlled trial. BMJ Open, 2019.9:e025442.

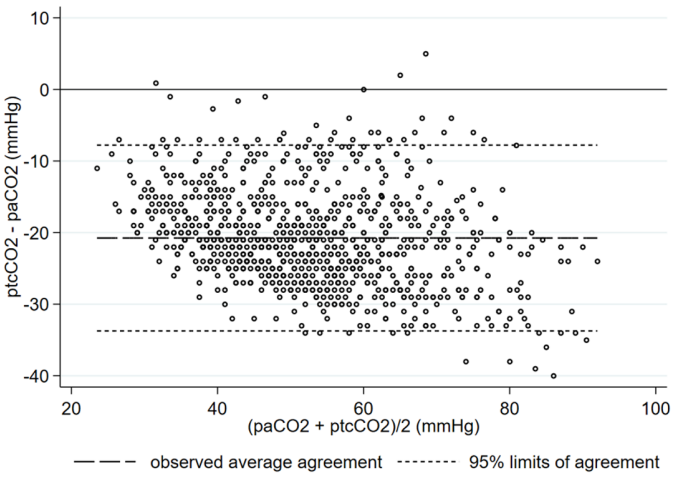


Fig. 1 Bland-Altman-analysis: difference between $ptcCO_2$ and $paCO_2$ versus the mean of the paired measurements

5530

The influence of bispectral index monitoring on the frequency of hemodynamic incidents during anesthesia

Trembach N.[1], Zabolotskikh I.[1]
[1]Kuban State Medical University - Krasnodar (Russia)

Background and Goal of Study: Maintenance of anesthesia by inhalation agents is most often performed under the control of expiratory gas analysis (ETAG). In this case, anesthetists are guided by the minimum alveolar concentration of the anesthetic. However, this value is very arbitrary and can lead to excessive or insufficient depth of anesthesia, which in patients with impaired reflex regulation can lead to hemodynamic instability. Estimation of the depth of sedation using the bispectral index (BIS) may possibly prevent these abnormalities. The aim of the study was to compare the frequency of hemodynamic critical incidents in patients with impaired reflex regulation of the cardiorespiratory system during ETAG-guided and BIS-guided anesthesia.
Materials and Methods: The study included 150 patients who underwent elective major abdominal surgery with impaired reflex regulation of the cardiorespiratory system (breath-holding duration less than 34 sec) [1]. Patients were randomized into two subgroups: in the first, anesthesia was performed on the basis of end-tidal anesthetic control and hemodynamic parameters, in the other, by control of the bispectral index with a target value of 40-60.
Results and Discussion: Analysis of the frequency of critical incidents showed a decrease in the incidence of intraoperative hypotension in the group of patients with anesthesia controled by the level of the bispectral index (21% versus 34% in the ETAG group, p <0.05). No significant differences in the frequency of other incidents (arrhythmias, arterial hypertension, bradycardia) were noted. The level of maximum end-tidal concentration of inhaled anesthetic was statistically significantly lower in the group of patients during anesthesia under the control of the bispectral index. The level of maximum concentration of inhalation anesthetic was statistically significantly lower in the group of patients during anesthesia under the control of the bispectral index: 0.83 ± 0.12 versus 1.14 ± 0.17 after the first hour of anesthesia, 0.82 ± 0.13 versus 1.12 ± 0.23 after the second hour of anesthesia and 0.86 ± 0.14 versus 1.12 ± 0.20 after the third hour of anesthesia (all p <0.05).
Conclusion: The use of a bispectral index to control the depth of sedation in patients with a high risk of hemodynamic disturbances can reduce the incidence of hypotension.
References:
1. Trembach N.V., Zabolotskikh I. B. Artery Research 2018; 24: 9-15.

5164

Noninvasive continuous cardiac output monitoring in patients undergoing spinal surgical procedures in prone position

Kukralova L.[1], Dostalova V.[1], Schreiberova J.[1], Dostál P.[1]
[1]University Hospital Hradec Kralove - Hradec Kralove (Czech Republic)

Background and Goal of Study: Patients undergoing spinal surgery frequently exhibit hemodynamic instability in prone position. The goal of this study was to study mechanisms of hemodynamic deterioration in prone position under propofol/desflurane/sufentanil anaesthesia and to compare the intraoperative hemodynamic management using an algorithm based on noninvasively measured cardiac output (ClearSight system, Edwards Lifesciencies) and derived hemodynamic parameters with a management based on anaesthesiologist's judgment.
Materials and Methods: 50 adult ASA I – III patients were randomized into the Clearsight (CS) and conventional (C) groups. Exclusion criteria included body weight >120 kg, preoperative fasting >12 hours, planned postperative arteficial ventilation, preoperative hypotension (MAP<65 mmHg), history of pulmonary hypertension, valvular disorder, periferal vascular disease and expected perioperative blood loss > 1500 ml. Management of anaesthesia in both groups and hemodynamic management in the CS group followed a strict protocol. Demographic variables, intraoperative evolution of cardiac index (CI), stroke volume index (SVI), stroke volume variation (SVV), number of fluid boluses, total amount of fluids, length of ICU and hospital stays and wound complications were recorded. Results are expressed as median (25–75% interquartile range).
Results and Discussion: Prone position was associated with lower CI in comparison with baseline and postinduction values (2.65 (2.20;2.80) vs 3.2 (2.50;3.60) l/min/m2, P=0.0005) and (2.65 (2.20;2.80) vs 2.80 (2.35;3.25) l/min/m2, P=0.0386), respectively. SVI (33.5 (29.5;39.5) vs 40.5 (34.5;47.0) ml, P= 0.001) was lower in comparison with baseline values. SVV remained unchanged in the prone position compared with the supine position (9.0 (7.5;11.5) vs 10 (6.5;13.5)%, P = 0.4077). Patients in the CS group received more fluid boluses (3 (2;3) vs 0 (0;0), P<0.0001) and more fluids in total (780 (560;1340) vs 340 (227;570) ml, P = 0.0002) in comparison with the C group. There were no differences between the CS and C groups in the length of ICU and hospital stay and the rate of wound complications.
Conclusion: The use of noninvasive continuous cardiac output monitoring enabled to identify mechanism of hemodynamic deterioration and significantly modified intraoperative fluid management.

5400

Comparison of post-tetanic counts during rocuronium-induced deep neuromuscular block evaluated by a new EMG module and acceleromyography: a prospective multicenter study

Takagi S.[1], Nakatsuka H.[2], Suzuki T.[1], Sasakawa T.[3], Kotake Y.[4], Nagata E.[5]
[1]Department of Anesthesiology, Nihon University School of Medicine. - Tokyo (Japan), [2]Department of Anesthesiology, Kawasaki Medical School. - Okayama (Japan), [3]Department of Anesthesiology, Asahikawa Medical University. - Hokkaido (Japan), [4]Department of Anesthesiology, Toho University Ohashi Medical Center. - Tokyo (Japan), [5]Department of Anesthesiology, Kagoshima Medical Association Hospital - Kagoshima (Japan)

Background and Aim of Study: When the EMG neuromuscular monitors have been recently reevaluating, a new EMG module, AF-201P is developed and released by Nihon Kohden corp., Japan. The purpose of this study was to compare the post-tetanic counts (PTC) between AF-201P and TOF Watch SX® during rocuronium-induced deep neuromuscular block.
Materials and Methods: The study protocol was approved by the Hospital Ethics Committee on Human Rights in Research. After registration with the University Hospital Medical Information Network (ID: UMIN 000034996), 41(sixteen male and twentyfive female, 57.6±10.4kg body weight) adult patients consented to participate in this study. The integrated AF-201P stimulating and sensing electrode was placed over the unilateral ulnar nerve on the distal volar forearm and the belly of the abductor digiti minimi muscle. The TOF Watch SX® was then applied with a provided hand adaptor to the opposite arm to observe twitch responses of the adductor pollicis muscle. After calibration of maximal currents and the first twitch height of each monitor and stabilization of the train-of-four (TOF) responses, 0.9mg/kg rocuronium was intravenously administered. During the repetitive TOF stimulations every 15 s, the PTC were simultaneously observed every 3 minutes using two monitors. Whenever observing over 5 PTC or reappearance of the 1 TOF count with TOF Watch SX®, 0.2mg/kg rocuronium was administered. The PTCs measured by AF-201P and TOF Watch SX® were compared using a linear regression analysis. Agreement between the two methods was assessed using the statistical method of Bland and Altman and bias and limits of agreement were calculated.
Results and Discussion: The PTC data of 1732 points of the PTC data were obtained and analyzed. Regression analysis revealed no statistically significant difference in PTCs between two monitors (PTC measured by AF-201P = 0.49· PTC measured by TOF Watch SX® + 0.93, R2=0.31). Bland–Altman analysis also showed acceptable ranges of bias [95% CI] and limits of agreement (0.34 [0.23 to 0.46] and – 4.56 to 5.25) for the PTCs. However, it should be paid attention to the possibility that the difference in PTCs between two monitors may increase as the PTC value increases.
Conclusions: The results of our study demonstrated that AF-201P, a new EMG device, is reliable for evaluating deep rocuronium-induced neuromuscular block and similar to TOF Watch SX® that is commonly used in clinical anesthesia.

5414

Changes in mean systemic filling pressure as an estimate of hemodynamic response to anesthesia induction with propofol

Ophir M.[1], Gregory K.[2], Zac L.[2], Matot I.[2], Adi N.[2], Goren O.[2]
[1]Tel Aviv University - Tel Aviv (Israel), [2]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel)

Background and Goal of Study: Mean systemic filling pressure (MSFP) minus the central venous pressure (CVP) is the driving force of the venous system. This pressure gradient between the venous system and the right atrium, is only a few cmH20, so a small change in the gradient can cause a significant hemodynamic deterioration. (1) MSFP has a significant effect on the venous return, and therefore on the cardiac output. It is known that the use of hypnotic substances during anesthesia induction can cause hemodynamic instability, however, the mechanism responsible for the effect is not fully known. Our objective was to measure Propofol bolus effect during anesthesia induction on different components of the venous and arterial system and on the hemodynamic state of the patient.
Materials and Methods: We collected data from patients undergoing a major surgery requiring hemodynamic monitoring. Hemodynamic measurements (including MSFP, CVP, heart rate, mean arterial pressure, cardiac output, systemic vascular resistance and venous return) were performed before, during and after induction of anesthesia using the p arm method.(2)
Results and Discussion: We examined the results of 15 patients. All patients have shown a decrease in their MSFP after induction with Propofol (pre-induction 25.3±6.2 mmHg, post-induction 18.3±5.7 mmHg). The pressure gradient of the venous return was reduced since the CVP showed only a small change (pre-induction 6.8±5.6 mmHg, post-induction 6.4±5.4 mmHg).
Conclusion: These results support our primary hypothesis that propofol induced hypotension is mediated mainly through a decrease in preload, caused by the change in the vasomotor venous tone and MSFP. These results suggest that a better management of hemodynamic deterioration during induction of anesthesia should focus mainly on the venous system components.
References:
1. Hall JE, John E, Guyton AC. Guyton and Hall textbook of medical physiology. Saunders Elsevier; 2011.2.
2. Maas JJ, Pinsky MR, Geerts BF, de Wilde RB, Jansen JR. Estimation of mean systemic filling pressure in postoperative cardiac surgery patients with three methods. Intensive Care Med. 2012 Sep 15;38(9):14.

5646

Opioid sensitivity index estimated by vascular stiffness is highly correlated with blood pressure changes after skin incision

Nakamura R.[1], Kamiya S.[1], Saeki N.[1], Miyoshi H.[1], Tsutsumi Y.[1], Tsuji T.[2]
[1]Hiroshima University Hospital - Hiroshima (Japan), [2]Hiroshima University - Hiroshima (Japan)

Background and Goal of Study: Our research group previously introduced a vascular stiffness index «K,» by fitting a Lissajous curve between plethysmography (PLS) and invasive arterial pressure waveforms with a mechanical impedance model [1]. The rate of change of K for invasive stimulation demonstrated a rough inverse correlation with opioid dose; however, the degree of correlation considerably varied among individuals [2]. We confirmed that the threshold of stimulus intensity at which K changes based on opioid use, called minimal evoking current of K (MECK), is a more accurate index of opioid sensitivity than the rate of change of K. Here, we compared the correlation between blood pressure fluctuation after skin incision under opioid administration and MECs to demonstrate the superiority of MECK as an opioid sensitivity index.
Materials and Methods: Following IRB approval, we recruited patients aged ≥ 20 years scheduled for laparotomy. After anesthetisation, remifentanil was administered at a rate to ensure an effect-site concentration of pharmacokinetic simulation of 2 ng/mL. Consequently, 50 Hz of tetanus stimulation (10–80 mA) was applied to the patients' forearm for 5 s. Lowest current to introduce changes in each parameter was defined as the MEC of each parameter. Correlations between each MEC of K, of heart rate (HR), of systolic blood pressure (sBP), and of PLS, and the rate of change in SBP after skin incision were compared, respectively. Statistical analysis was performed by Pearson's correlation analysis (p=0.05).
Results and Discussion: We included 30 patients (15 men, 15 women, age=64.5 ± 13 years) in this study. MECK, MECHR, MECsBP, and MECPLS were 49.7±22.8 mA, 60.7±23.6 mA, 43.3±19.4 mA, and 45.7±23.1 mA, respectively. The sBP was 78 ± 14 mmHg and 91±17 mmHg, before and after skin incision, respectively. The correlation coefficient of MEC and the rate of change of sBP after skin incision was 0.62, 0.35, 0.49, and 0.35 (p=0.0002, 0.06, 0.006, and 0.06) for K, HR, sBP, and PLS, respectively.
Conclusion: Compared with other MECs, MECK was highly correlated with an increased rate of blood pressure due to a skin incision, indicating that arterial stiffness index «K,» proposed by us, was a superior index to evaluate opioid sensitivity.
References:
1. Sakane et. al. the Society of Instrument and Control Engineers, 2004.
2. Yanabe et al. Minerva Anestesiologica, 2018.

5725

Comparison between phase lag entropy and bispectral index using population pharmacodynamic analysis during target controlled infusion of propofol

Jeong S. W.[1], Lee S.[1], Jeong S.[1], Pyeon T.[1], Kang D.[1]
[1]Chonnam University Hwasun Hospital - Hwasungun (South Korea)

Background and Goal of Study: Monitoring the depth of anaesthesia with processed electroencephalogram (EEG) monitors has become a routine practice during general anesthesia. However, several limitations of those monitors have been discovered. PLE (Phase Lag Entropy) is a recently developed EEG-based anaesthetic depth measurement algorithm. In contrast to the classical methods, PLE additionally calculates diversity of the temporal dynamics of functional connectivity. We performed pharmacodynamic analysis to compare the performance of PLE to the bispectral index (BIS).
Materials and Methods: After obtaining written informed consent, we observed 18 adult patients scheduled for elective surgery under general anaesthesia. A PLE sensor and a BIS sensor were attached to a patient's forehead together before anaesthesia. For induction of anesthesia, propofol was administered with target-controlled infusion system using the Schnider model for propofol. The effect-site concentration (Ce) of propofol was increased to 2, 3, 4 and 5 μg/mL with an interval of 4 minutes, and Ce was decreased again to 3 μg/mL. The values of Ce, PLE and BIS were recorded simultaneously by each device, and the data were transferred to a computer after surgery. The pharmacodynamic parameters for PLE and BIS were estimated by NONMEM VII (Icon Development Solutions) by minimizing log likelihood. The relationship between Ce of propofol and PLE/BIS value was analyzed using a sigmoid Emax model. Interindividual random variability was modelled using a log-normal distribution, and residual random variability was modelled using an additive error model.
Results and Discussion: A significant ($P < 0.001$) correlation between PLE and BIS was found ($r2 = 0.837$, Pearson correlation coefficient). Pharmacodynamic modelling resulted in estimated E0 values equal to 85.9 (relative standard error [RSE] 0.9%) for PLE and 91.9 (RSE 0.97%) for BIS. Emax parameters were estimated to be 38.8 (RSE 9%) for PLE and 37.7 (RSE 7.5%) for BIS. Ce50 parameters were estimated to be 2.69 μg/mL (RSE 3.75%) for PLE and 2.73 μg/mL (RSE 3.77%) for BIS. Gamma parameters were estimated to be 6.79 (RSE 14.4%) for PLE and 8.20 (RSE 17.8%) for BIS.
Conclusion: Population pharmacodynamic models using sigmoid Emax model adequately described the responses of BIS and PLE to Ce of propofol. The overall performance of PLE and BIS during propofol anaesthesia seemed to be similar despite major differences in their algorithms.

5738

Acceleromyographic monitoring at the trapezius muscle requires higher dose of rocuronium for maintaining moderate neuromuscular blockade, thereby providing better surgical conditions compared to the monitoring at the adductor pollicis muscle: a prospective randomised controlled trial

Lim B. G.[1], Park S.[1], Kim Y. S.[1], Kim H.[1], Kong M. H.[1]
[1]Korea University Guro Hospital - Seoul (South Korea)

Background and Goal of Study: The adductor pollicis muscle is most commonly used to assess degree of neuromuscular blockade (NMB) during general anaesthesia. However, positioning for surgery can disturb access to the patient's hand, thereby compromising the acceleromyographic response at the adductor pollicis muscle. Therefore, we aimed to investigate feasibility and characteristics of acceleromyographic monitoring at the trapezius muscle using stimulation of the accessory nerve by assessing operating conditions and total dose of rocuronium

administered for providing moderate NMB during lumbar spine surgery in which NMB monitoring could be compromised by the prone position.
Materials and Methods: Fifty adult patients with ASA class 1–2 undergoing elective lumbar spine surgery were randomised to maintain train-of-four count 1–3 using acceleromyography applied in the adductor pollicis muscle (group A;n=25), or the trapezius muscle (group T;n=25). Total rocuronium dose administered during surgery, time to maximum block for an intubating dose of rocuronium 0.5mg kg-1, intubating conditions, lumbar retractor pressure, degree of lumbar muscle tone (good/moderate/hard), and overall surgical satisfaction score (1–10) were compared. Pain score and rescue opioid consumption in postanaesthesia care unit (PACU) and postoperative patient-controlled analgesia (PCA) consumption were also measured. A P value<0.05 was considered statistically significant.
Results and Discussion: Total rocuronium dose administered during surgery was significantly higher in group T than in group A. Lumbar retractor pressure and degree of lumbar muscle tone in group T were significantly lower than those in group A. Overall surgical satisfaction score in group T was superior to that in group A. The time to maximum block for an intubating dose of rocuronium was significantly shorter in group T than in group A. However, intubating conditions, pain score and rescue opioid consumption in PACU, and postoperative PCA consumption were not different between the two groups. It could be said that the deeper NMB due to higher dose of total rocuronium in group T enabled to make the better surgical environments.
Conclusion: Acceleromyographic monitoring at the trapezius muscle required higher dose of rocuronium for maintaining moderate NMB, thereby providing better surgical conditions compared to the monitoring at the adductor pollicis muscle during lumbar spine surgery under general anaesthesia.

5866

Does thumb preload and arm stabilization affect NMT measurements with electromyography? A pilot study

Rodiera Olivé J.[1], Silva Gil L.[1], Julián González S.[1], Callicó Ros F.[1], Juanola Galcerán A.[1], Ramirez Paesano C.[1]
[1]Centro Medico Teknon - Barcelona (Spain)

Background and Goal of Study: An accurate monitorization of neuromuscular transmission (NMT) is necessary to ensure optimal intraoperative neuromuscular blockade and avoid residual paralysis. When monitoring NMT with electromyography (EMG) the most common nerve–muscle unit used is the ulnar nerve–adductor pollicis muscle. It is commonly assumed that hand position does not affect EMG measurements. In other methods such as mechanomyography (MMG) and acceleromyography (AMG) it is well known that apply a preload or stretch is required to guarantee NMT reliable measures. Our study is aimed at identifying any changes in EMG monitoring when applying a preload or stretch on thumb.
Materials and Methods: Two GE monitors were used for EMG NMT monitoring over the ulnar nerve-adductor pollicis muscle. Measurements within two group (20 patients, N=10 each , ASA I-II) were analyzed. Group A had monitoring both arms with standard EMG setup. On Group B both hands had standard EMG setup but on left hand a thumb preload and arm stabilization was applied using a splint. Measurements were programed bilaterally and independently every 20 seconds using a 70mA current, and were automatically recorded. TOF Ratios (TOFR) were compared between hands with Bland Altman for statistical significance.
Results and Discussion: After the automatically recording of data, 400 pairs of measurements were randomly selected (20 pairs per patient) during induction and recovery. Group A showed no statistically relevant difference between both hands with a mean difference of -0.02 (0.11 to -0.15 95%CI). Mean difference on Group B was -0.15 (0.08 to -0.38 95%CI). Differences up to 30% of TOFR were observed during recovery phase. Analysis showed a tendency for faster changes in TOFR values in time on the splint arm that was congruent with subsequent changes on the arm with free movement.
Conclusions: Preload has been advocated as a measure of stabilization of NMT signal during quantitative monitoring by the Stockholm group, classically applied only to MMG and AMG. When analysing our EMG measurements, significant differences appear applying a thumb preload compared to the conventional set up. This prior results make us deliver if the EMG should incorporate as standard a thumb preload and an arm stabilization in order to obtain reliable NMT results. Further studies focusing on EMG with preload are needed before any definite conclusion can be given on its practical implications.

5962

The comparison of Flotrac/Vigileo system and GIS-Heartio, A Novel Monitor of Cardiac output

Li Y. T.[1], Shih P. Y.[1], Hung M. H.[1]
[1]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Traditionally, we use the pulmonary artery catheter to measure the cardiac output (CO). Nowadays, less invasive monitors become more popular. In this study, we use a novel wireless transthoracic sonography, on the basis of Doppler method, to monitor intra-operative CO. GIS-Heartio is aimed to measure the blood flow of the main pulmonary artery. By calculating the stroke volume and heart rate to estimate the right-side cardiac output. In this study, we would like to compare the two measurements, FloTrac and GIS-Heatio.
Materials and Methods: We included the patients undergoing colorectal surgery between December 2018 to December 2019 with criteria: (1) older than 20 years old, (2) ASA class I to III. Exclusion criteria are severe arrhythmia, emergent surgery, and allergy to OP sites. GIS-Heartio is placed in parasternal 2nd or 3rd intercostal space (Fig.1), with the best waveform, revealed on GIS application in a smartphone. The waveform and calculated CO are saved per one to five minutes. Meanwhile, the FloTrac/Vigileo system is used for intra-operative monitoring, which keeps recording measurements every 20 seconds. The Bland-Altman analysis is used to compare the two measurements. We use FloTrac as the gold standard in this analysis.
Results and Discussion: A total of 67 patients were included, and we picked up 30 patients in random with 1970 paired data of FloTrac and GIS-Heartio measurements. After exclusion of CO less than 2L/min, which are considered to be poor signals, 1715 paired data are left for analysis. The mean value is -2.7504, which may indicate an overestimation of CO in GIS-Heartio. The upper limit of difference between the two measurements is 1.5269(95% CI: 0.7594 to 2.6118), and the lower limit is -7.0277(95% CI:-8.1126 to -6.2602). Most of the data lie between the 1.96 standard deviations.Although the range of the standard deviations seems to be wide, most of the data from the same patient are clustered. Especially the data around the upper limit and the lower limit are from few patients. We consider that GIS-Heartio is not accurate enough as invasive methods, but is relevant to the measurements of FloTrac.
Conclusion: GIS-Heartio is a safe and non-invasive cardiac output monitor, which is feasible for patients with moderate risks. Although the accuracy can still be improved, it is relevant to the fluctuation of cardiac output.

6056

Effect of ACEI on cardiopulmonary bypass mean blood pressure and blood lactic acid level of hypertension atients receiving CABG

Wang L.[1], Ao H.[1]
[1]Peking Union Medical College, Fuwai Hospital - Beijing (China)

Background and Goal of Study: Debate has arisen on the omission of angiotensin-converting enzyme inhibitor(ACEI) type antihypertension drugs on operation day morning. Several Randomized Controlled Trials have shown that continue preoperative ACEI treatment increased the risk of hypotension, postoperative myocardial infarction and postoperative renal dysfunction on coronary artery bypass graft(CABG) patients. But the effect of ACEI compared with other antihypertension drugs or no drugs on the CPB Blood Pressure and Blood Lactic Acid(Lac) level of hypertension patients receiving CABG surgery is unknow.
Materials and Methods: We retrospectively collected 466 hypertension patients receiving isolated CABG surgery in Fuwai Hospital which were separating into 2 groups, ACEI group and no ACEI group(n=106 and 350). Statistical analysis was did by student t test, Chi square analysis, simple Linear Regression and Multiple Linear Regression with SPSS.
Results and Discussion: There's no significant difference between ACEI and no ACEI group on CPB mean Blood Pressure (60.09±9.83&60.75±11.77, p=0.799), level of Lac (1.3±0.53&1.24±0.45, p=0.277), intraoperative use of Noradrenaline and Dopamine or Dobutamine, Ventilation Time, ICU stay and postoperative hospital Stay.

Variables	No ACEI(n=350)	ACEI(n=106)	P Value
Age(y)	60.88±8.15	63.19±7.66	0.006*
BMI(Kg/m2)	26.21±3.31	26.21±3.39	0.938
Male (%)	76.30	66.00	0.0358*
MI History (%)	6.30	9.40	0.266
Left Main Diseases (%)	16.30	12.50	0.343
DM (%)	34.00	45.30	0.035*
Heart Failure (%)	0.90	0.00	0.339
Hyperlipidemia(%)	81.10	81.10	0.998
Periphral Artery Diseases (%)	8.30	2.80	0.054
Cerebral Vascular Diseases (%)	3.40	1.90	0.420
Smoke (%)	48.00	46.20	0.749
β Blockers (%)	12.00	17.00	0.184
Statins (%)	44.00	45.30	0.816
Aortic Occlusion Time(min)	74.44±25.29	72.98±25.43	0.577
CPB Time(min)	106.94±33.75	105.11±33.66	0.588
Sufentanil Dosage(ug)	377.21±68.98	370.57±64.44	0.378
Preoperative Hbg (g/L)	135.23±15.09	131.66±19.77	0.087
Intraoperative Fluid Input and Output			
Intraoperative Blood Loss(mL)	589.52±76.28	587.97±66.38	0.851
Pre-CPB Urine volume(mL)	191.62±187.79	202.5±188.27	0.55
Intra-CPB Urine volume(mL)	325.74±350.43	376.08±403.16	0.153
Post-CPB Urine volume(mL)	525.96±297.59	486.02±326.37	0.252
Intraoperative Fluid Infusion Volume(mL)	704.58±310.69	700.1±358.02	0.923
CPB Input Volume(mL)	1597.26±274.45	1606.61±340.98	0.863
Ultrafiltration Volume(mL)	1278.38±734.49	1156.75±677.11	0.146
Postoperative Fluid Infusion(mL)	2146.96±677.21	2136.83±773.26	0.93
Outcome			
Intra-CPB Blood Pressure(mmHg)	60.09±9.83	60.75±11.77	0.799
Postoperative Lac(mmol/L)	1.3±0.53	1.24±0.45	0.277
Intraoperative Noradrenaline (%)	6.6	3.80	0.285
Intraoperative Dopamine or Dobutamine(%)	69.7	71.70	0.696
Mechanical Ventilation Time(h)	979.26±765.05	970.3±532.32	0.904
ICU Stay Time(h)	3130.72±2167.9	2696.08±1893.9	0.062
Postoperative Hospital Stay(d)	7.56±3.67	6.87±3.1	0.105

Table 1. Baseline Characteristics and Outcome of Two Groups.

Linear Regression also showed no correlation between use of ACEI with CPB mean Blood Pressure, level of Lac. While Lac was associated with Intraoperative Noradrenaline.

Variables	Simple Linear Regression		Multiple Linear Regression	
	B Value	p Value	B Value	p Value
ACEI(%)	-0.069	0.277	-0.074	0.166
Male(%)	-0.085	0.167	-0.081	0.414
DM (%)	-0.098	0.082	-0.092	0.075
Periphral Artery Diseases (%)	-0.179	0.098	-0.174	0.078
Intraoperative Blood Loss(mL)	0.001	0.024*	0.001	0.064
Intra-CPB Blood	0.006	0.032*	0.005	0.132
Intra-CPB Urine volume(mL)	0.000	0.004*	0.000	0.004*

(a)Linear Regression for Postoperative Lac.

Variables	Simple Linear Regression		Multiple Linear Regression	
	B Value	p Value	B Value	p Value
ACEI(%)	0.292	0.799	0.054	0.962
Male(%)	0.89	0.418	2.139	0.051
DM (%)	-0.242	0.809	-0.288	0.769
Periphral Artery Diseases (%)	0.843	0.656	0.501	0.787
Intraoperative Noradrenaline (%)	-6.068	0.003*	-5.782	0.004*
Intra-CPB Urine volume(mL)	0.006	0.000*	0.006	0.000*

(b)Linear Regression for Mean CPB Blood Pressure.

The limitations of the present study include follows. This research is a retrospective design with moderate sample size. The assessment of Blood Pressure didn't count in the instability of BP.

Conclusion: Preoperative ACEI have no different influence on CPB Blood Pressure and Lac compared with other antihypertension treatment for hypertension patients under CABG surgery.

6066

Cerebral State Index (CSI), depth of anesthesia and Ramsey Score during plastic and ophthalmic surgery: is there a correlation?

Lambo M. S.[1], Pedrotti D.[2], Galante D.[3]
[1]Department of Anesthesia and Intensive Care Sulmona Hospital - Sulmona (Italy), [2]Department of Anesthesia and Intensive Santa Chiara Hospital - Trento (Italy), [3]Department of Anesthesia and Intensive Care Hospital G. Tatarella, Cerignola, Italy - Foggia (Italy)

Background: The purpose of this study was to evaluate the correlation between cerebral state index (CSI) and Ramsey score in determining the level of sedation in patients undergoing minor plastic surgery (1).

Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 46 patients, aged between 22 and 63 years, ASA I - II, undergoing plastic and ophthalmic surgery were treated. The anesthetic management, after the execution of regional anesthesia with levobupivacaine 0.5% was conducted with midazolam 0.01-0.02 mg/kg i.v. following to a bolus injection of propofol 1-1.5 mg/kg, up to a level of Ramsey Sedation score of 5-6 and a CIS value between 60 and 50. During the procedure were administered additional doses of 4-6 mg propofol to maintain the level of sedation. The respiratory assistance was performed with a facial mask, by administering a mixture of air/O2 (50%). The mean duration of surgical procedures was 68 ± 4.4 min. Additional drugs, side effects, the answer to surgical stimulation and the time of awakening were all recorded. The level of sedation was based on Ramsey Score with the values detected by continuous monitoring of the CIS.

Results: The mean CSI value detected 2 min after induction was 57 ± 4. At the maximum surgical stimulation CSI showed an increase of mean value of 60 ± 2. A significant correlation was observed between CSI values and Ramsey Score 5-6 ($p < 0.001$). For values of Ramsey score of 2-3 was not observed correlation with CSI values ($p = 0.3$) (Fig.1)

Discussion: Monitoring the state of consciousness is important to avoid excessive or inadequate sedation. The significant correlation between the assessment objective state of sedation using the CSI and the evaluation performed with the Ramsey Score allows an optimal adaptation of sedation.

Conclusions: The CSI technology, provides a simple way to monitoring the level of sedation especially during day surgery in which it is often difficult define the optimal level of sedation.

References:

1. Nishiyama T. Cerebral state index vs bispectral index during sevoflurane-nitrous oxide anaesthesia. Eur J Anesthesiol 2009; 26:638-42.

INCREASED P WAVE AMPLITUDE (%)	CVC TIP/ACJ DISTANCE (cm.)
25%	2.4±1.2 cm.
33%	1.8±1.0 cm.
50%	1.2±0.4 cm.

Table 1. ECG increased P wave amplitude vs CVC tip distancve from ACJ

6100

Transesophageal echocardiography as method to verify the correct ECG central venous catheter insertion

Lambo M. S.[1], Pedrotti D.[2], Galante D.[3]
[1]Department of Anesthesia and Intensive Care Hospital of Sulmona - Sulmona (Italy), [2]Department of Anesthesia and Intensive Care Hospital Santa Chiara - Trento (Italy), [3]Department of Anesthesia and Intensive Care Hospital G. Tatarella, Cerignola, Italy - Foggia (Italy)

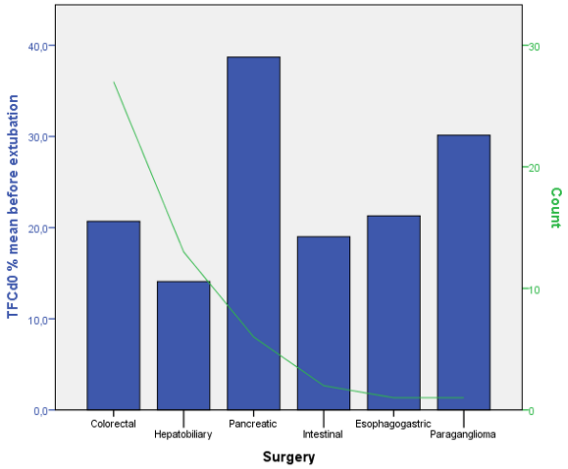
Background: The aim of the study is to demonstrate the validity of ECG guided CVC insertion. The amplitude of the P wave at ECG increases as we approach the atrio-caval junction (ACJ) and this method is more sensitive than the RX control.

Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. 64 adult patients, ASA I-II, mean age 62 ± 8 were enrolled. All CVC were placed into the internal jugular vein (VGI) or subclavian vein (VS) with ultrasound-guided puncture. The CVC 20 cm the maximum length was introduced with Seldinger technique. The clamp present on the connection cable for intra-cavity ECG derivation kit was connected to the same guide and then connected to the adapter kit for ECG. We observed the amplitude of the P wave at ECG increasing as we approached the atrio-caval junction (ACJ) to confirn the correct positioning of the CVC tip. A transesophageal echocardiogram (TEE) was

performed to obtain a further confirmation of the correct positioning of the CVC between the AVJ and the tipo of CVC.
Results: 55 CVC were positioned in right IGV while 9 in right SV. All CVC produced an increase in the amplitude of the P wave. Where the amplitude of the P wave has increased by 25% than normal, TEE scanning showed that the CVC tip was 2.4 ± 1.2 cm from the ACJ. Where the amplitude of the P wave has increased by 33%, the TEE scanning showed that the tip of CVC was 1.8 ± 1.0 cm from the ACJ. Where the amplitude of the P wave has increased by 50%, the tip of CVC was 1.2 ± 0.4 cm from the ACJ (Tab. 1). The thoracic RX described only summarily the presence of the catheter in the superior vena cava but not not explained the exact position relative to the gap.
Discussion: We demonstrated that the increase of the amplitude of the P wave detected by ECG, showed more precision about the correct position of the CVC tip without the need of the RX control.
References:
1. Pelagatti C. Endovascular electrocardiography to guide placement of totally implantable central venous catheters in oncologic patients. J Vasc Access 2011;12:348-53.

INCREASED P WAVE AMPLITUDE (%)	CVC TIP/ACJ DISTANCE (cm.)
25%	2.4±1.2 cm.
33%	1.8±1.0 cm.
50%	1.2±0.4 cm.

Table 1. ECG increased P wave amplitude vs CVC tip distancve from ACJ



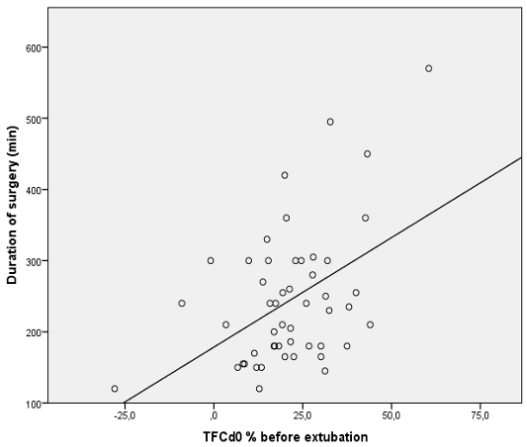
So, the response to surgical stress is related to the extent of tissue damage. Some risk factors identified in literature are: duration of surgery, extent, size of the incision and location.
Conclusion: TFC during the intraoperative period could be a useful tool when estimating lung damage secondary to surgical stress.

6139

Variation of thoracic fluid content: a parameter for monitoring surgical stress in major abdominal surgery

Martín Serrano P.[1], Alday Muñoz E.[1], Planas Roca A.[1], Nieves Alonso J. M.[1], Martín Pérez M. E.[1]
[1]Hospital de la Princesa - Madrid (Spain)

Background and Goal: Pulmonary complications in abdominal surgery may be related to anesthesia, mechanical ventilation, tissue damage secondary to surgical aggression, etc. Our objective was to measure the association, using a bioredactance monitor, of surgical stress and damage to glycocalix, and its contribution to lung damage.
Materials and Methods: A prospective observational study was conducted with 50 patients undergoing scheduled abdominal surgery. These were of different degrees of surgical stress. Monitoring with the non-invasive hemodynamic monitor (Cheetah) was performed prior to anesthetic induction. The fluid therapy was done guided by objectives, using the systolic volume value provided by the monitor. The mechanical ventilation was protective and controlled by volume. TFC (Thoracic Fluid Content) values were collected before and after orotracheal intubation, and at the end of the surgery. Also, surgery data: such as its type and duration. They were analyzed using IBM SPSS Statistics program, and Pearson and ANOVA parametric tests.
Results and Discussion: We found no difference between baseline TFC mean values (48.12; SD:22.19) and TFC after intubation (48.37; SD:23.25), while at the end of surgery (TFCd0%) this presented a value of 57.19 (SD:19.81). A longer duration of surgery was correlated with a greater variation of TFCd0% (r=0.47; p=0.001).



Depending on the type of surgery, TFCd0% increased; being 38.70% (SD:13.36) in a surgery of very high surgical stress, such as pancreatic, while in those of medium stress it was lower (p=0.02).

6150

Residual neuromuscular blockade and temperature: the impact of perioperative hypothermia

Fernandes A. L.[1], Lopes M.[1], Mendonça M.[1], Costa D.[1], Zenha S.[1], Freitas S.[1]
[1]Hospital Central do Funchal - Funchal (Portugal)

Background and Goal of Study: Besides being associated with a series of postoperative complications1, hypothermia has the potential to influence the pharmacokinetics of multiple drugs used in anaesthetic practice, namely neuromuscular blocking agents2. Residual neuromuscular blockade (RNMB) is a known postoperative complication, associated with an increased risk of patient morbidity and mortality3. The aim of this study was to evaluate the incidence of RNMB in our post-anaesthesia care unit (PACU) and its association with perioperative hypothermia.
Materials and Methods: After approval from the ethics committee, 104 adults who met the inclusion criteria were enrolled in the study. The patients' temperature was recorded in the preoperative (T1), intraoperative periods (T2) and after admission in the PACU (T3). The train-of-four ratio (TOFr) was recorded in the PACU, and RNMB was considered if TOFr average was lower than 0.9 after 3 measurements. Posterior analysis was done to evaluate the correlation between the variables using the Mann-Whitney test.
Results and Discussion: The median pre-operative, intra-operative and PACU temperatures recorded were 36.2ºC, 35.9ºC and 35.6ºC, respectively. In the studied population, RNMB incidence was 16.3%. T2 and T3 were significantly lower in the population with TOFr < 0.9 (35.65ºC vs. 36ºC, p=0.008 and 35ºC vs. 35.7ºC, p=0.000, respectively).
Conclusion: Temperature plays a key role in the anaesthetic management of patients because of its implications on multiple outcomes, from increased myocardial rate to higher incidence of wound infection1. It also influences the pharmacokinetics of multiple drugs, like neuromuscular blocking agents, delaying its metabolism2. In this study, patients with RNMB in the PACU recorded lower temperatures both in the intraoperative and postoperative periods. Since RNMB is potentially responsible for multiple complications in the PACU3, temperature monitoring and normothermia must be a crucial anaesthetic concern.
References:
1. Lee HJ et al. The influence of mild hypothermia on reversal of rocuronium-induced deep neuromuscular block with sugammadex. BMC Anesthesiol 2015.15,7.
2. Heier T et al. Impact of hypothermia on the response of neuromuscular blocking drugs. Anesthesiol 2006.104.1070-80.
3. Hunter JM. Reversal of residual neuromuscular block: complications associated with perioperative management of muscle relaxation. BJ Anaesth 2017.119.I53-62.

4451

SVV-directed fluid therapy improves cardiovascular status for renal failure patients undergoing parathyroidectomy

Bu T.[1], Wang L. F.[1], Pan Q.[1], Zhang Q.[1], Yin Y. Q.[1]
[1]*China-Japan Friendship Hospital Beijing - Beijing (China)*

Background and Goal of Study: Poorly managed renal failure(RF) and long-term dialysis leads to secondary hyperparathyroidism(SHPT). Parathyroidectomy(PTx) for SHPT has high cardiovascular risk. Fluid therapy strikes a tricky balance. So far there's no ideal volume response parameter. Stroke volume variation(SVV), applied for fluid therapy in high risk patients, is calculated through arterial pressure waveform influenced by respiration. This study is to evaluate SVV-directed fluid therapy for PTx in patients with RF.
Materials and Methods: A single-center randomized controlled trial enrolled RF patients scheduled for PTx from May 2018 to April 2019(Clinical Trial Registration Number:ChiCTR1800019009). Patients were randomized into control(CON) group and SVV group. For SVV group, SVV and cardiac output(CO) were obtained by Vigileo/Flotrac monitor. Patients in SVV group were infused 3mL/kg of 0.9% saline in every 5 minutes until SVV≤10%. CON group followed routine fluid restriction. As remedy, vasopressors were available to maintain SBP≥90mmHg or MAP≥65mmHg, or CI 2.5-4.5(L/min/m2). Inferior vena cava(IVC) diameter was measured in M-mode ultrasoundand and ΔIVC was calculated as (IVCmax-IVCmin)/IVCmax*100%. In CON group, CO was estimated following Liljestrand-Zander formula:CO=(SBPmean-DBPmean)/(SBP+DBP)*HR. Power of BP fluctuation was calculated as coefficient of variation(CV)=[standard deviation of MAP]/MAP. Primary outcome was peri-operative hemodynamic stability, secondary outcome was morbidity and mortality 30 days after surgery. Data were presented as mean(SD) or median(25%, 75%).
Results and Discussion: 121 patients were enrolled(Table 1). Patients in SVV group exhibited better volume status. BP were more stable within 24 hours after surgery, with higher CO, lower serum lactic acid(cLAC), and more patients achieved ΔIVC<50%. Post-operative complication in 7 days also decreased. There was no significant correlation between SVV and ΔIVC.

Table 1. Pivotal parameters during PTx for SHPT patients and peri-operative outcomes

	Parameters		CON	SVV	p
pre-operative		cLAC (mmol/L)	1.09(0.47)	1.37(0.60)	0.063
		ΔIVC	0.40(0.14)	0.44(0.15)	0.155
intra-operative	BPV	$CV_{induction-5hrpost-op}$	11.99(9.71,15.84)	10.44(7.31,12.62)	0.029*
		$CV_{induction-12hrpost-op}$	12.93(8.58,21.03)	9.80(6.70,12.66)	<0.001**
		$CV_{induction-24hrpost-op}$	14.28(9.03,20.42)	9.77(7.01,12.21)	<0.001**
	vasoactive agent	Noradrenaline (μg)	27.70(69.34)	22.18(68.24)	0.533
		Ephedrine (mg)	4.43(0, 7.28)	2.00(0, 5.37)	0.012*
		saline infusion (mL)	250(180,350)	485(300,650)	<0.001**
post-operative		proportion of ΔIVC<50%	15%	28%	0.016*
		cLAC (mmol/L)	1.30(0.52)	0.97(0.40)	<0.001**
		CO (L/min)	5.09(3.86,7.16)	6.86(5.14,7.98)	0.001**
		length of hospital stay (day)	4.9(1.6)	4.2(1.5)	0.059
		incidence of post-op complications# within 7days	53.1%	33.3%	0.046*
		incidence of re-hospitalization	26.4%	20.4%	0.475

ΔIVC, respiratory variation in inferior vena cava. CON, control group. SVV, SVV-directed fluid therapy group. BPV, blood pressure variability. CV, coefficient of variation. $CV=SD_{MAP}/MAP$. CO, cardiac output.
post-operative complications: hypocalcemia, hyperkalemia, hypertension, hypotension, myocardial ischemia and arrhythmia, etc.
*p<0.05, **p<0.01.

Conclusion: It is proposed for the first time, for RF patients undergoing PTx, SVV-directed liquid titration could correct volume-deplete state and reduce postoperative complications, with no known long-term adverse effects.

4323

Automated clinical alert systems can improve anesthesia documentation: a retrospective cohort study

Tollinche L.[1]
[1]*Memorial Sloan Kettering Cancer Center - New York (United States)*

Background and Goal of Study: Clinical alert systems have been used to analyze deviations from hospital standards in the electronic medical record to identify missing documentations and send alerts to the appropriate providers to increase adherence to required elements. To improve compliance, an alert system for documentation of the Immediate Preoperative Assessment was implemented at our institution in August 2018 with the goal of improving documentation compliance rates. We hypothesized that implementation of this alert system would increase the compliance of on-time documentation of the IPOA.
Materials and Methods: An initial data query in our institutional data warehouse was made for all patients who had a completed anesthetic during our study period. This date range corresponded to 6 months before and after August 2nd, 2018, the date when the IPOA alert was implemented and the anesthesiology department. The following analyses were performed: testing the proportion of cases compliant with on-time documentation of the IPOA pre- versus post-implementation for the full cohort and among subsets of interest, testing the time when the IPOA was completed relative to anesthesia end, and testing whether time of day of when surgery occurred had an impact on the time when the IPOA was completed relative to the drapes off/IPOA alert sent time. The proportion of compliance for pre- versus post-implementation was tested by Chi-square test.
Results and Discussion: Through retrospective chart review of electronic patient records, 47,417 cases matched our inclusion criteria of patients that had a completed anesthetic between February 2nd, 2018 to February 2nd, 2019. In total, we excluded 5132 cases. The compliance rate of IPOA completion increased from 76% to 88% (P < 0.001) before and after the alert implementation date. In the initial month following alert implementation, the compliance rate immediately increased to 83% and stayed in the high 80's for the balance of the study period.
Conclusion: We demonstrate that automated Clinical Alert Systems operating via a single page notification can improve the compliance rate for documentation of key anesthesia events and that this observation is sustained six months after the implementation date. Improvement in compliance is highest in shorter cases and cases that occur early in the day.

4327

Under-representation of women in leadership roles: An overview of the Spanish gender imbalance

Aliaño M.[1]
[1]*Clinica Universidad de Navarra - Madrid (Spain)*

Background and Goal of Study: Publications of diverse medical specialties confirm that women are under-represented in leadership positions in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.
Materials and Methods: Anonymous survey sent to Spanish anaesthesiologists between March 2018 and November 2018.
Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). When asking about having ever been in a leadership position, 46.2% of men answered affirmatively compared to 25.2% of women (P<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.8% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (p<0.001). In addition, a greater proportion of men accepted the offered position, 61.5% of men vs 50.5% of women (P>0.05). The results of the survey show that the percentage of men who hold hospital man-agement or leadership positions is significantly higher than that of women. When we compare our results with the numbers from public hospitals given by Spanish Society of Anesthesiology (SEDAR), the percentages are quite similar. Around 74% of the head of department positions in anaesthesiology are held by men in Spain. In addition, the representation of women in the executive committee of the Spanish Society of Anaesthesia is very low, only one out of seven positions is held by a woman. Further-more, since its foundation in 1953, the president has always been male.
Conclusion: The results of this study show that women are under-represented in leadership positions in Spain.

4327

Under-representation of women in leadership roles: An overview of the Spanish gender imbalance

Aliaño M.[1]
[1]Clinica Universidad de Navarra - Madrid (Spain)

Background and Goal of Study: Publications of diverse medical specialties confirm that women are under-represented in leadership positions in the medical field. The aim of this study is to determine whether this imbalance also exists in Anaesthesia in Spain.
Materials and Methods: Anonymous survey sent to Spanish anaesthesiologists between March 2018 and November 2018.
Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). When asking about having ever been in a leadership position, 46.2% of men answered affirmatively compared to 25.2% of women (P<0.001). About twice as many men as women have held a head of department position, been a section chief, or a surgical coordinator. 70% of respondents answered that their head of department is male. 21.8% of male respondents communicated that they have been offered a head of department position compared to only 9.7% of women (p<0.001). In addition, a greater proportion of men accepted the offered position, 61.5% of men vs 50.5% of women (P>0.05). The results of the survey show that the percentage of men who hold hospital man-agement or leadership positions is significantly higher than that of women. When we compare our results with the numbers from public hospitals given by Spanish Society of Anesthesiology (SEDAR), the percentages are quite similar. Around 74% of the head of department positions in anaesthesiology are held by men in Spain. In addition, the representation of women in the executive committee of the Spanish Society of Anaesthesia is very low, only one out of seven positions is held by a woman. Further-more, since its foundation in 1953, the president has always been male.
Conclusion: The results of this study show that women are under-represented in leadership positions in Spain.

4328

Individual perceptions among Spanish anaesthesiologist regarding gender discrimination at workplace

Aliaño M.[1]
[1]Clinica Universidad de Navarra - Madrid (Spain)

Background and Goal of Study: Publications of diverse medical specialties confirm that gender differences still exist in the medical field. The aim of this study is to determine whether this misbalance also exists in Anaesthesia in Spain.
Materials and Methods: Anonymous survey sent to Spanish anaesthesiologists between March 2018 and November 2018.
Results and Discussion: Completed surveys were received from 1619 respondents which represents 17.6% of the total number of anaesthesiologists in Spain; 654 respondents were male (40.4%) and 965 were female (59.6%). Among women´s perceptions, 36.3% of female respondents believe that they have lost opportunities for promotion because of their gender; 60% of them think that this situation is frustrating. 39.2% of women were afraid that their contract would not be renewed if they become pregnant. In addition, 10% of women suspect that their pregnancy resulted in none renewal of their contract. 33.8% of participants consider that female anaesthetists are treated differently in the workplace: The majority of respondents (85.2%) reported that patients are more polite to male practitioners than females. Almost half of women surveyed (46%) reported that gender discrimination in their workplace exists. Workplace discrimination has been discussed extensively and it is also evident in this study. Both respondents, men and women, have reported perceptions of workplace gender-based discrimination. Female physicians feel that their colleagues, patients, and nursing staff treat them differently. This situation is considered a social problem; it has been linked to the term «unconscious gender bias» which refers to women being treated differently than men, and to having different expectations placed on them without any realization of this bias. Although the analysis of possible solutions to eliminate gender disparity is not the aim of this study, it cannot be overlooked. Certain measures which could help include identifying current barriers for women within the workplace, and subsequently developing and implementing action plans to combat this. These programs could help with women's leadership development at any level and include work-life support.
Conclusion: The global perception of the respondents of this survey shows that gender differences also exist in the workplace in anaesthesia in Spain.

4443

Coffee consumption – do young anaesthesiologists drink as much as rumour has it?

Blacker C.[1], Abela G. P.[2], Duranteau O.[3], Risberg E.[1]
[1]Uppsala University Hospital - Uppsala (Sweden), [2]Mater Dei Hospital - Msida (Malta), [3]Hopital Erasme - Bruxelles (Belgium)

Background and Goal of Study: Traditionally, anaesthesiologists are considered as avid coffee consumers and this impression, although questioned, continues to be propagated. 1,2 This study investigates coffee consumption among young European anaesthesiologists and attempts to indicate if coffee consumption is related to the doctor's level of experience, working out-of-hours and reporting not getting enough rest while doing so.
Materials and Methods: A questionnaire was written up and this included questions on the number of coffee cups consumed in one day, the number of years working in anaesthesiology and if the responder is a trainee or a specialist, if they work out-of-hours and if they get enough rest. A young anaesthesiologist was arbitrarily defined as a doctor working in anaesthesiology for 10 years or less. The questionnaire was published on the ESA Trainee Network Facebook page, an online network which connects European trainees in anaesthesiology and intensive care. The post remained active for 24 hours and generated 286 responses. Responses were filtered and the remaining 231 were analysed using R.
Results and Discussion: Coffee consumption in this cohort was a median of 3 cups/day (IQR 3). Mean age among responders was 29.8±3.5 years and 34.6% were trainees while 61.0% were specialists. Mean anaesthetic experience was 4.0±2.3 years with 92.6% of participants working out-of-hours. 44.1% "rarely" get enough rest, 40.3% "sometimes" and 8.2% "never". There was no statistical difference between the number of coffee cups consumed by specialists or trainees (p=0.59), those working out-of-hours or not (p=0.33), those getting rest or not (p=0.72) or with increasing working experience (p=0.11). Coffee consumption in this cohort is similar to that found by Do et al, who discuss how coffee does not alter reported work satisfaction.
Conclusion: Coffee consumption among young European anaesthesiologists appears to be moderate and the factors studied do not seem to be related to it.
References:
1. Do HQ, Granholm A, Ellekjaer KL, et al. Coffee consumption and work satisfaction among Scandinavian anaesthesiologists: A survery. Acta Anaesthesiol Scand. 2019;63:414–417.
2. Giesinger K, Hamilton DF, Erschbamer M, Jost B, Giesinger JM. Black medicine: an observational study of doctors' coffee purchasing patterns at work. BMJ 2015; 351: h6446.

4769

Oxidative stress and antioxidant effects in medical residents occupationally exposed to anaesthetics

Braz L. G.[1], Aun A.[1], Figueiredo D.[1], Silva M.[1], Sotero N.[1], Braz M.[1]
[1]Department of Anaesthesiology, Universidade Estadual Paulista (Unesp), Botucatu, Brazil - Botucatu (Brazil)

Background and Goal of Study: Occupational exposure to waste anaesthetic gases may be associated with toxic effects. Medical residents are a special category of physicians whose occupational and personal well-being are of major concern worldwide. The aim of this study was to monitor oxidative stress in physicians occupationally exposed to anaesthetics during their medical residency. We hypothesized that changes in oxidative/antioxidative markers would occur during the specialization period.
Materials and Methods: The study was approved by the local IRB and all the subjects signed the informed consent. This follow-up study included 23 young physicians who worked in operating rooms and were occupationally exposed to the waste anaesthetics gases (isoflurane, sevoflurane, desflurane and nitrous oxide) during their medical residency in anaesthesiology or surgery in a Brazilian university hospital. Fasted blood samples were collected at three time points, as follows: before the start of the medical residency program (before exposure; the residents were their own control), in the first year and in the second year of medical residency. Oxidative stress markers were monitored in these three time points to assess lipid peroxidation (malonaldehyde; MDA) and oxidative DNA damage, in addition to antioxidant capacity, which were evaluated by repeated measures analysis followed by Duncan test. Additionally, the trace concentration of the anaesthetics were measured in the physician's breathing zone by a portable infrared analyzer.
Results and Discussion: All the anaesthetic concentrations were above the recommended limit established by the National Institute for Occupational Safety and Health (NIOSH, USA). The results showed a progressive increase in MDA ($p < 0.0001$) and oxidized DNA bases ($p < 0.001$) at the first and second years of exposure. In addition, the antioxidant defense enhanced at the first and second years of exposure ($p < 0.0001$). The findings suggest that high concentrations

of waste anaesthetic gases found in unscavenged surgical theatre is related to oxidative stress in young physicians during their specialization.
Conclusion: Exposure to inhaled anaesthetics in an inadequate workplace is associated with oxidative stress in physicians during a 2-year period of medical residency. Therefore, this study emphasizes the need to minimize this occupational exposure.
Acknowledgements: FAPESP (2018/20143-4).

4800

Cooperation and anesthesia. Anesthesia in turkana

González Cibrián C. C.[1], Mané Ruiz N.[2], Montiel Carbajo M.[2], Flores Cajal B.[2], Rodriguez Velasco G.[2], Mendia Conde E.[2]
[1]Hospital Ramon Y Cajal - Madrid (Spain), [2]hospital Ramón y Cajal - Madrid (Spain)

Goal of Study: Turkana is a 77000 square kilometres region, located in the northwest of Kenya. The last reports said that it counts with 900000 habitants; 60% of them are nomads, 35% are semi-nomads and 5% live in urban settlements. Doctor-patient ration is one doctor for each 74000 patients, even though most of them cannot approach one because of its location. The poverty index is 94% due to the isolation, the drought, and its geographical location. Those conditions made a group of Spanish doctors, along with some priests living in the area, to go there for a surgery mission in 2004 with three general surgeons, one fellow and one nurse. Last campaign in 2019 it was a group of 9 surgeons (general surgeons, maxillofacial surgeons, traumatologists, gynecologists), 2 fellows, 4 students and 2 anesthesiologists. They saw 613 patients, performed 202 surgeries, with a total of 127 anesthesia procedures. We want the world to know the job there.
Materials and Methods: We recorded all the patients coming to the surgery room. Of those who underwent some type of anesthesia we wrote down the demographical data (56,7% of men and a median of 13 years old), along with the estimated weight and height . We also recorded the type of anesthesia, the surgical procedure and speciality that performed it, the dosage in case it was regional anesthesia and the coadyuvan drugs we had to use to sedate the patients or to administer some extra analgesia.
Results: There were 127 anesthesia procedures: 55,9% were general anesthesias, 30,7% were spinals with 8,7% sedation needed; 2 patients (1,6%) received regional echo guided anesthesia; 3,1 % only needed sedation. Surgeries were 52% done by general surgeons, 18,9% by traumatologists, 11,8% by maxillofacial surgeon and 17,3% by gynecologist including some urgent cesarean sections. This past year there were 54 patients under the age of 10, 28 of them under 3 years. Clefts were the most common pathology between the kids with 15 children having there lips and palates repaired. Referring regional anesthesia, we found that the dosage of intradural anesthesia was much larger than expected with 2,41 mL of average of hyperbaric bupivacaine for an average weight of 54,8 kilograms for those patients.
Conclusion: Performing anesthesia in a non developed country is always a challenge. We have been doing a rising number of procedures and we consider important to start registering those data.

5148

Gender equity in departmental leadership, research opportunities, and clinical work attitudes: perceptions from German-speaking anaesthesiologists

Berger-Estilita J.[1], Noronha B.[2], Osinova D.[3], Zdravkovic M.[4]
[1]Inselspital Bern - Bern (Switzerland), [2]Paracelsus Medical University - Salzburg (Austria), [3]Jessenius Faculty of Medicine in Martin, Comenius, University Bratislava, University Hospital Martin - Martin (Slovakia), [4]University Medical Centre Maribor - Maribor (Slovenia)

Background and Goal of Study: There is a paucity of data available on gender differences in promotion of anaesthesiologists in Europe1. We aimed to define the perception of gender equity among German-speaking anaesthesiologists in the areas of departmental leadership, research, and attitudes in the clinical workplace.
Materials and Methods: We performed an internet-based survey to investigate career opportunities in leadership and research among anaesthesiologists. The survey instrument was piloted and uploaded to the SurveyMonkey® platform. Participant consent and ethical approval were obtained. Quantitative analysis was done with Chi-square and Cramer's V as a measure of the strength of associations (p significant when <0.05).
Results and Discussion: There were 818 respondents from Austria, Germany and Switzerland. The mean age of respondents was 42 ± 10 years and 47% of respondents were female. Overall, women anaesthesiologists in these countries represent 48% ± 15% of the departmental workforce. Women were equally driven to take any leadership position and do research at their departments. However, gender was self-reported as a disadvantage for leadership (P<0.001, Cramer's V: 0.63) and research (P<0.001, Cramer's V: 0.51). The current head of the department was reported to be a female in 5.6% and the immediate-past head was a female in 9.9%. Similarly, 4.4% of female respondents reported being a current or past head of the department compared to 17.1% of male respondents. Females were also more likely to be mistreated in the workplace (OR 9.2, 95% CI 6.0-14; P<0.001), most commonly by surgeons. Women spent somewhat less time investing in their career (P<0.001, Cramer's V: 0.26).
Conclusion: We characterised current gender inequity perceptions among German-speaking anaesthesiologists. Women still feel harmed in the promotion of leadership positions and research possibilities within our speciality. There is a high proportion of women who reported having been mistreated at work.
References:
1. Haller G, Delhumeau C, Mamie C, Zoccatelli D, Clergue F. Gender difference in career advancement and job satisfaction in anaesthesia: A cross-sectional study. Eur J Anaesthesiol 2016; 33: 588-90.
2. Fisler N, Sweitzer BJ, Wurz J, Kleiman AM, Stueber F, Luedi MM. Achieving Gender Parity in Acute Care Medicine Requires a Multidimensional Perspective and a Committed Plan of Action. Anesth Analg 2019.

5497

Practice of documenting pre-anaesthesia assessment chart in regional teaching hospital. A concern for patient safety

Talreja V. K.[1]
[1]Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)

Background and Goal of Study: Detailed pre-anaesthetic evaluation, proper and detailed documentation, record keeping for easy access is prime responsibility of every anaesthesiologist. Proper and complete documentation is extremely essential for improving patient's outcome and for medico-legal aspects. It is also a marker of provision of quality care.
Objective: To identify the quality of preoperative assessment and documentation of patients coming for elective or emergency surgery. The required information including history, examination and investigations and other applicable information.
Materials and Methods: Design, setting and participants: Prospective audit of medical records of 100 patients following all kinds of surgical procedures in our hospital during period of one month, data collected by all authors in their own area of work daily.
Results and Discussion: During the study period total of 100 patients' charts were reviewed, no chart was found completely filled. The most (>90%) completed documentation was of the information addressogram, allergies (even with not any), airway examination and ASA classification. Major (<50%) lack of information was found of pre-operative vital signs, timings of empty stomach pre-operatively, BMI, lab investigations and name of the surgeon. The variables like radiology examination, ECG, weight, procedure to be done, past medical or surgical history and ongoing medications were not reported in between percentages of 22-48%. There was no significant difference between the trends for elective or emergency surgeries irrespective of daytime or out of hours surgeries.
Conclusion: Main recommendations: The pre-operative assessment and documentation of the patient's general health and previous conditions are of utmost importance for anaesthetist, not only for planning and provision of safe conduct of anaesthesia and post-operative management, also for medico-legal matters. More emphasize on comprehensive documentation of all information and refreshing the importance of documentation achieved is highly recommended.

5498

Practice of documenting pre-anaesthesia assessment chart in regional teaching hospital. A concern for patient safety

Talreja V. K.[1]
[1]*Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)*

Background and Goal of Study: Detailed pre-anaesthetic evaluation, proper and detailed documentation, record keeping for easy access is prime responsibility of every anaesthesiologist. Proper and complete documentation is extremely essential for improving patient's outcome and for medico-legal aspects. It is also a marker of provision of quality care.
Objective: To identify the quality of preoperative assessment and documentation of patients coming for elective or emergency surgery. The required information including history, examination and investigations and other applicable information.
Materials and Methods: Design, setting and participants: Prospective audit of medical records of 100 patients following all kinds of surgical procedures in our hospital during period of one month, data collected by all authors in their own area of work daily.
Results and Discussion: During the study period total of 100 patients' charts were reviewed, no chart was found completely filled. The most (>90%) completed documentation was of the information addressogram, allergies (even with not any), airway examination and ASA classification. Major (<50%) lack of information was found of pre-operative vital signs, timings of empty stomach pre-operatively, BMI, lab investigations and name of the surgeon. The variables like radiology examination, ECG, weight, procedure to be done, past medical or surgical history and ongoing medications were not reported in between percentages of 22-48%. There was no significant difference between the trends for elective or emergency surgeries irrespective of daytime or out of hours surgeries.
Conclusion: Main recommendations: The pre-operative assessment and documentation of the patient's general health and previous conditions are of utmost importance for anaesthetist, not only for planning and provision of safe conduct of anaesthesia and post-operative management, also for medico-legal matters. More emphasize on comprehensive documentation of all information and refreshing the importance of documentation achieved is highly recommended.

6173

Postanaesthetic visits recording: benefits and obstacles

Panteleou K.[1]
[1]*Hippokrateio General Hospital of Thessal - Thessaloniki (Greece)*

Background and Goal of Study: Postanesthetic visits (PAVs) allow detection of anesthesia related complications and increase patient satisfaction.However, limited information is available regarding current practice of PAVs. Goal of our study was to record and evaluate PAVs.
Materials and Methods: A PAV service was initiated in our deparment,in January 2018. Anesthesiologists should record in the PAV book any performed surgical anesthesia by date, patient's name and age, type of surgery, anesthetic technique, anesthesiologist's and surgeon's name. PAV should be performed within 24 h recording pain, PONV, sensory/motor block and other potential complication.
Results and Discussion: We analysed PAVs for cesarean sections (CS) for the year 2018. Just 761 CS (67%) were recorded in the PAV book out of 1139 registered in the formal archive. PAV was performed only to 421 patients (55%). From our data analysis it occured that regarding anesthesia technique, general anesthesia (GA) was carried out in 95 parturients (12%). Among them, 5 were epidurals for vaginal delivery that failed to convert to surgical anesthesia and 17 were incomplete spinals. Regional anesthesia (RA) was performed to 666 parturients(88%); 604 spinals, 59 epidurals, 3 compined spinal-epidurals. Pain ≥ 5 was recorded in 79 patients (19%); 73 after spinal and 6 after GA. PONV was reported by 8 patients (8%); 7 after spinal and 1 after GA. Sensory/motor block was recorded in 3 patients after RA. It became evident that extra record keeping, lack of time, emergency situations and lack of personnel impeded regular PAVs, even with a dedicated service. On the other hand, PAVs contributed to detection of complications, facilitating their management. Additionally, the recorded data were used to guide future practice. GA reduction was considered a measure of quality improvement along with the need for more effective postoperative pain management. Furthermore, the observed absence of post dural puncture haedache emerged as avery positive outcome.
Conclusion: Recording and analyzing PAVs may establish or guide changes in current anesthetic practice aiming to improve quality. Lack of technical and personal facilities seems to be major obstacles for adoption in every day practice.
References:
1. Fink T et al. Rev Bras Anestesiol 2017;67(6):5.

4338

A successful anesthetic management without muscle relaxants in a patient undergoing re-scheduled surgery after intraoperative anaphylaxis due to rocuronium

Yasui M.[1], Kawagoe I.[1], Kataoka K.[1], Mitaka C.[1], Satoh D.[1]
[1]*Juntendo University Hospital - Bunkyoku (Japan)*

Background: Perioperative anaphylaxis is mostly induced by non-depolarizing muscle relaxants (1, 2). We report a successful anesthetic management without muscle relaxants in a patient with an anaphylaxis history due to rocuronium.
Case Report: A 73-year old male patient was diagnosed as gallbladder cancer and was scheduled for extended cholecystectomy. He had no history of general anesthesia or allergy except for skin redness by povidone-iodine. In the first surgery, after insertion of an epidural catheter with lidocaine, remifentanil, propofol and rocuronium were used for induction. Immediately after intubation, a remarkable hypotension of 30mmHg in systolic refractory to ephedrine and phenylephrine was observed, which developed into cardiac arrest. He was successfully resuscitated with epinephrine, and after resuscitation, a pale redness on the chest was observed. An emergent TEE examination revealed temporary basal diffuse hypokinesis with LVEF of 35%, which was not compatible with the findings of ischemia. Judging from the sudden hypotension and the redness, anaphylaxis was suspected. The surgery was suspended and he was transferred to ICU. The measurements of histamine, tryptase, and IgE antibodies of the medications used during the surgery were within normal range and negative, but rocuronium was found positive with the pin prick test. We had a thorough discussion and planned the anesthetic method for the second surgery after two months. In the second surgery, 0.75% of ropivacaine was used for the purpose of epidural analgesia and abdominal muscle relaxation, while remifentanil and midazolam were used for general anesthesia. Sevoflurane was also used to support muscle relaxation. The surgery was successfully completed and he discharged with no complications.
Discussion and Learning points: Since the common chemical structure of non-depolarizing muscle relaxants is also included in the daily materials such as shampoo (3), patients may possibly be sensitized in daily life, making it hard to predict intraoperative anaphylaxis from the anesthetic history. Appropriate diagnosis, effective treatment, and careful planning for the future anesthesia for patients with perioperative anaphylaxis history are important.
References:
1. Masuda K. Perioperative erythema•anaphylaxis. Allergy 2018.
2. J.Miller et al. Outcome of repeat anesthesia after investigation for perioperative anaphylaxis. BJA 2018.
3. Horikawa T. Drug-induced anaphylaxis. Allergy 2016.

4511

Incidence of Postoperative Residual Neuromuscular Blockade - A Multicenter, Observational Study in Portugal (INSPIRE 2)

Esteves S.[1], Correia De Barros F.[1], Nunes C. S.[2], on behalf of INSPIRE[2] Group - Andreia Puga; Blandina Gomes; Catarina S Nunes; Fernando Abelha; Filinto Correia de Barros; Humberto Machado; Milene Silva; Nuno Fernandes; Paula Vitor, Sandra Pereira; Simao Esteves; Teresa Lapa; Vitor Pinho-Oliveira
[1]*CHUP - Centro Hospitalar Universitario do Porto - Porto (Portugal),* [2]*Universidade Aberta, Departamento de Ciências e Tecnologia, Delegação do Porto; CHUP - Centro Hospitalar Universitario do Porto - Porto (Portugal)*

Background and Goal of Study: Residual neuromuscular blockade (RNMB) is a widely recognized complication associated with the use of neuromuscular blocking agents (NMBA). RNMB can result in significant clinical consequences that may increase postoperative morbidity and mortality. A study in 2010 reporting an incidence of 26% of TOFratio<0.9 (TOFr) at post anaesthesia care unit (PACU) arrival, highlighted the dimension of this complication in Portugal1. Awareness of this problem and sugammadex widespread use since then, may have changed this reality. The primary objective of this study was to determine the current incidence of RNMB defined by a TOFr<0.9 at PACU arrival. Secondary objectives were the possible association of RNMB with use of reversal agents and intraoperative monitoring of neuromuscular blockade (NMB).
Materials and Methods: Multicentre, observational prospective study involving adult patients undergoing elective surgical procedures requiring general anaesthesia with NMBA (from 07/18 to 06/19). 366 patients were included from 10 Portuguese hospitals. After patient arrival in PACU, an investigator not involved in anaesthesia care, applied 3 consecutive TOF stimulations with 15 seconds interval

(TOFscan®). Demographic data, vital parameters at arrival in PACU, clinical history, ASA classification and perioperative relevant medication data were also collected. RNMB was defined as TOFr<0.9.
Results and Discussion: Of the 366 patients, 20 had TOFr<0.9 representing an incidence of 5.5%. Intraoperative monitoring of NMB was performed in 53% of patients. NMB was reversed with sugammadex in 340 patients (93%), neostigmine in 12(3%) and 14(4%) had no drug reversal. There was no statistically significant association between RNMB and intraoperative monitoring of NMB (P=0.752). Association between RNMB and reversal drugs or no reversal couldn't be established due to the low RNMB incidence and the low number of patients with neostigmine or without reversal drugs. Although in 2010 only 7 of 350 patients had sugammadex, intraoperative NMB monitoring data was not collected, so we can't exclude that differences in monitoring could also played a role on the improvement in RNMB, beyond the widespread use of sugammadex.
Conclusion: A significant reduction in RNMB has been achieved in the last 8 years in Portugal but we believe that an improvement is still possible towards making RNMB a "never event".
References:
1. Esteves et al. Eur J Anaesthesiol 2013; 30:1–7.

4517

Sugammadex Associated Hypotension, Bradycardia, Asystole and Death: A Case Report

Mirza K.[1], Kazim Mirza D.O., Dilip Thakar M.D., Jagtar Singh M.D., Kathy Landowsky CRNA, Cynthia Kassab M.D., Sean Lau
[1]University of Texas MD Anderson Cancer C - Houston (United States)

Background: Sugammadex, introduced in Europe in 2008, is a well tolerated drug. There are several recent reported events in literature of hypotension, bradycardia and asystole immediately after its administration. In 2015 FDA approved sugammadex, a first and unique selective (NDSMR) binding agent with a greater affinity for rocuronium and vecuronium, as a reversal agent.
Case Report: A 68 kg, 82-year male, 150 pack-year smoker, COPD and lung cancer post surgery and radiation. No significant cardiovascular history. January of 2019 cystoprostatectomy which was complicated by a chronic SBO since March of this year treated with a venting g-tube and TPN. Induction occurred with lidocaine 2% 5 ml, propofol 50 mg, rocuronium 50 mg and fentanyl 50 mcg and was intubated with a 8.0 ETT. An arterial line was placed. Anesthesia was maintained with Desflurane, additional 100 mcg fentanyl and 1.5 mg hydromorphone was given, procedure lasted 3 hours 40 minutes. At about 30 minutes prior a combination of 0.25% Bupivacaine and Exparel was infiltrated into the abdominal incision. Sugammadex 200 mg was given. Shortly after he became bradycardic. A PEA was noted and CPR started with chest compressions and. The code lasted a total of 1 hour 50 minutes. Multiple doses of epinephrine were given, twice he eventually converted to ventricular rhythms that permitted defibrillation, but he was unable to sustain a blood pressure despite a norepinephrine infusion.
Discussion: Despite a functional arterial line it took twelve minutes before hypotension most likely caused by sugammadex administration was recognized and treated. Patient became hypotensive several minutes before becoming bradycardic and asystolic. 15 minutes into the CPR blood gas ph=7.27, pO2=462, pCO2=30, lactate=5.6, platelet=25. Low platelets and drop in hemoglobin by 2 points in the absence of bleeding was indicative of initiation of DIC. Bupivacaine cardiac toxicity is possible, however, the temporal association between sugammadex administration and hypotension can't be ignored. It is unlikely that the toxic effect of bupivacaine administration exactly peaked with sugammadex administration.
References:
1. Kim Y. Sugammadex: watch out for new side effects. Korean J Anesthesiol. 2016;69:427-8.
2. Oliveira C. Severe bradycardia and asystole associated with sugammadex. Rev Bras Anesthesiol. 2019;69(2):218-221.
Learning points: Sugammadex can cause substantial and prolong hypotension.

4586

Intraoperative anaphylaxis related to rocuronium: a case report

Gjorchevska E.[1], Gavrilovska-Brzanov A.[1], Petrusheva A.[1], Mojsova-Mijovska M.[1], Nicevska-Golubikj S.[1], Burmuzoska M.[1]
[1]University Clinic of Anesthesia, Reanimation and Intensive Care – Skopje - Skopje (Republic of North Macedonia)

Background: The primary cause of anaphylaxis in 50%-70% of patients under anesthesia is neuromuscular blocking drugs (NMBD). Rapid recognition and immediate management are essential to prevent mortality and morbidity.
Case Report: ASA III, 42-yr-old-woman was scheduled for right nephrectomy and cholecystectomy. She had positive family allergy history and allergy tests positive to several antibiotics and anesthetic agents: propofol, fentanyl, pancuronium and succinylcholine. We administered corticosteroid and antihistamine prophylaxis before induction. General anesthesia with continuous remifentanil infusion and epidural analgesia was of choice. Induction was with midazolam, remifenatnil and sevoflurane. Due to inadequate depth of anesthesia, we gave 50 mg of rocuronium prior to intubation. Thirty minutes after beginning of surgery we repeated 20 mg of rocuronium. Shortly after, she became profoundly hypotensive, with low end-tidal CO2 and high peak inspiratory pressure. We immediately stopped all anesthetic agents, maintained the airway and ventilated the patient with 100% of O2. We started resuscitation with fluids and continious phenylephrine and epinephrine infusions. Aminophylline, magnesium sulfate, calcium gluconate, lidocaine and a repeated dose of corticosteroids and antihistaminic agents were given. We maintained anesthesia with sevoflurane, ketamine and epidural analgesia until the end of surgery. The patient was stabilized, extubated and transferred to the ICU for postoperative monitoring.
Discussion: According to literature, rocuronium is a potential anaphylactic agent from the intermediate-risk group that induces Type I hypersensitivity reaction in which the IgE antibodies cause inflammatory mediators to be released. Recently, side-effects such as anaphylaxis have been reported due to its increased use. We have to recognize and treat this life-threating condition according to guidelines.
Learning points: It is important that we monitor the use of rocuronium closely and ensure that any possible reactions are investigated and reported appropriately in order to facilitate the gathering of adverse events data.
References:
1. Madeira, F. at all, Anaphylaxis to rocuronium: a case report.European Journal of Anaesthesiology (EJA):June 2013-Volume 30-Issue-p147–148 Pharmacology.
2. M. Rose, M. Fisher. Rocuronium:high risk for anaphylaxis? BJA: British Journal of Anaesthesia,Volume 86, Issue 5,1 May 2001,Pages 678–682, doi.org/10.1093/bja/86.5.678.

4980

Transient and acute onset atrial fibrillation with rapid ventricular response after reversing of neuromuscular block: unexpected complication of Sugammadex

Öncü K.[1], Tuğcugil E.[1]
[1]Karadeniz Technical University - Trabzon (Turkey)

Background: Sugamadex is a gamma-cyclodextrin, the first selective agent in clinical use since 2008 for reversing neuromuscular blockade induced by steroidal non-depolarizing muscle relaxants with superior affinity for rocuronium. It is aimed to present a case of sudden onset of rapid ventricular responded atrial fibrillation due to the use of sugammadex.
Case Report: 69-year-old patient, with no comorbidities and medication history, had first and mostly second degree %60 of body flame burns (without inhalation burn) was admitted to hospital. In laboratory tests, electrolyte and other parameters were within normal limits and she had sinus rhythm. As the patient did not have enough peripheral vascular access due to burns on the extremities, the central venous catheter was placed and the patient was taken into operation. Debridement and grafting was performed uneventfully under general anesthesia (used rocuronium as a neuromuscular blocker) by plastic surgery. The patient was treated with appropriate fluid regimen during the operation and there was no hemodynamic disorder or arrhythmia. After the surgery, sugammadex (2mg / kg) was performed from the central venous catheter before extubation and after that, atrial fibrillation with rapid ventricular response developed within seconds. The patient was treated with an appropriate dose of esmolol (1 mg/kg) and ,due to insufficient, amiodaron (300mg in %5 Dextrose). As a result of this treatment, sinus rhythm was obtained and the patient was sended to the burn center after waking up without any problem.
Discussion: Arrhythmias due to electrolyte abnormalities are common in burn cases. The patient had normal sinus rhythm with normal laboratory values in preoperative and intraoperative period, and sudden onset of atrial fibrillation (has not been encountered in the literature) developed after sugammadex It has

been interpreted by us as a side effect of this agent, which had previously been known to source of arrhythmia (especially bradycardia and asystole in the current publications).In addition to other common causes, it should be kept in mind that this agent may also have an arrhythmogenic effect. It is the fact that appropriate anti-arrhythmic treatment can prevent the possible worse outcomes in a short time. As a conclusion, we think that sugammadex should not be administered centrally and slow infusion under monitored condition is more appropriate.
Learning points: sugammadeks induced arrhythmia.

5044

Mechanisms of depressed recovery from rocuronium-induced paralysis after insufficient sugammadex administration: possible contributions of pre and postsynaptic neuromuscular junction

Muramatsu T.[1], Isono S.[1]
[1]Chiba University Hospital - Chiba-shi (Japan)

Background: We previously reported that recovery speed of train of four ratio (TOFR) from rocuronium(Rb)-induced paralysis with insufficient sugammadex (SGX) is slower and recurarization occurs more frequently in elderly patients (Muramatsu T, et al. Anesthesiology 2019). Changes of TOFR can be resulted from changes of muscle contraction either at T1 and T4. Within the neuromuscular (NM) junction, acetylcholine receptors locate both at pre and postsynaptic regions, and the T1 and T4 are generally believed to reflect post and presynaptic NM junction function, respectively. More importantly, T1 and T4 reflect strength and endurance of muscle contraction. Detailed analysis of the patterns of T1 and T4 changes during insufficient SGX-induced recovery from Rb paralysis may reveal mechanisms of recurarization in elderly patients. We took an advantage to test a hypothesis that T1 and T4 differently respond to insufficient SGX administration with using the previously-reported data.
Materials and Methods: Acceleromyograph NM monitoring data and background variables obtained from forty patients (24-85ys) anaesthetized with TIVA participating in the previous study were used for this secondary analyses. Recovery speeds of T1, T4 and TOFR were measured as slopes of the corresponding acceleromyograph tracings. We specifically focused on occurrence of acceleration or deceleration determined by ratio of early and late phases' slope (TX-AR = late-TXslope/early-TXslope).
Results and Discussion: Both T1- and T4-AR were less than 1.0 in majority (98%, 95%, respectively). T1-AR (0.13 ± 0.12) was significantly less than T4-AR (0.29 ± 0.25) (P<0.001). Systematic dissociation between them at higher value range indicated by their linear relationship, T4-AR= -0.03+(2.4*T1-AR), r=0.85, p=0.005) implies greater T4-AR reduction than T1-AR possibly leading to TOFR reduction, i.e., recurarization. These suggest stronger deceleration on T1 resulting in muscle weakness, and faster deceleration at T4 possibly resulting in recurarization. T1-AR was independently explained by BMI (p=0.005) and GFR (p=0.014), and T4-AR by BMI (p=0.005) and GFR (p=0.01) whereas lower GFR (p=0.01) was a sole independent risk factor for TOFR-AR (0.12 ± 0.13).
Conclusions: Insufficient SGX administration significantly decelerates recovery of both T1 and T4 whereas postsynaptic deceleration is more severe possibly leading to symptomatic muscle weakness and faster presynaptic response may result in recurarization.

5160

Management of subcutaneous infiltration of uncertain dose of rocuronium: a case report

Saraiva R.[1], Dias C.[1], Rodrigues I.[1]
[1]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: The use of neuromuscular blocking (NMB) agents can improve surgical conditions like in microsurgical breast reconstruction.1Adequate neuromuscular blockade can be achieved using a rocuronium infusion but can increase the likehood of drug extravasation to subcutaneous tissues. As a result prolonged exposure and unknown pharmacokinetics of NMB could lead to serious complications.
Case Report: A 44y female patient was scheduled for a reconstructive breast surgery. ASA standard monitoring, TOF scan and Bispectral Index monitor was used. Anesthesia induction was performed with remifentanil and propofol infusions plus a rocuronium bolus, through 18G and 20G cannulas, respectively. Considering the need of complete paralysis and expected duration of the procedure, a rocuronium infusion at 0,3mg/Kg/h was started through the 20G cannula. Because the patient has still needed rocuronium boluses, the infusion rate was increased to 0,6mg/Kg/h. Meanwhile TOF scan got damaged and neuromuscular blockade couldn't be monitored. Access to the patient's arm was limited by the surgical team placement and five hours later, after some changes in the team's positioning, a moderate soft tissue swelling was noticed around the 20G cannula. The rocuronium infusion was stopped and another TOF scan monitor was requested. At the end of the surgery the patient was extubated uneventfully after reversal using 4 mg/kg of Sugammadex and a TOF ratio>0,9. The patient was taken to the post-anesthesia care unit (PACU) where she was closely monitored. Her post-operative period was unremarkable.
Discussion: Subcutaneous infiltration of drugs is not a rare event and could lead to serious complications due to unknown pharmacokinetics through this route. Regarding muscle relaxants, subsequent residual blockade may compromise ventilation. In the first hours, a tight surveillance of the patient in a PACU is critical to get an optimal outcome.
References:
1. Awad N, Zalut S, Deutsch E. Case Report Successful Management of Subcutaneous Infiltration of an Intubating dose of Rocuronium in a Morbidly Obese Patient: A Case Report. 2018;4(2):21-23.
Learning points: Access to the patient may be limited and intravenous line displacement can go unnoticed. TOF device must be assured in order to facilitate the infusion titration and guarantee the precise amount of reversal agent required. Clinical effects of rocuronium subcutaneous extravasation are unknown so postoperative surveillance is critical.

5508

Sugammadex dosing: anaesthesiologist's clinical perception versus quantitative monitoring

Frias P.[1], Marinho S.[1], Resendes H.[1], Paiva A.[1], Silva R.[1], Gonçalves A.[1]
[1]Hospital Divino Espirito Santo Ponta Delgada - Ponta Delgada (Portugal)

Background and Goal of Study: The use of neuromuscular block (NMB) monitoring by one of the currently available quantitative methods is a class IA recommendation. Yet, despite limitations, most clinicians continue to rely on subjective evaluation in making decisions about the adequacy of neuromuscular function before tracheal extubation rather than using quantitative TOFscan monitoring. The aim is to compare the sugammadex dose suggested by the Anaesthesiologist based on his clinical experience versus the dose determined by quantitative monitoring to determine if the subjective dose is appropriate.
Materials and Methods: This was a prospective, 3-month study in patients 18-75 years who underwent general anesthesia with rocuronium and reversal with sugammadex. At the time of pharmacologic reversal of NMB, both the sugammadex dose proposed by the Anaesthesiologist and the dose suggested by a TOFscan, according to Portuguese guidelines on the management of the NMB, were recorded. Then the TOFscan suggested dose was administered. The subjective dose was considered appropriate if it was within 10% of the recommended dose for the depth of NMB. The results were analysed descriptively.
Results and Discussion: Of 66 patients evaluated, in 16% the subjective dose would have been >10% below the recommended dose (range for the difference to the recommended dose was -56 to -232 mg), and the median time between the last Rocuronium administration and pharmacological reversal was 30 min (range: 10-60min). In 40% of patients the subjective dose would have been >10% above the recommended dose (range for the difference to the recommended dose was + 28 to +200 mg) and the median time to pharmacological reversal was 45 min (range: 15-220 min). In 44% of patients the subjective dose would have been within 10% of the recommended dose and the mean time to pharmacological reversal was 40 min (range: 15-160 min).The empiric decision would have resulted in sugammadex under-dosing or over-dosing in 56% of patients. While under-dosing can result in residual NMB and associated post-operative complications or increased risk of recurrence after initial transient reversal, over-dosing may increase the hypersensitivity reactions and economic burden.
Conclusion: Given these risks and the interindividual variability, these data show that the sugammadex dose should be determined using quantitative monitoring, as it is the only way to ensure an appropriate dose is given.

5741

Economic Impact of Expanding the Use of Sugammadex for the Reversal of Neuromuscular Blockade in Adults Undergoing Surgery in Spain

Cedillo S.[1], Jiang K.[2], Bash L.[2], Ndirangu K.[3], Zhang S.[3], Ramirez-Boix P.[1]
[1]MSD - MADRID (Spain), [2]MSD - New Jersey (United States), [3]ICON - New York (United States)

Background and Goal of Study: Neuromuscular blocking agents (NMBAs) are often administered to prevent patient movement during surgical procedures requiring use of general anesthetics with intubation. Patients extubated with incomplete neuromuscular reversal may experience residual neuromuscular paralysis, potentially leading to post-operative complications. The aim of this study is to estimate the clinical and economic impact of expanding sugammadex use in the routine reversal of NMB with rocuronium in Spain. NMB induced by cisatracurium and others are included in the analysis with caveat that patients are switched to rocuronium first.
Materials and Methods: A budget impact analysis was developed based on a decision analytic model that followed 733,876 hospital procedures carried out in Spain in 2015,73.3% of them using a NMBA. The model estimated the annual net Budget impact of substituting sugammadex for no reversal agent in 50% of the patients administered with rocuronium and no reversal agent. The risk of the composite endpoint, PPC (post-operative pulmonary complications), was based on a study of the Multicenter Perioperative Outcomes Group(MPOG) centralized research registry. The analysis was conducted from payers' perspective, considering only the direct costs associated with PPC management(€6,990.01 per episode) and pharmacy costs of the NMBAs. Deterministic sensitivity analyses (DSA) were carried out by varying key parameters included in the model within a range of +/- 25%.
Results and Discussion: The estimated budget impact of expanding the use of sugammadex in 226,119 procedures, displacing neostigmine or no reversal agent use, in the routine reversal of neuromuscular blockade in Spanish hospitals was a net savings of M€8.1 annually. The potential increase (M€13.9) in pharmacy costs would be offset by savings (M€22) from a reduction in the number of PPC events (3,148 cases; 12.8%).The DSA confirmed that the economic impact of expanding the use of sugammadex resulted in cost savings across all variables varied except for where the risk ratio (sugammadex vs neostigmine) of PPC decreases (from 0.71 to 0.89).
Conclusion: Improving patient care in the operating room is essential in surgical procedures. The management of PPC is often expensive. Expanding the use of sugammadex could potentially lead to a reduction in the number of PPC events, resulting in net savings for the Spanish National Healthcare System.

5879

Deep neuromuscular blockade with sugammadex reversal, reduced both anesthetic requirements and recovery times in cervical spine surgery patients: a randomized controlled trial

Amorim P.[1], Nunes C. S.[1], Casal M.[1], Correia L.[1], Machado H.[1], Esteves S.[1]
[1]CHUP - Centro Hospitalar e Universitário do Porto - Porto (Portugal)

Background and Goal of Study: Deep neuromuscular blockade (NMB) is currently used mostly for the benefit of laparoscopic surgeries. We hypothesized that deep NMB could also offer advantages regarding titration of BIS guided propofol/ remifentanil anesthesia. EMG activity, if present, may lead to higher artifacted BIS values and higher doses of anesthetics. We conducted a randomized controlled trial to assess whether deep NMB could eliminate EMG activity, reduce BIS variability and result in the use of reduced doses of anesthetics and of their hemodynamic side effects.
Materials and Methods: Patients subjected to cervical spine surgery (N=63) were randomized to receive rocuronium infusion for deep NMB (PTC of 1-2 kept until the end of wound dressing) with sugammadex (4mg/kg) for reversal or standard-practice rocuronium boluses with neostigmine for reversal if TOF<90%. Propofol/ remifentanil TCI anesthesia was titrated to maintain BIS between 40-60. Trial had national EC/regulatory authority approvals; all patients provided informed consent. Student's t test, Mann-Whitney U-test and chi-square c2were used. When samples were compared the 95% IC of the difference is presented. Significance was at p<0,05.
Results and Discussion: Baseline characteristics did not differ among groups. The main results are in Fig1. Propofol estimated Ce for maintenance and total propofol in mg/kg/min were 20% lower in the deep NMB group. BIS average was significantly higher, by 3,3(1,06) and EMG activity significantly reduced in the deep NMB group, but BIS variability was not. Remifentanil did not differ. Ephedrine was administered in 34% of patients in the standard practice group vs 13% in the deep NMB group (P=0,045). At end of surgery propofol Ce was lower in the deep NMB group and times to eye opening and extubation were halved.
Conclusion: Deep NMB and sugammadex reversal accounted for reduced propofol requirements during anesthesia, higher BIS values, decreased EMG activity, less need to treat hypotension and faster recovery times. Possible explanations for these findings may be that deep NMB reduces EMG activity leading the anesthesiologist to accept higher BIS values, or that it reduces afferences to the brain, namely from proprioception, that would favor arousal. While deep NMB is advocated only to provide better surgical conditions, our results suggest that it may be beneficial also from the perspective of anesthesia.

6083

Sugammadex reversal versus neostigmine: analysis of rapid muscle activity recovery

Lambo M. S.[1], Pedrotti D.[2], Galante D.[3]
[1]Department of Anesthesia and Intensive Care Hospital of Sulmona - Sulmona (Italy), [2]Department of Anesthesia and Intensive Care Hospital Santa Chiara - Trento (Italy), [3]Department of Anesthesia and Intensive Care Hospital G. Tatarella, Cerignola, Italy - Foggia (Italy)

Background: The purpose of the study is to test the rapid muscle activity recovery of sugammadex vs neostigmine after surgery through microlaryngoscopy.
Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. We enrolled 148 patients between 39 and 68 years old, ASA I-II, undergoing ENT. The patients were divided into two groups: S (74 pts) and N (74 pts). The group S received sugammadex in a dose dependent on the depth of the block. The patients of Group N received neostigmine for decurarization. In both groups the curarization was obtained by the administration of rocuronium. The recovery time and the achievement of the TOF-ratio 0.9 as extubation index were recorded.
Results: At the end of surgery (mean duration 28 ± 7 min) the TOF showed a partial recovery in 111 patients; in the remaining 37 patients a post-tetanic counts (PTC) was performed to assess the depth of the block and the recommended dose of sugammadex was administered. Of the 111 patients with moderate muscular block and reappearance of T2 to TOF, 33 patients were included in group S with administration of 2 mg/kg of sugammadex while 78 were included in Group I with administration of neostigmine 0.05 mg/kg. 37 patients in which PTC showed a value of 1-2, indicating deep block, were antagonized with sugammadex 4 mg/kg. Times muscle recovery, were respectively: 1 min, 33±6 sec for 33 patients of the group S antagonized at the appearance of T2; 6 min and 45±5 sec for 78 patients of group I and 2 min 42± 3 sec for 11 patients of Group S antagonized during deep block (PTC = 1-2). At a TOF ratio 0.9 all patients were extubated. No case of PORC/PONV were recorded (Fig. 1).
Discussion and conclusion: The study showed that the administration of sugammadex determined a shortening of muscle recovery from rocuronium when compared with neostigmine with advantage during microlaryngoscopy.
References:
1. Geldner G. A randomised controlled trial comparing sugammadex and neostigmine at different depths of neuromuscular blockade in patients undergoing laparoscopic surgery. Anaesthesia 2012; 67:991-8.

INCREASED P WAVE AMPLITUDE (%)	CVC TIP/ACJ DISTANCE (cm.)
25%	2.4±1.2 cm.
33%	1.8±1.0 cm.
50%	1.2±0.4 cm.

Table 1. ECG increased P wave amplitude vs CVC tip distancve from ACJ

4428

Comparison of the intubation success rate between two techniques using lightwand in patients undergoing spine surgery with difficult airway: conventional vs. face-to-face technique

Seo H.[1], Yi J. W.[1], Lee B. J.[1], Chae M.[1]
[1]Kyung Hee University Hospital at Gangdong - Seoul (South Korea)

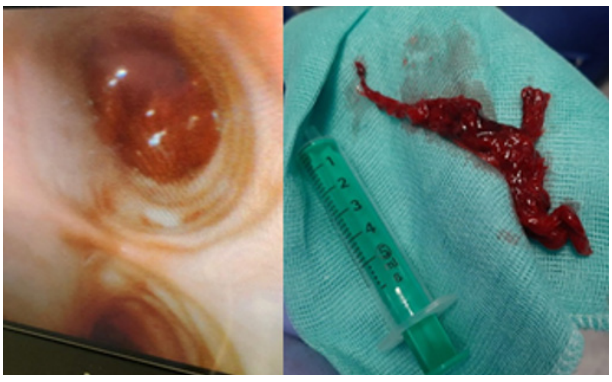
Background and Goal of Study: A lightwand device can provide easy and safe intubation, particularly in a patient with anticipated difficult intubation or cervical immobilization. For a successful lightwand intubation, it is essential to locate the tip of lightwand just in front of the vocal cord opening, and some soft tissue injury or technical difficulty can happen during this process. As an alternative technique, the face-to-face lightwand technique provides lightwand insertion in a sitting position, thereby anticipating less soft tissue injury, and not requiring mandible lifting for lightwand insertion. We compared the intubation success rate between conventional lightwand technique and face-to-face lightwand technique.
Materials and Methods: Patients who were undergoing spine surgery were randomly allocated into two groups; Group C using a conventional lightwand technique or group F for using a face-to-face lightwand technique for tracheal intubation. After anesthesia induction, patients in group C were intubated using lightwand with a conventional technique. In group F, patients were sitting in 45 degrees and intubated facing with an anesthesiologist. The primary outcome was the success rate at first attempt.
Results and Discussion: A total of 178 patients were enrolled. The intubation success rate at first attempt was 88.6% in group C and 84.1% in group F, respectively (P=0.381). Intubation time was slightly shorter in group F, but there was no statistical significance. (14.0 vs. 12.0, P=0.704) Intubation related complications, including post-intubation bleeding, sore throat, and hoarseness, were similar between the two groups.
Conclusion: Compared with the conventional technique, the face-to-face lightwand intubation technique showed a similar result. So it may be used as an alternative technique in cervical immobilized patients.

4795

Respiratory distress by airway obstruction in orthognathic surgery during the postoperative period: case report

Aguado La Iglesia I.[1], Aragonés Quintanero L.[1], Madrid Vázquez L.[1], Montero Saiz Ó.[1], Ibañez Lorente C.[1], Muñoz Alameda L. E.[1]
[1]University Hospital Fundación Jiménez Díaz - Madrid (Spain)

Background: A 45 year old female, ASA II, was scheduled for elective orthognathic surgery, under TIVA. In the absence of surgical, anaesthetic complications and Cormack I, the patient was extubated and transferred to the critical care unit (CCU) with intermaxilar suture (IMS). After 4 h, the patient develops nasal bleeding, agitation, respiratory distress and desaturation. The IMS is removed and the patient is intubated and transferred to the operating room (OR) where experienced a new desaturation episode for 15 min and chest asymmetry movement, calling the bronchoscopist who removes a clot in the left main bronchus.



Subsequently, the patient is moved to the ICU, experiencing a neurological status disorder with a MRI and EEG matching with a hypoxic-ischaemic encephalopathy.
Case Report: Highlight the early diagnosis of a life threatening situation, as well as the application of a treatment without delay. Unfortunately, the neurological status didn't improve and the patient needed 3 more surgeries.
Discussion: The aim of this case report is to review the extubation options and transfer to a CCU in orthognathic surgery. Looking through the literature, there are a few references which review a similar complication1 and standardized recommendations in extubation. Most importantly, it should be individualize according to comorbidities, anxiety, airway, bleeding, OR stability and a CCU availability, and extubating the patient as soon as possible in order to reduce postoperative complications and morbimortality2. In this case, the patient fulfilled all the requirements for an early extubation.
References:
1. Incidence of complications and problems related to orthognathic surgery.
2. Decision on the time for post-operative extubation of maxillofacial surgery patient in the intensive care unit.
Learning points: It is crucial to assess every case aspect to determine the best extubation moment. An early extubation in the OR or in the first hours, doing the IMS 24 h after, could be a secure practice which reduce the risk for severe complications. Finally, emphasize the importance of review the literature with a view to write a clinical guideline with recommendations.

4937

Comparison of the pressure on the upper teeth during tracheal intubation by using a pressure inspection sensor sheet, among the McGrath MAC, AirwayScope and Macintosh laryngoscope

Harada S.[1], Yamamoto S.[2]
[1]University of Tsukuba Hospital - Tsukuba (Japan), [2]University of Tsukuba - Tsukuba (Japan)

Background and Goal of Study: Perioperative dental damage is the one of the most common complications. The majority of dental injuries occur during tracheal intubation, and the maxillary incisors are most frequently damaged because the laryngoscope blade hits. Video laryngoscopes were developed to facilitate intubation in case of difficult direct laryngoscopy. However, the difference in pressure on the teeth due to different devices is not well understood. Prescale® (Fujifilm Corporation) is a pressure inspection sensor sheet that provides a topographical image by changing its color to red across the contact area, allowing to measure the pressure distribution. The color turns red where 10~50 MPa pressure is applied. Using a manikin, we compared the pressure on the upper teeth while using McGrath® MAC (MGM), Airway Scope® (AWS) and Macintosh laryngoscopes (MLS) by confirm the pressure distribution with Prescale®.
Materials and Methods: Twenty one anesthetists (9 staff and 12 residents) were enrolled in the study. The sequence of use of the devices was randomized and each device was used once. MGM disposable blade size 3, AWS Introck® M-ITL-SL, and MLS HEINE Classic+ Macintosh Fiber Optic Blades size3 were used. All intubations were performed using a size 7 mm internal diameter endotracheal tube (ETT) on a SimMan® manikin (Laerdal Medical Canada Ltd.). Prescale® MS (L 6 cm × W 5 cm) were stuck onto upper teeth. A stylet (Shiley, Covidien Inc.) was used to with MGM and MLS. Prescale® was captured with a scanner and the number of cluster and areas were analyzed with ImageJ. A Kruskal–Wallis analysis was performed to test for differences between the devices.
Results and Discussion: Significantly larger number of clusters was in AWS than MGM and MLS (52.1±21.9, 22.1±8.5 and 28.2±23.2 for AWS, MGM and MLS respectively. F=2, P<0.000). Moreover, total area was larger in AWS than the other devices (35.7±21.7, 10.4±9.2 and 12.2±15 mm2 for AWS, MGM and MLS respectively. F=2, P<0.000). AWS was used with the single-use attachment Introck® blade whose size was bigger (L 9.6 cm x H 13.1 cm x W 5.2 cm) than other blades, and that may cause greater chances to damage the upper teeth. The limitation of this study is that we used a manikin instead of humans, whose mouth was harder to be opened, therefore it may produce different results on everyday practice.
Conclusion: AWS was shown to press the upper teeth significantly stronger comparing to MGM or MLS on a manikin.

5292

The discrepancy of rotation angle of the endotracheal tube tip at the glottis during nasotracheal intubation using fiberscope

Tsukamoto M.[1], Taura S.[2], Hitosugi T.[2], Yokoyama T.[2]
[1]Kyushu University Hospital - Fukuoka (Japan), [2]Kyushu University - Fukuoka (Japan)

Background and Goal of study: Nasotracheal intubation using fiberscope is a useful technique in patients. In clinical practice, we experience sometimes the difficulty in advancing the tube over the glottis, as the tip of the tube catch on the vocal cord. It may give damage to the vocal cord and lead to postoperative sore throat. Rotation of the tube may easily release this catching. However, when the end side of the tube was rotated, rotation angle at the tip may be different especially in the soft material tube. The discrepancy of those rotation angles was unclear. In this study, we investigated the discrepancy of the rotation angle between at the tip and at the end side.
Material and Methods: The patients (20-80 yrs) undergoing nasotracheal intubation for oral surgery participated 3 sizes of preformed nasotracheal tubes (Portex; Smiths Medical) were intubated using fiberscope. They were divided into 3 groups; the tube internal diameter (ID) 6.5 mm group (6.5 group), ID 7.0 mm group (7.0 group) and ID 7.5 mm group (7.5 group). The tube was inserted through nasal cavity into the pharynx. After the fiberscope was advanced through the tube into the trachea. At this timing the end side of the tube was rotated by 90° and 180° in both right (clockwise) and left (counterclockwise) together with fiberscope, then the rotation angle at the tip was monitored by Pentax Airway Scope.
Results and discussion: A total of 39 patients were included. When the tip was rotated right by 90° at the end side, in 6.5 group (n=13), the tip rotated by 47.8 ± 17.9°. In 7.0 group (n=13), the tip rotated by 40.2 ± 13.7°. In 7.5 group (n=13), the tip rotated by 35.1 ± 2.1°. When the tip was rotated right by 180°, in 6.5 group, the tip rotated by 128.1 ± 37.7°. In 7.0 group, the tip rotated by 122.0 ± 48.8°. In 7.5 group, the tip rotated by 116.8 ± 29.9°. All rotation angles were significantly less than that at the end side ($p<0.001$). In left rotation, similar results were obtained. These discrepancies of the rotation angles might be caused by resistance against the rotation in the nasal cavity and softness of the tube materials. Therefore, overrotation is important to release the catching of the tube tip.
Conclusion: When the tube is rotated to release the tip catching on the vocal cord during nasotracheal intubation using fiberscope, rotation angle at the tip is significantly less than the rotation angle at the end side of the tube. Therefore, overrotation should be considered.

5360

Insertion of different types of supraglottic airway devices causes different deformities of the larynx during medialization laryngoplasty: a report of two cases

Maruyama Y.[1], Sugiyama Y.[1], Numata K.[1], Kawamata M.[1]
[1]Shinshu University School of Medicine - Matsumoto (Japan)

Background: Desirable visibility of the overall structure around the glottis is required for intraoperative assessment during medialization laryngoplasty (ML) such as type 1 thyroplasty and arytenoid adduction. Although a supraglottic airway device (SAD) has been successfully used for assessment of placement of the vocal cord during ML [1], it is unclear which type of SAD is optimal for ML. We report two cases with left unilateral vocal fold paralysis in which visibility around the glottis was significantly different depending on the type of SAD.
Case Report: Case 1: A 50-year-old man was scheduled to undergo ML. After induction of anesthesia with fentanyl, propofol and rocuronium, i-gel® was inserted. The view of the larynx by a flexible bronchoscope through i-gel® was not suitable because the glottis could not be seen when the arytenoid cartilage was visible (Fig. 1A). After changing i-gel® to AuraGain™, both the glottis and arytenoid cartilage could be observed simultaneously in one field of view with the bronchoscope through AuraGain™ (Fig. 1B). Case 2: A 65-year-old man was scheduled to undergo ML. After induction of anesthesia with fentanyl, propofol and rocuronium, i-gel® was inserted. Bronchoscopy through i-gel® revealed that the tip of i-gel® was in direct contact with the arytenoid and that silastic medialization with arytenoid adduction was difficult in this situation during ML (Fig. 1C). After the SAD was changed from i-gel® to AuraGain™, the view of the larynx and the surgical field around the arytenoid was significantly improved (Fig. 1D).
Discussion: The findings from the two cases suggest that SAD insertion itself can cause deformity of the larynx and that visibility of the surgical field around the arytenoid is different depending on the type of SAD. The shape and space around the orifice of the SAD also differ depending on the type of SAD (Fig. 1E). Thus, further study on determination of the optimal type of SAD during ML is needed.

References:
1. Acta Otolaryngol 2014;134:193-200.
Learning points: Insertion of different types of SAD causes different deformities of the larynx that affect the view of the glottis and the arytenoids during ML.

5456

Endoscopic closure of a tracheoesophageal fistula using an Amplatzer device. Potential new indication

Solchaga Sanchez I.[1], Barrio Perez I. M.[1], Sira Martinez C.[2], Caballero Garzon M. E.[2], Carretero Rollon E.[2], Quintana Villamandos B.[1]
[1]Hospital Gregorio Marañon - Madrid (Spain), [2]Universidad Complutense - Madrid (Spain)

Background: Tracheoesophageal fistulas (TEF) are a rare condition with a high morbidity and mortality rate. Treatment includes primary repair and endoscopic closure. We present a successfully endoscopic closure of TEF using an Amplatzer septal occluder (ASO), a device originally designed to treat atrial septal defects.
Case Report: The patient is a 23-year-old man with VACTERL syndrome. Secondary, he presents an 8mm TEF which lead to bronchoaspiration episodes, chronic bronchopneumopathy and malnutrition. The TEF was treated several times by endoscopic techniques (clip and oesophageal endoprosthesis) without success. Surgeons dismissed surgery due to its high risk and complexity. Then, endoscopic closure with an ASO was performed under general anaesthesia: 100mcg of fentanyl, 20mg of etomidate and 40mg of rocuronium were administered as induction; endotracheal intubation was achieved easily with an nº 5.5 tube. Anaesthesia was maintained with sevofluorane and remifentanil (0.1mcg/kg/min). A 16mm ASO was placed successfully in the fistula by direct view from both the esophagus and trachea, achieving its full closure. The procedure lasted 60 minutes.
Discussion: The main treatment of TEF is primary repair but the patient's clinical condition does not often allow it, so several endoscopic treatments have been described (stent, clips, etc). Recently, ASO has been proposed as a new option1. It is a disk made of nitinol with superelastic properties and memory foam and it was created to treat cardiac defects. Our patient was dismissed surgery, so the medical team thought of endoscopic closure with an ASO as his last curative chance. We chose general anaesthesia instead of sedation as we expected the procedure to last long. A small orotracheal tube (nº 5.5) was placed because bronchoscopist found it easiest to handle the fibroscope from outside the tube than through it. The procedure was uneventful and the patient was discharged the following day.
References:
1. Rabenstein et al. (2006). First use of ventricular septal defect occlusion device for endoscopic closure of an esophagorespiratory fistula using bronchoscopy and esophagoscopy. Chest, 130:906 –909.
Learning points: ASO was created to treat atrial septal defects, but it seems to be an effective, non-invasive way to close TEF in non-surgical patients, so it may become a new indication for this device. Anaesthetic management depends on the expected duration of the procedure and each patient's comorbidities.

5477

Comparison of LMA protector and I-gel in aintree catheter-mediated fiberoptic tracheal intubation

Saracoglu T.[1], Turan A. Z.[2], Aydas A. D.[2], Yilmaz M.[2]
[1]Health and Science University Kartal City Hospital - Istanbul (Turkey), [2]Health and Science University Derince Training and Research Hospital - Derince (Turkey)

Background and Goal of Study: Fiberoptic intubation through the supraglottic airway device (SAD) is recommended in difficult airway management algorithms. The Difficult Airway Association (DAS) published a guideline describing the details of this technique in 2011. The Aintree catheter is a 56 cm long device with an outer diameter of 6.5 mm and an inner diameter of 4.7 mm. The DAS guideline does not recommend the use of the Aintree catheter with LMA Supreme. However, there is no clear recommendation as to which the supraglottic device is more suitable. There is a limited number of clinical studies on this subject. In this study, we aimed to compare the efficacy of two different 2nd generation supraglottic airway devices suitable for tracheal intubation.
Materials and Methods: After the study was approved by the local ethics committee, 80 adult patients with ASA 1-3 score undergoing elective surgical procedures were included in the study. The patients were intubated after randomization into two groups: I-gel group and LMA Protector group. SAD insertion time and tracheal intubation time were recorded separately. Demographic data, changes in

hemodynamic parameters during the procedure, and complications were noted.
Results and Discussion: Three patients from each group were excluded from the study and the data of the remaining 74 patients were analyzed. Demographic data, number of SAD interventions, device placement time, and the need for optimization maneuver were similar between the study groups (Tables 1 and 2). There was no statistically significant difference between groups in terms of Aintree catheter insertion time and tracheal intubation time, fiberoptic laryngeal appearance scale, and hemodynamic parameters. However, the airway complication rate was significantly higher in the LMA Protector group than in the I-gel group (21.6% vs 2.7%, respectively, p = 0.013; Table 3). The most common complication was bronchospasm and bloody secretion on SAD.
Conclusion: We concluded that I-gel is preferable in fiberoptic-mediated tracheal intubation through SAD because the hemodynamic parameters were stable during the procedure, it has acceptable insertion duration and fewer complication rates. We believe that the more curvature and rigid structure of LMA Protector compared to I-gel might contribute to this result.

5771

Comparison of Success Rate of Endotracheal Intubation with Two Different Videolaryngoscopes

Karabak P.[1], Cakar Turhan K. S.[1], Ozcelik M.[1], Alanoglu Z.[2]
[1]Ankara University School of Medicine Ibni Sina Hospital - Ankara (Turkey), [2]Ankara University School of Medicine Ibni Sina Hospital/ WUSTL School of Medicine Department of Anesthesiology - Ankara (Turkey)

Background and Goal of Study: Airway management defines all interventions necessary for airway protection and it is among the main responsibilities of anesthesiologists. Therefore an anesthesiologist should know and be able to practice intubation by using video-assisted techniques if conventional techniques for intubation become unsuccessful. The current study aimed to compare the effects of two different videolaryngoscopes in terms of success of intubation and postoperative early complications.
Materials and Methods: The current retrospective study included 123 ASA I-III patients aged 18-65, undergoing elective surgery and requiring endotracheal intubation. Preoperative demographical variables, thyromental distance, sternomental distance, upper lip bite test and Mallampati classification scores were recorded. The patients intubated with McGRATH(n=63) and Truview videolaryngoscope(n=60) were included to Group MG and Group TW, respectively. All patients included to the study had standard protocol for premedication, sedation and anesthesia induction. The number of intubation trials and duration of intubation (standardized as the time between laryngoscope entrance to mouth and demonstration of end-tidal carbondioxide graphy), Cormack Lehane scores and postoperative early complications such as nausea, vomiting, shivering, sore throat and hoarseness were recorded.
Results and Discussion: Demographical variables were not significantly different. Intubation was successful in the first trial in 59 patients in Group MG (93.7%) and in 51 patients in Group TW(85%), the difference between groups was not statistically significant. The duration of intubation was 14 and 36 seconds in Group MG and Group TW, respectively. The duration of intubation was significantly shorter in Group MG when compared with Group TW. The presence of at least one of postoperative complications was 19% and 35% in McGRATH and Truview groups, respectively. The difference was statistically significant ($p<0.05$). The most common early postoperative complication in both groups was sore throat.
Conclusion: Videolaryngoscopes facilitates intubation with their ergonomic use and by improving anatomic visualization. In the current study, it was demonstrated that McGRATH videolaryngoscope provides better glottic view, decreases duration of intubation and decreases early postoperative complications caused by laryngoscopy and endotracheal intubation.

6337

Airway rescue after failed videolaryngoscopic intubation by fibrobronchoscopy through a second-generation supraglottic airway device in a patient with known difficult airway; a case report

Prada J.[1], Bolaños I.[1], Sanchez N.[1], Sanchez T.[1], Grupo de Investigación del Departamento de Anestesiologia del Hospital Universitario Clínica San Rafael
[1]Universidad Militar Nueva Granada - Bogotá (Colombia)

Background: Airway management is safest when potential problems are identified before surgery, enabling the adoption of a strategy, a series of plans, aimed at reducing the risk of complications. However, human factor issues are considered among the most important contributors of bad decision making and adverse outcomes. In the scene of an anticipated difficult airway the anesthesiologist must have a set of backup plans to work around possible unexpected scenarios.
Case Report: We report the airway rescue of a 26-year-old patient scheduled for insertion of a cochlear implant due to history of microtia and bilateral congenital aural atresia in the context of Treacher Collins Syndrome causing deep hypoacusia with no other known relevant antecedents. There was no report of difficult airway history, however the patient exhibited multiple difficult airway predictors which led to consider the awake intubation according to the anticipated difficult airway algorithm. There was lack of collaboration from the patient during this attempt. We initiated anesthetic induction with total intravenous anesthesia (TIVA) and neuromuscular relaxation. After three failed attempts at intubation using a videolaryngoscope the patient had to be rescued with a second generation supraglottic airway device (I-gel), and the airway secured using a fibrobronchoscope through said supraglottic airway device to advance an endotraqueal tube.
Discussion: The adoption of strategies while managing a difficult airway improves the rate of success. The supraglottic airway devices, one of the stepping stones in the management of the difficult airway algorithm allow intubation even using a fibrobronchoscope which we consider to be a safe alternative in the management of these types of patients.
References:
1. O. Langeron, J.L. Bourgain. Difficult intubation and extubation in adult anaesthesia. Guideines. Anaesth Crit Care Pain Med 37 (2018) 639-651.
2. C.Frerk, V.S Mitchell, A.F McNarry et al. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. Br J Anaesth.
Learning points: There is not one unique way to face the patient with difficult airway and an initial and backup strategies must be considered in order to guarantee a safe anestethic induction. The supraglottic airway device must always be considered in the scenario of a difficult airway in order to rescue it and then secure it via other method, including the use of a fibrobronchoscope.

5859

Unexpected ventricular fibrillation after removal of Laryngeal Mask in a young healthy patient

Ozdemir M.[1], Kuvaki B.[1], Ocmen E.[1], Gokel E.[1]
[1]Dokuz Eylul University School of Medicine Hospital - Izmir (Turkey)

Background: Major cardiac complications such as ventricular fibrillation can occur unexpectedly in patients without risk factors.
Case Report: A 44-year-old male patient without any coexisting disease was scheduled for elective vitrectomy. After induction with 2 mg/kg propofol and 1 mcg/kg fentanyl, anesthesia was maintained with 2–3% sevoflurane in 50% O2-air via a laryngeal mask airway (LMA). The operation lasted 70 minutes and the LMA was removed when the patient had sufficient spontaneous ventilation. Immediately after removing of the LMA ventricular fibrillation was seen on the monitor. Also, SpO2 disappeared and the patient stopped breathing. Help was called, chest compressions started and the patient was intubated. When the defibrillator arrived in about 90 seconds, the first shock was given with 150 J and 2 minutes CPR was continued according to the ERC guidelines. Sinus rhythm with ST elevations was seen on the monitor at rhythm check after 2 minutes and the return of spontaneous circulation was confirmed. On the ECG has taken in the OR no ST elevation could be seen anymore. The patient was transferred to the Post-anesthesia care unit (PACU) for further evaluation. Echocardiography(ECHO) was performed by the cardiologist at the bedside. The patient was taken over to the coronary angiography unit, and a diagnostic angiography revealed %60 stenosis in the Left Anterior Descending(LAD) and Circumflex-artery(CX), as well as %30 in the right coronary artery(RCA). Consultations between cardiologists and cardiovascular surgeons ended in the decision of coronary artery bypass graft(CABG). After CABG the patient could be discharged uneventfully.
Discussion: The incidence rate of cardiac arrest during general anesthesia is 1.1–25.5/10,000. The mortality rate in non-cardiac surgery is 1.5%, and 42% of cases are associated with cardiac complications.

References:
1. Weiser, Thomas G., et al. «An estimation of the global volume of surgery: a modeling strategy based on available data.» The Lancet 372.9633 (2008): 139-144.
2. Biboulet, Philippe, et al. «Fatal and non-fatal cardiac arrests related to anesthesia.» Canadian Journal of anesthesia 48.4 (2001): 326-332.
Learning points: An important message to take from this case is, that even in young healthy patients without any disease and low-risk surgery there may be a catastrophic outcome when the anesthetist doesn't react promptly and correctly.

4485

Comparison between Opioid-Free Anesthesia (OFA) and Opoid-Reducted Anesthesia (ORA) during open hepatectomy: a retrospective study

Ardant E.[1], Boudjema K.[2], Rousseau C.[2], Estèbe J. P.[2]
[1]CHRU de Tours - Tours (France), 2CHU de Rennes Pontchaillou - Rennes (France)

Background and Goal of Study: Open hepatectomy is a painful procedure. Opioids consumption could slow the postoperative rehabilitation. They induce hyperalgesia and could increase the risk of recurrence and metastasis in cancer surgery. Because OFA has become a common practice in our institution, we retrospectively compared OFA to ORA protocols on the postoperative consumption of opioids.
Materials and Methods: In ORA protocol, patients received a multimodal analgesia: lidocaine, ketamine, dexamethasone and opioids (sufentanil or remifentanil). In OFA protocol, patients received similar multimodal treatment but opioids have been replaced by dexmedetomidine. The choice of the protocol was left to the discretion of the anesthesiologist. The primary outcome was the morphine consumption in Postoperative Anesthesia Care Unit (PACU). Secondary outcomes were pain evaluation using maximum Numeric Rating Scale (maxNRS) in PACU, opioids consumption and maxNRS at D1 and D2, as well as treatment of PostOperative Nausea and Vomiting (PONV). Statistical evaluation was performed with univariate and multivariate analysis, comparison was performed with Student test and Mann-Whitney Wilcoxon test as required. $p<0.05$ was considered as significant.
Results and Discussion: From January to December 2018, 90 patients received OFA and 57 received ORA protocols. There was no significant difference in patient's and surgical characteristics. In PACU, morphine titration was significantly lower in the OFA group (2.5±3.5 mg Vs. 6.4±5.5 mg, respectively in OFA and ORA groups; $p<0.001$) (Fig.1). Pain was significantly reduced (2.4±2.7 Vs. 5.8±2.9; $p<0.0001$) (Fig.2). At D1 there is a trend, but not significant difference in morphine consumption: (4.8±5.2 mg of equivalent IV morphine (MEIV) Vs. 8.4±9.5; $p=0.2$). In terms of level of pain, no difference was recorded (max. NRS=5.4±1.9 Vs. 5.3±1.7; $p=0.7$). At D2, the morphine consumption wasn't significantly different (1.7±4.3 Vs. 3.1±7.5; $p=0.16$) but the pain was significantly lower in OFA group (3.5±2.1 Vs 4.9±1.9, $p<0.0001$) (Fig.2). The treatment of PONV was significantly less important in OFA group (18% Vs. 33%; $p=0.031$).
Conclusion: Compared to the multimodal approach in ORA protocol, OFA protocol could reduce the morphine consumption in PACU, and the total postoperative opioid consumption after open liver surgery. It isn't surprising to find a lower level of PONV in the OFA group.
Reference:
1. Current opinion in Anesthesiology 2018;556-6.

4606

Randomized controlled trial comparing the impact of OFA (opioid free anesthesia) and steroids as part of the ERAS (enhanced recovery after surgery) protocol on the quality of recovery after Hip Arthroplasty by Direct Anterior Approach Using Minimally Invasive Surgery

Korthoudt C.[1], Mulier J.[2], Vanlommel J.[2], Vandekerckhove M.[2]
[1]Universitair Ziekenhuis Antwerpen - Edegem (Belgium), [2]AZ Sint-Jan Brugge-Oostende - Brugge (Belgium)

Background and Goal of Study: The direct anterior approach (DAA), a hip replacement method is less invasive showing superior early outcomes compared to lateral approach, both in terms of reduced pain and improved mobility.The aim of the study is to evaluate the effect of opioid free anaesthesia (OFA) combined with a high dose steroid on the analgesic requirements and the quality of recovery (using the QoR15) post-operative in hip arthroplasty by DAA. Both OFA and steroids have shown independent already inflammation reduction. We assume that the combination is stronger in reducing postoperative inflammation and improving recovery.
Materials and Methods: An original intervention study with 41 patients undergoing DAA were randomized in two groups, only the surgeon was blinded. The study group got a classic OFA with high dose methylprednisolone 125 mg. A classic opioid anesthesia was used in the control group without the corticoid. A NMB dose assumed to achieve deep neuromuscular block (PTC <5) was given in every patient, lung protective ventilation, fluid restriction (100mL/h) and a pericapsular injection intraoperative. A linear regression is used to evaluate the independent effect of the study group next to the effect of age/BMI/ASA/gender on the primary and secondary endpoints. Primary endpoints were morphine peri-operative used, QoR15 and CRP after 24h. Surgical access and muscle damage scored by surgeon and Dindoo-Clavien score were the secondary endpoints.
Results and Discussion: The demographic and clinical characteristics of both groups shown only difference in the BMI, this was higher in the control group. OFA & steroids patients recovered better with lower CRP (11,5±3,0 vs 35±12,9 mg/dL; $p=0,002$) and higher QoR15 (127±7 vs 112±10; $p=0,019$) while getting a lower total dose of opioids peri-operative (5,2±2,1 vs 31,5±6,1 mg; $p<0,001$). In a linear regression analysis OFA & steroids was the only independent factor improving the quality of recovery and reducing the peri-operative opioids for the same VAS score. Surgical access scored by the surgeon during the procedure revealed a better exposure when PTC was kept continuous below 5, also showing less muscle damage. The CRP was independent lower in patients getting an OFA & steroid.
Conclusion: OFA and high dose steroids improve quality of recovery with lower CRP. Deep neuromuscular block improves surgical access and limits muscle damage. OFA reduces the total peri-operative opioid need, but most patients after OFA still require an opioid postoperative.

4979

Can Opioid Free Anesthesia (OFA) reduce postoperative pain after Adolescent Idiopathic Scoliosis surgery?

Julien Marsollier F.[1], Marsac L.[2], Assaker R.[2], Ilharreborde B.[2], Dahmani S.[2]
[1]Robert Debré University Hospital - Paris (France), [2]Robert Debré - Paris (France)

Background and Goal of Study: Posterior fusion for adolescent idiopathic scoliosis (AIS) is among the most painful surgeries. Common anaesthesia usually associates hypnotics and morphinomimetics to stabilize blood pressure, while postoperative pain management combines high doses of opioids and non-opioid analgesics. High doses of opioids have been reported to trigger chronic pain, responsible for poorer functional outcomes, and Opioïd Free Anaesthesia (OFA) has recently gained popularity in colorectal surgery. We therefore hypothesized that avoiding intraoperative opioids using a new OFA protocol, during AIS surgery could decrease both postoperative morphine consumption during hospitalization stay, but also the occurrence of chronic neuropathic pain.
Materials and Methods: After IRB approval, a consecutive series of patients operated for AIS were prospectively included. A control group (January and June 2017) using a standard opioid-based anaesthesia, was compared to the OFA group (June 2018 and September 2018) using dexmedetomidine and ketamine. The primary measured outcome was morphine consumption at day 1 and day 3. The second outcome was the occurrence of self-reported chronic pain at 1 year postoperative.
Results and Discussion: A total of 33 patients included in the OFA protocol were compared to 36 controls. All patients were discharged at day 4 postoperative, without difference between groups. Morphine consumption was significantly decreased in the OFA group at day 1 (0.78 mg/Kg [0.16-1.5] vs 1.07 mg/Kg [0.60-1.54], $p=0.023$) and at day 3 (0.9 mg/Kg [0.07-1.73] vs 1.39 mg/Kg [0.46-2.32], $p=0.048$). No difference was reported between groups for pain intensity at day 1 and day 3, but the occurrence of chronic pain was significantly reduced in the OFA group at 1-year postoperative (48% vs 12%, $p=0.036$) without any side effect or complication reported.
Conclusion: OFA is efficient to reduce both postoperative morphine consumption during hospitalization and chronic neuropathic pain after AIS surgery. This protocol should be considered to enhance fast-track rehabilitation.

5085

Opioid sensitivity estimated by vascular stiffness predicts blood pressure after a skin incision

Kamiya S.[1], Nakamura R.[1], Saeki N.[1], Miyoshi H.[1], Tsutsumi Y.[1], Tsuji T.[2]
[1]Hiroshima University Hospital - Hiroshima (Japan), [2]Hiroshima University - HIgashi hiroshima (Japan)

Background and Goal of Study: Previously, we quantified the degree of vasoconstriction as the vascular stiffness value (K) by fitting the Lissajous curve from plethysmography and invasive arterial pressure waveforms to a mechanical impedance model [1], and reported that the rate of change of K (KR) increased with nociceptive stimuli and decreased with opioid dosage [2]. However, the KR value may not be suitable for individual comparison as it varies widely among individuals. We hypothesized that the minimum nociceptive (tetanus) stimuli intensity to evoke the increase in K (MECK: Minimal evoking current of K) more accurately represents individual opioid sensitivity and blood pressure changes after a skin incision than KR.
Materials and Methods: After obtaining local IRB approval, the patients older than 19 years scheduled for a laparotomy were enrolled. After anesthesia induction, when remifentanil was maintained with an effect-site concentration of 2 ng/mL, sequential tetanus stimuli (10 to 80 mA) were loaded. KR at 80mA (KR80) and the current value at which K began to rise (MECK) were measured. The correlation between KR80, MECK, and systolic blood pressure (sBP) changes after the skin incision were analyzed. The formula predicting the sBP after the skin incision was made from MECK, and the accuracy between the predicted and measured sBPs were examined. Pearson's correlation coefficient and the Bland-Altman method were used for our statistical comparisons.
Results and Discussion: There were 30 patients (15 males, 15 females), with an average age of 64.5±13 years. KR80 was 167±80 % , and MECK was 49.7±22.8 mA. The sBP before and after the skin incision were 78±14 mmHg, and 91±17 mmHg, respectively. The correlation coefficient between KR80, MECK, and the changes in sBP after the skin incision was KR80: r = 0.167, MECK: r = 0.62. A Bland-Altman plot compared the measured and predicted sBPs (Bias:-0.276mmHg, Precision:13.46mmHg). The increase in sBP after the skin incision was accurately estimated.
Conclusion: MECK is superior to KR80 as an opioid sensitivity index. MECK may predict individual opioid requirements for suppressing blood pressure increases from a skin incision.
References:
1. Sakane et. al. the Society of Instrument and Control Engineers, Vol.40, No.12, pp. 1236-1242, 2004.
2. Yanabe et al. Minerva Anestesiologica 2018 March;84(3):311-8.

5117

Opioid Sparing General Anaesthesia and pupillometric evaluation of analgesia depth using dexmedetomidine as adjuvant: a pilot study

Stefanini M.[1], Cagnazzi E.[2], Bongiovanni F.[2], Rasulo F. A.[2], Latronico N.[2]
[1]Università degli Studi di Brescia - Brescia (Italy), [2]Department of Anesthesiology-Intensive Care, University of Brescia, Spedali Civili - Brescia (Italy)

Background and Goal of Study: This observational pilot study aims at verifying the depth of analgesia during an opioid sparing anaesthesia (OSA) carried with continuous infusion of dexmedetomidine (Dex) in addition to general multimodal anaesthesia. The Pupillary Dilation Reflex (PDR) seems a useful and objective indicator of the level of analgesia in anaesthetized patients[1]. Particularly, the Pupillary Pain Index (PPI) score evaluates the level of analgesia measuring PDR during increasing tetanic stimulation (10-60 mA).
Materials and Methods: The study analyzed 45 adults who underwent elective surgery under general anesthesia (78% inhalational anesthesia) from 18/02 to 1/08/2019. Only patients submitted to open surgery (incision ≥5 cm) were enrolled. Exclusion criteria were: implanted pacemaker or ICD, ophthalmological comorbidities, chronic opioid use, peripheral neuropathy, other adjuvant drugs, epidural analgesia or loco-regional block. 30 patients («DEX» group) received continuous infusion of Dex and remifentanil (starting dose respectively 0.2-0.4 mcg kg-1 h-1, 0.02-0.2 mcg kg-1 min-1) and 15 («N-DEX» group) received remifentanil only. For each patient, 3-5 measurements were taken, the first 15 mins after the incision, the others at least 15 min apart and at least 10 mins after every change in drug dose. Depth of Anesthesia (BIS or Psi), HR, BP, transient side effects, PONV and NRS were recorded. A PPI score ≤3 was considered the target for appropriate analgesia.
Results and Discussion: "DEX" group patients (8 male, age 42±13 y, BMI 45±8) underwent bariatric surgery, being dex elective in obese patient. "N-DEX" group patients (8 male, age 62±13 y, BMI 26±6) underwent abdominal or plastic surgery. PPI ≤3 was observed in 97% of «DEX» group patients compared to 53% of «N-DEX» group. Moreover, «DEX» group received less than half the remifentanil dose of «N-DEX» group (0,13±0,07 vs 0,3±0,11 mcg kg-1 min-1). The average dose of administered dexmedetomidine was 0,17±0,08 mcg kg-1 h-1.
Conclusion: An OSA strategy with Dex may have a better analgesia stability. A RCT is required to verify this hypothesis.
References:
1. Larson MD et al. Anesth Analg. 120(6):1242-53, 2015.

5308

Total intravenous anesthesia for laparoscopic cholecystectomy in Duchenne muscular dystrophy patient. With or without opioids: an opioid free anesthesia case report

Ferreira Albuquerque Costa N. T.[1], Ojea Yañez R.[1], Díez Munar R.[1]
[1]Hospital Universitario Quirónsalud Madrid - Pozuelo de Alarcón, Madrid (Spain)

Background: Duchenne muscular dystrophy (DMD) patient is always challenging either to respiratory and cardiovascular comorbidity or the anesthetics trigger life-threatening reactions.
Case Report: A DMD 34-year-old patient with absence mobility in lower extremities, domiciliary bi-level positive airway pressure (BiPAP) and multiple admissions due to aspiration, cardiac systolic dysfunction with global hypokinesis, in addition to 95Kg obesity, scoliosis and difficult airway predictors. From acute cholecystitis multidisciplinary evaluation, percutaneous cholecystostomy and antibiotic started prior surgery scheduled under total intravenous opioid free anesthesia (TIVOFA) with difficult airway and rescue planification. Preoxygenation and recruitment promoted during loading perfusions 1.00 µg/Kg Dexmedetomidine, 0.25 mg/Kg Ketamine and 1.25mg/Kg Lidocaine. Anesthesia induction 3 µg/mL effect-site concentration (Ce) Propofol according Marsh program and 1mg/Kg Rocuronium bolus achieves Cormack-Lehane I score with tracheal intubation followed protective pulmonary ventilator strategy. Maintenance with Propofol Ce (2.0-2.5 µg/mL) to bispectral index (BIS® 40-60), Dexmedetomidine (0.20-0.60 µg/Kg/h), Ketamine (0.12-0.25 mg/Kg/h), Lidocaine (0.20-0.60 mg/Kg/h) according to hemodynamic parameters and Rocuronium (0.6 mg/Kg) bolus to Post Tetanic Count (PTC <4) measure by Dragger-TOFscan®. Intraoperative treatment with 50mg Dexketoprofen and 8mg Dexamethasone. Laparoscopic cholecystectomy achieved with hemodynamic stability without opioid requirement. Perfusions withdrawal and 2mg/Kg Sugammadex neuromuscular reversal allowed successful extubating to domiciliary nasal BiPAP. At 12h intensive care unit and 72h hospital staying patient was discharge without opioid analgesic postoperative requirement.
Discussion: Short anesthesia in DMD such as propofol and remifentanil are preferable, succinylcholine must be avoided, volatile anesthetics are considered at high risk for life-threatening complications and anticholinesterase drugs are not recommended.1 Pubmed database search founded 143 results for ("Anesthesia" AND "Duchenne") and 5 results for ("Dexmedetomidine" AND "Duchenne") in sedation strategies.
References:
1. Racca F, et al. Minerva Anestesiol 2013;79:419-33.
Learning points: Regarding respiratory concerns and risk of aspiration in DMD patient, TIVOFA it's an excellent option allowing hemodynamic stability and postoperative analgesia with less nausea and vomit.

5560

Impact of opioid free anaesthesia (OFA) versus opioid anaesthesia (OA) on oxygenation after bariatric surgery: a prospective observational study

Geerts L.[1], Mulier J.[2], Jarahyan E.[2]
[1]Ghent University Hospital - Ghent (Belgium), 2AZ Sint-Jan - Brugge (Belgium)

Background and Goal of Study: Opioids are frequently needed after bariatric surgery but depress breathing. Oxygen (O2) is therefore routinely given postoperative but masks hypoventilation. The primary objective was to compare O2 saturation without O2 therapy at the post anesthesia care unit (PACU) on admission, at discharge and after an opioid dose was given in patients receiving OFA versus OA.
Materials and Methods: In a observational study 64 patients who underwent bariatric surgery from August till October 2019 were included. The study is recorded on NCT 03660306 and approved by the hospital ethical committee. All patients provided consent to allow anonymized data analysis. Depending on the experience of the attending anaesthesiologist an OFA using dexmedetomidine, lidocaine, ketamine and magnesium or an OA using sufentanil was given. Since 2019 laparoscopic bariatric cases are requested to be ventilated using a lung protective ventilation 1 strategy to keep the lungs open until extubation. Fluid loading is restricted to 100 ml/h and deep neuromuscular blockade (PTC<2) is provided until the end of surgery followed by suggammadex to reach full reversal. At the PACU 5 mg of piritramide was given intravenously when VAS for pain was above 5. If saturation drops below 94% an oxygen mask is given. Chi2 and linear regression are used with p<0.05.
Results and Discussion: 34 patients were included in the OFA group and 30 in the OA group. There was no difference between the groups in age, gender and BMI. We found a lower saturation value before induction with OFA due to the dexmedetomidine loading dose of 0.2 mcg/kg LBW. Less oxygen masks at the PACU were needed after OFA (13% vs 53% p=0.001). The average opioid dose required postoperative was 4.8 mg in OFA versus 13.4 mg in OA (p< 0.001). An opioid given in the PACU after OFA or OA gave a significant reduction in oxygen saturation from 97.4% to 94.8% (p=0.001). Oxygen saturation on admission at the PACU was found to be associated with older patients, higher BMI or opioid anesthesia. The drop in saturation after an opioid bolus was associated with older patients, OA and the dose of opioids given postoperative.
Conclusion: OA reduces oxygen saturation post bariatric surgery. Postoperative opioids (after OA/OFA) reduce oxygen saturation in a dose related manner.
References:
1. Young CC et al. BJA 2019;123:898-913

5580

Comparison of early recovery after manual and target control infusion of remifentanil in obese patients

Aldakauskaitė P.[1], Karbonskiene A.[2]
[1]Lithuanian University of Health Sciences - Kaunas (Lithuania), [2]Hospital of Lithuanian University of Health Sciences - Kaunas (Lithuania)

Background and Objective of Study: Early recovery characteristics are important for patients' safety and operating room turnover. Our aim was to compare fundamental methods for dosing remifentanil during morbid obesity surgeries: a manual infusion (MI) and a target-controlled infusion (TCI). Throughout study, patient's recovery time was tracked and compared between the groups.
Materials and Methods: 31 patients were evaluated who underwent bariatric surgery in HLUHS. All of them had received sevoflurane/remifentanil anaesthesia. Remifentanil infusion was randomly assigned to a MI (control group) or to a TCI (TCI group) method. We had evaluated patients' hemodynamics (arterial blood pressure (BP), heart rate, saturation), spontaneous breathing and airway reflexes recovery time, time of extubation, eye opening, recovery of orientation and start of the following oral command. Also we had registered concentrations of remifentanil in the blood (according to automatic infusion pump) while using TCI method.
Results: Groups were similar in demographic data (fig. 1), remifentanil infusion duration (control - median 1,21 h (1,1;1,4), TCI - median 1,25 h (1,3;1,7), p>0,05) and differed according to BMI (fig. 1). We found that remifentanil consumption in the TCI group was higher (median 1,0 mg (1;1,5), p=0,02). We counted a difference of systolic BP (in percent) before and after anaesthesia and compared it in each group – it didn't differ (control – median 13,0 (5,7;17), TCI group – median 12,0 (1,1;15). 9 patients were on antihypertensive treatment preoperatively, there wasn't any statistically significant difference in arterial BP comparing with those 22 who didn't use it. The TCI group demonstrated longer recovery time (median 14 min (12,3;15,7) comparing to median 10 min (8,8;11,2), p<0,001).
Conclusions: We found that comparing TCI method with MI, manual infusion showed better results in patients' recovery after surgery. Moreover, higher doses of remifentanil were consumed using MI. In conclusion, decision of highly qualified anestesiologist is more convenient for morbid obesity patients in comparison with TCI method.

Fig. 1:

	Control	TCI	p
Male	9	4	p>0,05
Female	11	7	
Age (years)(quartiles)	40 (37,1;44,3)	45 (37,3;53,24)	p>0,05
BMI	36,9(37,4;42,2)	43,8(41,9;46,9)	p=0,07

5766

A comparison of hemodynamic response to pneumoperitoneum in morbidly obese patients during low opioid and opioid based general anesthesia

Sobczyk S.[1], Gaszynski T.[2]
[1]Uniwersytet Medyczny w Lodzi - Lodz (Poland), [2]Medical University of Lodz - Lodz (Poland)

Background and Goal of Study: Pneumoperitoneum has important impact on hemodynamic function during general anaesthesia. Low opioid anesthesia is new concept of general anesthesia to reduce opiod use which is especially important for obese patients regarding possible postoperative complications. The primary goal of this study was to estimate the impact of two type of anesthesia - Low Opioid Anesthesia and opioid based anesthesia on cardiac function during penumoperitoneum in morbidly obese patients.
Materials and Methods: 43 patients, aged 18-55 years with BMI ≥35, scheduled for elective laparoscopic bariatric surgery were randomized in two groups : low opioid or opiod based general anaesthesia. Haemodynamic function was measured using transaesophageal Doppler probe ODM+ (Deltex Medical, United Kingdom). Pneumoperitoneum pressure was 15 mmHg. In both groups we measured Cardiac Output. Measurements time points: T1 - after induction to anaesthesia, T2 - anti-Trendelenburg (Fowler) position and pneumoperitoneum. In every timepoint 5 measurements were taken. Group 1: 30 Patients. Anesthesia was induced with 1,5 mg/kg Lignocaine, FNT 0,1mg, Ketamine 50mg, Propofol 1,5-2mg/kg, Rocuronium 0,6mg/kg. Anesthesia was maintained with desflurane in concentration depending on age of patients. Group 2: 13 Patients. Anesthesia was induced with FNT 5mcg/kg, Propofol 1,5-2mg/kg, Rocuronium 0,6mg/kg. Anesthesia was maintained with desflurane.
Results and Discussion: Changes in measured parameter. Results are Mean ± SD:

Parameter	Group	T1	T2
CO (l/min)	1	5,6 ± 1,09	5,18 ± 1,32
	2	6.88 ±1,13	5.55 ±1.12

In Group 1 a drop in CO between T1 and T2 was mean 7,5%, in Group 2 -19,33% (p>0,09). Opioid based general anesthesia decreased CO of 11,83% more than low opioid general anesthesia. There are studies showing no advantage of fentanyl over low opioid dexmedetomidine-based general anaesthesia in attenuating cardiovascular response during surgery in morbidly obese patients [1]. Our study supports that obeservations/
Conclusion: Less hemodynamic changes after anti-Trendelenburg position and pneumoperitoneum were observed during Low Opioid Anesthesia – this type of anesthesia probably provide better hemodynamic stability.
References:
1. Anaesthesiol Intensive Ther. 2016;48(5):275-279.

6405

Comparision between opioid based anaesthesia technique and opioid free anaesthesia technique in patients undergoing laparotomy for gynaecological malignancy: a randomized controlled trial

Kalagara R.[1], Bhoi D.[1], Baidya D. K.[1], Maitra S.[1], Subramaniam R.[1]
[1]AIIMS New Delhi - New Delhi (India)

Background and Goal of Study: Opioid Free Anaesthesia (OFA) was used in bariatric surgery, breast cancer surgery 1, gynaecological laparoscopy 2, which yielded better recovery profile, reduced opioid consumption & related side effects. However, literature search did not reveal the use of OFA in gynaecological oncology surgeries(GOS). Our hypothesis is that OFA technique will provide early recovery compared to Opioid Based Anaesthesia (OBA) technique with the primary outcome being time to attain Post Anesthesia Care Unit (PACU) discharge criteria.
Materials and Methods: This was a prospective, randomized, double blinded trial, of 50 patients (25 in each group), aged 18-65 years, posted for GOS, in which the post-op recovery profile of OBA group - receiving fentanyl & OFA group - receiving dexmedetomidine & ketamine at analgesic doses (at induction & rescue analgesia) were compared. Both the groups received rectus sheath block for analgesia & were maintained with isoflurane. The time to eye opening, time to extubation & the time to shift to the PACU were noted. Post-operatively in the PACU, they were connected to a PCA pump delivering morphine. Pain was assessed with the help of a 0 – 10 cm VAS scale. The time to first analgesic use was recorded. The time to attain the PACU discharge criteria was assessed every 10 minutes. PONV was assessed and treated accordingly. The total analgesic consumption in 24 hours was noted.
Data was analysed using Stata software, using standard statistical tests.
Results and Discussion: Demographic data was comparable. The time to attain the PACU discharge criteria was 99.6 ± 16.197 min in OBA group & 101.8 ± 13.684 min in OFA group which were comparable. The time to extubation & time to shift to PACU were 15.76 ± 4.380 min & 18.44 ± 4.253 min in the OBA group, 17.36 ± 4.367 min & 20.52 ± 4.528 min in the OFA group which were significantly different (p=0.043, p=0.046). The time to first analgesic request in PACU, PONV till 24 hours and post-operative analgesic consumption for 24 hours were comparable.
Conclusion: OFA technique showed similar time to attain PACU discharge criteria compared to OBA technique with a slightly delayed time to extubation.
References:
1. Opioid free anesthesia: what about patient comfort? A prospective, randomised controlled trial by Hontoir et al. PMID: 29873988.
2. Opioid free TIVA improves post operative quality of recovery in ambulatory gynaecologic laparoscopy by Hakim KYK et al. PMID: 31198230.

4518

The comparison of dexmedetomidine and remifentanil on perioperative hemodynamics and recovery profile for laryngeal microsurgery; prospective randomized double blinded study

Won Y. J.[1], Park J. S.[1], Kim H.[1], Chang H. W.[2]
[1]Korea University Guro Hospital - Seoul (South Korea), [2]Eulji University Hospital, Seoul - Seoul (South Korea)

Background and Goal of Study: Laryngeal microsurgery (LMS) causes hemodynamic instability and postoperative agitation, cough, pain, nausea and vomiting. Moreover, short operation time makes anesthesiologist challenging. The aim of this study is comparing the feasibility between continuous administration of dexmedetomidine and remifentanil during general anesthesia in LMS.
Materials and Methods: The patients were randomly assigned to dexmedetomidine (group D) or remifentanil (group R). Before 5min of induction of anesthesia, dexmedetomidine 1.0 mg/kg bolus (group D) and 0.5mg/kg/hr, remifentanil 0.5mcg/kg bolus and 0.05ug/kg/min (group R) was administered to each group, keeping mean blood pressure -20~10%. In both groups, administration of propofol 1.5mg / kg and rocuronium 0.5 mg / kg for induction and anesthesia was maintained with desflurane and 50% O2 + 50% N2O 3L / min titrated through the measurement of the Bispectral index. We recorded hemodynamic data during the general anesthesia and the grade of cough, pain score, analgesia requirement during anesthesia recovery.
Results and Discussion: A total of 61 patient (30 for Group D 31 for Group R) were completed this study. The proportion of patients with no cough or single cough during extubation was comparable between the two groups (Group D 73%, Group R 70%). Eye opening time was significantly longer in group D than group R(599.4±177.9sec, 493.5±103.6sec 95CI -181.2~-30.5, p=0.007). But incidence of more than moderate sore throat is higher in group R than group D (42% vs. 10%, p=0.008) and rescue ketorolac consumption in PACU was significantly higher in group R than group D(23.2 ±24.6mg vs. 3.3±8.6mg p=0.003). The incidence of hemodynamic instability was comparable between the two groups.
Conclusion: Although there was a transient delay on emergence time, dexmedetomidine reduced postoperative sore throat and ketorolac consumption. Dexmedetomidine may be used as an alternative agents to opioid in laryngeal microsurgery.
Acknowledgements: After obtaining approval from the Korea University Guro Hospital Institutional Review Board (IRB No. 2017GR0160), the trial was registered in the UMIN clinical trials registry (unique trial number: UMIN000030217; registration number: R000034516 Principal investigator: Young Ju Won, Date of Registration: 22 November 2017).

4389

Perioperative care for transoral endoscopic thyroidectomy via vestibular approach (TOETVA)

Wang Y. C.[1], Kuo T. C.[1], Wu M. H.[1]
[1]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Transoral endoscopic thyroidectomy vestibular approach (TOETVA) has been developed to improve aesthetic outcome in thyroid surgery. Acquiring new surgical approach neccesitate the cooperation of surgeon ane anesthesiologist. We used the cumulative sum (CUSUM) method to analyse the preoperative preparation time and surgical duration to know the maturation time needed for the team. We also analyzed the the outcomes in recovery and exam our anesthetic protocols for TOETVA.
Materials and Methods: We collected medical records for TOETVA patients from Dec, 2016 through Jul, 2019 in National Taiwan University Hospital. Patients were all intubated after generanl anesthesia with nasotracheal tube, and confirmed with Glidescope. All patients were premedicated with dexmedetomidine and odensetron to avoid post-operative nausea and vomiting. Ketoroloc was given in advance if no allergy and peptic ulcer is identified. We kept Train-Of-Four (TOF Watch SX®) at 40% by cistracurium titration. Intraoperative neural integrity was monitored by Medtronic NIM 3.0 or Inomed ISIS IOM System. We used remifentanil infusion and desflurane for maintenance. All the patients were extubated in the operation theater after patients could spontaneously open their eyesby anesthesiologistwas The learning curve was analyzed by the cumulative sum (CUSUM) method. All patients completed follow-up for at least 3 months and there were no missing outcome data.
Results and Discussion: 119 patients had TOETVA during our observation, of them 107 were femal. Our patient had mean age of 44.7 years. The average preparation time was 37.5 ± 11.7 min. The average operation time is 123.0 ± 39.6 min. There was an obvious slope in time decreasing during the initial cases. Based on competency, the first 35 cases were included in Phase 1 and the following 84 cases in Phase 2. Thyroidectomy related complications, such as hypocalcemia, transient recurrent laryngeal nerve palsy, showed no significant difference between Phase 1 and Phase 2, respectively. However, the TOETVA procedure related complications, such as focal infection, chin numbness, facial indentations, corena erosions, decreased in Phase 2 significantly. Extubation time is significantly shorter in phase 2. All the patients were discharged on the postoperative day 2 without reoperation.
Conclusion: The learning curve for monitored TOETVA was about 35 cases for surgical team.

4758

Postreperfusion syndrome in liver transplantation: incidence and predictors in patients with piggy-back technique

Cardozo Panoff M.[1], Rodriguez Tesouro A.[1], Camps A.[1], De Nadal M.[1], Serrano H.[1], Gonzalez-Suarez S.[1], Anaesthesia, Resuscitation and Pain Management Department
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Background and Goal of Study: Postreperfusion syndrome (PRS) in patients undergoing liver transplantation, was defined as a decrease in the mean arterial pressure (MAP) 30% during the first 5 minutes after unclamping of the inferior portal vein (IPV). The variety of the risk factors presented in several studies suggest that the PRS occurs in an unpredictable manner. So, the primary aim of this study was to determine the clinical predictors factors of the PRS in our patients.
Materials and Methods: After institutional review board approval, this retrospective study was performed. Preoperative variables (age of recipient and donor, etiology of cirrhosis, recipient pathology, Child-Pugh classification, Model for End-Stage Liver Disease score) were analyzed. Intraoperative variables were recorded at each stage of the surgery (acid-base balance, serum electrolytes, systolic volume index, pulmonary capillary pressure, MAP, heart rate, cardiac index, systemic vascular resistance index (SVRI)). The times of each surgical phase, duration of cold-warm ischemia, a portocaval shunt and the weights of the liver (donor/recipient) were recorded too. Prior to graft revascularization, MAP and metabolic status of the recipient were optimized. Association between PRS and preoperative and intraoperative (anhepatic stage) data were tested. Statistical analysis was performed with SPSS software (IBM, 2016). Bivariate analysis was performed to analyze the association between two variables. Association of continuous variables with nominal variables was tested with t-Student (2-tailed). Pearson chi-square was used for nominal dependent variables. P<0.05 was considered threshold for statistical significance.
Results and Discussion: Of the 149 patients included in the study, 34.9% developed PRS. There were significant differences in the variable "donor liver weight/recipient liver weight" (1.15 ± 0.36 in non-PRS group versus 1.35 ± 0.56 in PRS group; p= 0.05); and in the percentage of change in the SVRI, from before clamping of IVC to after clamping (35.6% ± 52.2% increase in the non-PRS group versus 18,39% ± 35,46% (OR 0.44) increase in the PRS group (p=0.045). There were no significant differences between occurrence of PRS and the other preoperative and intraoperative variables analyzed.
Conclusion: In patient undergoing liver transplantation, a low increase in SVRI after clamping of IVC and a greater donor liver weight, are clinical predictors of PRS in our patients.

5272

Evaluating the influence of propofol or sevoflurane on 1-year recurrence free survival by considering pre and postoperative neutrophil-lymphocyte ratio

Nakai Y.[1], Shibata S. C.[1], Fujino Y.[1]
[1]Osaka University Graduate School of Medicine - Osaka (Japan)

Background and Goal of Study: The neutrophil-to-lymphocyte ratio (NLR) has been suggested to reflect inflammation and immunosuppressive conditions. It has been used as an independent prognostic factor in primary breast cancer. When compared with sevoflurane, propofol based total intravenous anaesthsia (TIVA) with regional anaesthesia (RA) has been suggested to suppress cancer recurrence in primary breast cancer. Sevoflurane is suggested to be immunosuppressive while propofol and RA both have anti-inflammatory properties. The monitoring of perioperative NLR may be useful in assessing potential risk of recurrence in breast cancer surgery with respect to the type of anaesthtic agent exposure. We evaluated the association of perioperative NLR variance with recurrence-free survival (RFS) at 1-year in primary breast cancer patients receiving sevoflurane or propofol.
Materials and Methods: In this single center, secondary analysis study, we included patients receiving either sevoflurane or propofol for primary breast cancer surgery between 2008 and 2012. Our primary outcome was the association between NLR increase and RFS at 1-year. Recurrence was defined as locoregional recurrence and distal metastasis. Data was compared using paired t-tests after propensity score matching. Propensity scores were calculated using 7 variables (age, sex, BMI, cancer stage, tumor size, intrinsic subtype, and deviation from standard therapy).
Results and Discussion: Two hundred thirteen patients received sevoflurane and 836 patients received TIVA with propofol. Median follow-up was 59 (interquartile range 44-75) months. Local anesthetic techniques were not used in any cases. After 1:1 propensity-score matching, 224 patients were analyzed in total. There was no significant difference in 1-year RFSs (sevoflurane group: 8.0% [n=9], and propofol group: 7.1% [n=8]) We found no significant change in NLR(sevoflurane group: preoperative 2.45±1.57, postoperative 2.52±1.57, p=0.76, and propofol group: preoperative 2.6±1.96, postoperative 2.7±1.96, p=0.71).We also did not find a no significant difference in NLR of patients with 1-year recurrence. Our result suggests that the anti-inflammatory properties of TIVA without RA may be insufficient for the suppression of cancer recurrence.
Conclusion: There was no significant difference between perioperative NLR during primary breast cancer surgery with either sevoflurane or propofol based TIVA management.

5420

Diabetes mellitus aggravates perioperative neurocognitive disorders by inhibiting autophagy via mTOR signaling pathway in rats

Iin C.[1], Chen X.[2], Zheng T.[2], Zheng X.[2]
[1]Fujian Provincial Hospital - Fuzhou (China), [2]Fujian Provincial Hospital - Fuzhou (China)

Background and Goal of Study: Perioperative neurocognitive disorders (PND) is commonly observed in diabetes mellitus (DM) patients following surgery and anesthesia, but the exact mechanism has not been fully clarified. It has been reported that the activation of mTOR signaling pathway can inhibit autophagy flux in the progression of PND and DM, respectively. However, the role of autophagy in orthopedic surgery-induced hippocampal neuron apoptosis of DM rats remains elusive. The study was designed to investigate the effects of autophagy on the orthopedic surgery-induced cognitive dysfunction in DM rats.
Materials and Methods: Male SD rats were divided into 8 groups randomly (n = 15): Con, DM, DM+Vehical (DM+V), DM+Rapamycin (DM+Rapa), PND, PND+Rapamycin (PND+Rapa), DM+PND, DM+PND+Rapamycin (DM+PND+Rapa). Cognitive function was assessed by using Morris water-maze (MWM) test. Immunohistochemistry and Western Blot were used to determine the expression of p-mTOR and Aβ and p-tau. The contents of cleaved caspas3, Bax, Bcl-2, Beclin1 and LC3 were detected by Western Blot. All data were expressed as means ± SD. P <0.05 was considered statistically significant.
Results and Discussion: The results demonstrated that orthopedic surgery significantly impaired memory performance and inhibit hippocampal neuron autophagy. Similar effects have been found in DM rats. And cognitive function was severely impaired in DM+PND. What's more, autophagy significantly suppressed in DM+PND compared with PND group, accompanied by the mTOR signaling pathway upregulated. Interestingly, treatment of rapamycin, an autophagy inducer, improved the cognitive deficit observed in the DM rats under orthopedic surgery by improving autophagic flux. Rapamycin treatment led to the inhibition of Aβ and p-tau accumulation, and increased the ratio of LC3-II to LC3-I in hippocampal neurons through inhibiting mTOR signaling pathway. These findings suggest that impaired autophagy in the hippocampal neurons of DM rats after orthopedic surgery contributes to cognitive impairment.
Conclusion: Diabetes mellitus aggravates perioperative neurocognitive disorders by inhibiting autophagy via mTOR signaling pathway in rats.

5441

Perceptions and knowledge of post-operative delirium in anaesthesiologists in Singapore - a multicentre questionnaire

Hwang K. Y.[1], Ke Y.[2]
[1]National University Hospital - Singapore (Singapore), 2Singapore General Hospital - Singapore (Singapore)

Background and Goal of Study: Elderly patients aged >65 years are presenting for surgery at an ever-increasing rate. Post operative delirium (POD) affects quality of life after surgery. It has been associated with higher risk of mortality at 6 months, poorer functional outcome and a longer, more costly hospitalization and advancement to dementia. Due to a lack of effective treatment, awareness is important in the prevention of POD and its consequences. The questionnaire aims to understand the knowledge gap amongst anesthesia professionals in Singapore. Materials and Methods: A questionnaire on perceptions and knowledge of POD was administered to senior and junior anaesthesiologists working in Singapore. Various response options were used and data was analysed using descriptive statistics.
Results and Discussion: A total of 205 clinicians responded, with a majority from general and university hospitals. 68% had more than 6 years of practice in

anaesthesiology. Majority ranked POD as the 4th-5th most important post-operative complication, after acute myocardial infarction(AMI), stroke and hypoventilation. However, only 44% were aware that low education level is a major risk factor for POD, and 77% were of the impression that delirium only happens in <30% of elderly population. Half of them were unaware that delirium is associated with an increased risk of AMI, stroke and sepsis; however 94% believe it does contribute to longer hospital stay. When asked about personal practices, 66% admit to having never performed delirium screening tools before (Confusion Assessment Method)3, and only 41% correctly answered that the most prevalent type of delirium is hypoactive. A majority would use depth of anaesthesia monitoring to prevent awareness, but only 40% would use it with intention to reduce POD, despite 72.9% believing in its utility of doing so.
Conclusion: The responses show a general lack of awareness of prevalence and risk factors for POD. Although clinicians know the importance of POD, they underappreciate the severity and significance of its occurrence, and thus are less likely to implement preventive measures. In view of our aging patient population and susceptibility to POD, it is imperative that clinicians are educated and encouraged to maintain a high standard of care for these patients.

5516

Anesthesia Management and Outcome in Gynecological Oncologic Surgery: Retrospective Analysis of Postoperative Mortality, Morbidity and Complications

Yeniay H.[1], Kuvaki B.[1], Ozbilgin S.[1], Saatli H. B.[2], Timur H. T.[2]
[1]Dokuz Eylul University School of Medicine, Department of Anaesthesiology & Intensive Care - İzmir (Turkey), [2]Dokuz Eylul University School of Medicine, Department of Gynecology & Obstetrics - İzmir (Turkey)

Background and Goal of Study: Multidisciplinary approach to anesthesia management has become more important regarding the outcomes of cancer surgery (1). In terms of both incidence and mortality, gynecological cancers are among the top ten in Turkey. The aim of this study was to evaluate the anesthetic management and its possible effects on postoperative mortality, morbidity and complications in gynecologic oncologic abdominal surgery and to determine the related risk factors.
Materials and Methods: The data of the patients, who underwent elective gynecological oncologic surgery between 2010 and 2017, were obtained from the electronic hospital records for this retrospective study. Demographic data, comorbidities, preoperative anemia, Charlson Comorbidity Index, anesthesia management, complications, duration of postoperative hospitalization and morbidity were evaluated in four subgroups of different cancers. (Ethics committee approval was obtained. Approval Number: 2017/21-32).
Results and Discussion: Four hundred and sixty six (466) patients were evaluated. At the time of analysis, 330 patients were alive and 86 were deceased. Mortality ratio was 20,6%. The mean preoperative serum albumin levels were 3,68 ± 0,69 g/dl, mean volume of intraoperative crystalloid administration was 2500,00 ± 1744,12 mL, mean volume of colloid administration was 500,0 ± 434,53 ml, rate of wound infection was 7%, rate of postoperative blood transfusion was 18% and average length of hospital stay was 9,0 ± 9,73 days. Postoperative chemotherapy ratio, preoperative hypoalbuminemia, intraoperative administrated colloid volume, wound infection and need for postoperative blood transfusion were found significantly higher in patients who died. The amount of intraoperative crystalloid administration was significantly higher among the patients, who survived.
Conclusion: Anesthesia management, postoperative mortality, morbidity and complications were investigated in gynecological oncologic surgery. Recently, anesthesia management has become more important in cancer surgery. It requires a multidisciplinary approach for the management of patients perioperatively; especially by the anesthesiologist and the surgeon. This may contribute to reducing the length of hospital stay; rate of morbidity and time for recovery.
Reference:
1. Vanacker B. Curr Opin Anaesthesiol. 2009;22(3):362-7.

5854

Perioperative changes due to Using of the tourniquet for a long time in retrospective study

Kosaka Y.[1], Takenaka J.[2], Sekita A.[2], Sato K.[2], Kanai A.[3], Okamoto H.[3]
[1]Kanto Rosai Hospital - Sagamihara (Japan), [2]Kanto Rosai Hospital - Kanagawa (Japan), [3]Kitasato University School of Medicine - Kanagawa (Japan)

Background and Goal of Study: In orthopedic surgery, we often use Tourniquet due to prevent bleeding during surgery. The long period of artificial ischemia with Tourniquet could be produce a number of side effects on the human, but we don't know about detailed time and side effects. Therefore, we investigate relationship between used Tourniquet time and a lot of side effects in the retrospective study.
Materials and Methods: From October 2018 to March 2019, patients who were scheduled for total knee replacement at the Kanto Rosai Hospital were examined. The primary endpoints are serum potassium level, and serum lactic concentration, and the occurrence of fatal arrhythmia. Secondary endpoints are age, sex, ASA-PS classification, operation time, anesthesia time, bleeding volume, urine volume, infusion volume, transfusion volume, blood gas value, serum electrolyte concentration, and so on.
Results and Discussion: 55 patients were performed total knee replacement, of which 10 (male: 3 and 7 female) patients were inserted intra-arterial line and done a blood test. The periods of use Tourniquet was 121.1±31.23 minutes. In shortly after anesthesia induction, serum potassium level was 3.73±0.24 mEq/dl, and serum potassium level after release of tourniquet was 3.95±0.33 mEq/dl. The lactic acid level increased from 0.9±0.18 mmol/l to 2.2±0.63 mmol/l , and the PH value decreased from 7.425±0.036 to 7.379±0.034. There were significant difference in the serum potassium level and lactic acid level. Also, we could not establish the occurrence of fatal arrhythmia in the perioperative period.
Conclusion: We evaluated elevation in serum potassium level after long-time tourniquet using in total knee replacement.

5903

Effect of dexmedetomidine on postoperative cognitive function in patients undergoing shoulder arthroscopy with beach chair position: a randomized double-blind study

Kim N.[1], Min K. T.[1], Choi S. H.[1]
[1]Yonsei University College Of Medicine - Seoul (South Korea)

Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is one of the most common complications after general anesthesia, especially in elderly patients. Many studies have reported that dexmedetomidine sedation would reduce the incidence of POCD. As the sitting position can decrease the brain perfusion and increase the risk of POCD, the aim of this study was to determine whether intra-operative dexmedetomidine infusion can reduce the incidence of POCD and alleviate the neuro inflammatory response in patients over 60 years of age who underwent shoulder arthroscopic surgery.
Materials and Methods: A total of 80 patients, undergoing arthroscopic rotator cuff repair under beach chair position were randomly allocated to either control group (group C) or dexmedetomidine group (group D). Dexmedetomidine (0.6 ug/kg/hr) or comparable amount of normal saline were infused to each group during the surgery. Hemodynamic variables with cerebral oxygen saturation were recorded (1.) before anesthetic induction (2.) 10 minutes after anesthetic induction (3.) 10 minutes after changing to beach chair position (4.) 10 minutes after returning to supine position. Cognitive tests were assessed on the day before surgery and the day before discharge using the Korean version of Mini-Mental State Examination (MMSE-K). Arterial blood samples were collected for S-100β assay to confirm neuro inflammatory response before anesthetic induction (baseline) and at the end of the surgery.
Results and Discussion: There were no differences in hemodynamic variables and cerebral oxygenation between group C and group D during the measured time points. The results of MMSE-K after surgery were significantly lower compared to the results before surgery in both groups ($P = 0.03$), however, variables with repeated measures did not show significant time by group interaction. Similarly, although results of S-100β measured at the end of surgery (group C, 68.5 ± 22.7; group D, 75.6 ± 45.9) were significantly higher compared to the baseline (group C, 36.7 ± 13.0; group D, 33.6 ± 12.8, $P < 0.001$) in both groups, there was no significant differences with time by group interaction.
Conclusion: Unlike the previous in vitro and in vivo reports that dexmedetomidine administration is associated with reduced incidence of POCD, our results suggest that intraoperative dexmedetomidine does not prevent POCD.

6241

Prospective cohort study on the perioperative course of Reticulocyte Haemoglobin levels in a cohort of colorectal surgery patients and its use for optimization of preoperative (subclinical) anaemia

Hohnen A.[1], Müller C. S.[2], De Korte J. D.[2], Buhre W. F.[2]
[1]Uniklinik Köln - Köln (Germany), [2]Maastricht University Medical Center - Maastricht (Netherlands)

Background and Goal of Study: Pre-operative anaemia increases the risk for perioperative mortality and morbidity. Standard parameters for diagnosing (iron deficiency) anaemia are not optimal and markers for recent erythropoiesis, as the haemoglobin content of reticulocytes (RetHe), were not evaluated in a perioperative setting yet. We aim to evaluate the utility of RetHe as marker for perioperative subclinical (iron deficiency) anaemia.
Materials and Methods: A prospective cohort study was performed in 175 adult patients undergoing colorectal surgery from September 2017 until November 2018 at the Maastricht University Medical Center. Anaemia diagnosis including RetHe measurement occurred perioperatively at five predefined time points. Pre-operatively, the iron status was determined and substituted according to the algorithm proposed by Goodnough et al. (2011). A linear mixed-effects model and correlation analyses were performed.
Results and Discussion: RetHe levels were 2.56 and 5.35 pg lower on post-operative day three and five, respectively, compared to baseline. RetHe levels did not differ between genders and patients with different underlying diseases. RetHe positively correlated with haemoglobin and transferrin saturation and negatively correlated with CRP. Additionally, RetHe levels were significantly lower in iron-deficient anaemic patients compared to non-iron deficient, non-anaemic patients.
Conclusion: RetHe might be an appropriate marker for iron deficiency anaemia pre- and post-operatively and in patients with inflammatory diseases.

6335

Lamotrigine for Reduction in Psychologic Side-Effect of Perioperative Ketamine: Pilot Randomized Double-blinded Placebo-controlled Trial

Fang J.[1], Maheshwari K.[1], Makarova N.[1], Turan A.[1], Sessler D. I.[1], Anand A.[1]
[1]Cleveland Clinic Foundation - Cleveland (United States)

Background: Ketamine, an NMDA receptor antagonist, is an attractive general anesthetic, but the drug's psychologic side-effects limit widespread use. Limited evidence suggests that lamotrigine, which inhibits glutamate release, may reduce the psychologic side effects of ketamine. We therefore tested the hypothesis that combining 300 mg of lamotrigine with ketamine reduces psychological side-effects.
Methods: We enrolled 46 adults 18-65 years old who were scheduled for non-cardiac surgery with general anesthesia and planned overnight hospital stay. Patients were randomized to placebo or 300 mg oral lamotrigine given 1 hour before surgery. Anesthesia was induced with ketamine 1 mg/kg and propofol, and maintained with sevoflurane. An infusion of ketamine (5 µg/kg/min) was started at induction and continued throughout anesthesia. The primary outcome was presence of psychologic side-effects measured 30-90 minutes after admission to the postanesthesia care unit (PACU). Side effects were characterized by four key items: conceptual disorganization, hallucinations, suspiciousness, and unusual thought content. Secondary outcomes were amount of opioid use in morphine equivalents, time-weighted average verbal-response pain scores (0-10), and the incidence of postoperative nausea and vomiting (PONV).
Results: 23 patients were randomized to lamotrigine and 23 to placebo. No patients randomized to lamotrigine had the psychologic side-effects, whereas 3 assigned to placebo did. Psychological side effects were thus too sparse to justify formal statistical testing. Opioid use in morphine equivalents was a median of 5 [Q1, Q3: 0, 15] mg in patients randomized to lamotrigine and 10 [0, 15] mg in those assigned to placebo, with the ratio of means being 0.82 (98.3% CI; 0.08, 8.47, P=0.84). Mean pain scores were similar in the lamotrigine (4.9 ± 3.1) and placebo (4.4 ± 2.8) patients. 6 patients in each group experienced PONV.
Conclusions: Lamotrigine did not change postoperative pain, opioid consumption, or the incidence of PONV. Even in patients given relatively high doses of ketamine, psychological side effects were rare at 6%, which was much lower than currently reported 15-20%. Assuming the observed incidence of psychological side effects, a full trial would require 200 patients (80% power, alpha=0.05). Future trials should also consider more sensitive measures of psychological side-effects.

4384

Differential Modulations of Hippocampal CA1 Pyramidal and Interneuron Contribute to Amnesic Effect of Isoflurane

Zhou C.[1], Zhao W.[1], Zhao S.[2], Liu J.[1]
[1]West China Hospital, Sichuan University - Chengdu (China), [2]Union Hospital, Tongji Medical College, Huazhong University of Science and Technology - Wuhan (China)

Background and Goal of Study: Anterograde amnesia is one of the main pharmacological endpoints of volatile anaesthetics, which can prevent distressing memory and intraoperative awareness. Volatile anaesthetics including isoflurane can induce anterograde amnesia starting at sub-anaesthetic concentration. Hippocampal high-frequency ripple is the local field potential (LFP) highly associated with synchronous neural firing in the hippocampal CA1 subfield and support memory consolidation and retrieval 1. This study was designed to explore the effect of isoflurane on hippocampal network, which may explain amnesic effect of isoflurane.
Materials and Methods: Hippocampal CA1 ripple was measured in mice by LFP with the electrode inserted into CA1 subfield. Effect of isoflurane on mice memory was investigated by fear-potentiated startle. Whole-cell patch clamp recording was performed in acute brain slices to determine the effects of isoflurane on neuronal excitability of hippocampal CA1 pyramidal and fast-spiking interneuron. A simulation model in silico was used to validate the effects of isoflurane on neuronal activity and ripple suppression.
Results and Discussion: Isoflurane at sub-anaesthetic concentration decreased the amplitude, rate and duration of ripple while increased inter-arrival time between ripples. With the same concentration, isoflurane impeded fear-potentiated startle in mice in vivo. In patch clamp recording, isoflurane depressed frequency of action potentials (APs) at sub-anaesthetic concentration in fast-spiking interneuron while slightly enhanced frequency of APs in pyramidal neurons. A simulation model of ripple that based on neuronal excitability of CA1 pyramidal and interneuron was used to validate the effects of isoflurane between neuronal excitability in vitro and ripple in vivo. This study indicates that isoflurane at sub-anaesthetic concentration can suppress hippocampal CA1 high frequency ripple by differentially modulating neuronal excitability of pyramidal and interneuron, which may contribute to the amnesic action of isoflurane.
Conclusion: Differential modulations of neuronal excitability in hippocampal CA1 subfield contribute to amnesic effect of isoflurane and hippocampal high frequency activity maybe the predictor of memory during general anaesthesia.
References:
1. Joo HR, Frank LM. The hippocampal sharp wave-ripple in memory retrieval for immediate use and consolidation. Nat Rev Neurosci 2018; 19: 744-57.

4542

Plasma mitochondrial DNA levels and damage correlate with post-transplant renal allograft function in living donor kidney transplantation

Trefna M.[1], Nieuwenhuijs-Moeke G.[1], Hijazi Z.[1], Kopa M.[2], Seelen M.[1], Henning R.[1]
[1]Universitair Medisch Centrum Groningen - Groningen (Netherlands), [2]Charles University - Prague (Czech Republic)

Background and Goal of Study: The definition of an organ's transplantability and prediction of early graft dysfunction is hindered by the lack of sensitive biomarkers. Mitochondrial DNA (mtDNA) in plasma has been identified as a propagator of tissue injury in trauma and sepsis and as a marker predicting progression of AKI. Here we explore the potential of mtDNA plasma level and mtDNA damage as a marker of organ function in a cohort of living donor kidney transplantations, a post-hoc analysis of VAPOR1.
Materials and Methods: Plasma was obtained from 57 donor-recipient couples at various time points. MtDNA levels were measured in donors pre-op and in recipients pre-, intra- and post-operatively, with intraoperative samples being taken from both the renal vein and systemic arterial circulation. mtDNA was measured using polymerase chain reactions for D-loop, ND1 and ND6. MtDNA damage was determined using ND1/Dloop and ND6/Dloop ratios, under the assumption that D-loop is less prone to DNA damage than ND1 and ND6. MtDNA levels and damage were associated with kidney function parameters and urinary biomarkers KIM-1 and NAG in recipients
Results and Discussion: Pre-op mtDNA levels were higher in recipients than donors. Highest levels of mtDNA were measured upon reperfusion in renal vein samples. Recipients showed increased mtDNA levels 9 d post-op compared to pre-op, with recipients receiving a kidney from a related donor having higher levels than those receiving a kidney from an unrelated donor. Recipient's mtDNA levels 2 h

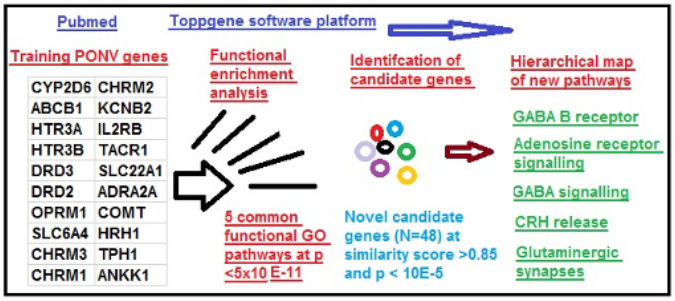
post-op correlated with creatinine levels at 6 and 24 m. In addition, mtDNA levels at 9 d correlated with KIM-1 at d 9, creatinine levels at 6 and 24 m and glomerular filtration rate at 6 m. Pre-op mtDNA damage was comparable between donors and recipients, while mtDNA damage increased in recipients throughout 9 d post-op. Recipients with high mtDNA damage directly after reperfusion had significantly higher levels of KIM-1 at 1 and 9 d post-op, but lower creatinine levels at 6 and 24 m post-op compared to recipients with low mtDNA damage. Conversely, patients with the highest mtDNA damage at 9 d post-op had lower KIM-1 and NAG levels.
Conclusion: Levels and damage of plasma mtDNA early after kidney transplantation are associated with momentuous kidney biomarkers and a long-term accelerated decline in renal function. Measurement of post-op mtDNA levels may aid to the identification of patients at risk for accelerated kidney dysfunction.

4564

Machine-learned discovery of new genes and pathways associated with postoperative nausea and vomiting (PONV)

Janicki P.[1]
[1]Penn State Hershey Medical Center - Hershey (United States)

Background and Goal of Study: The high interindividual variability infrequency of PONV suggests genetic susceptibility. System biology can be leveraged to integrate genetic level data with biologic processes to generate prioritized candidate gene lists and to understand novel biological pathways. Such data would be key to informing future polygenic studies with targeting genome wide profiling.
Materials and Methods: The literature search by Pubmed (1998-2019) was performed to identify 'training' genes set associated with PONV in humans. Candidate genes were identified and prioritized using Toppgene suite (toppgene.cchmc.org), based on functional enrichment using several gene ontology (GO) annotations. Computationally top-ranked candidate genes and literature curated genes were then included in pathway enrichment analyses, Hierarchical clustering was used to visualize select functional enrichment in patients with PONV phenotype.
Results and Discussion: Literature review identified 20 training genes associated with PONV which jointly enriched (p value < 5x10--11, Benjamini-Hochberg correction) 5 functional activity GO pathways including neurotransmitter binding, G protein-coupled amine receptor activity, neurotransmitter receptor activity, ammonium ion binding and serotonin binding. By prioritizing or ranking with machine–learning algorithm we identified 262 novel candidate genes based on functional similarity to training gene list. The top of candidate genes with the similarity score > 0.85 and combined p < 10-5 comprised 48 genes potentially associated with PONV. Heat map demonstrated significant enrichment of previously reported genes common to PONV phenotype, and several novel GO pathways, topmost being GABA signaling, glutaminergic synapse, adenosine receptors, corticotropin-release pathway, immune processes (chemokine receptors) and tyrosine hydroxylase.
Conclusion: This study demonstrates the utility of functional annotation-based prioritization and enrichment approaches and identifies novel genes and unique/shared biological processes involved in PONV.



4609

The Effect of Inhaled Anesthetics on Myocardial Contractility in Laparoscopic Cholecystectomy: a Single-center Randomized Trial

Gritsan A.[1], Korolkov O.[2], Lutcenko M.[3], Chervyakov I.[2]
[1]Krasnoyarsk Regional Clinical Hospital, Krasnoyarsk State Medical University - Krasnoyarsk (Russia), [2]Krasnoyarsk Interdistrict Clinical Emergency Hospital named after N. S. Karpovich, Dep. Anesthesiology - Krasnoyarsk (Russia), [3]Krasnoyarsk Interdistrict Clinical Emergency Hospital named after N. S.Karpovich, Dep. Anesthesiology - Krasnoyarsk (Russia)

Background: Evaluation of the effect of inhaled anesthetics on hemodynamics during laparoscopic cholecystectomy is traditionally carried out by measuring blood pressure and heart rate (HR), which does not give an idea of the change in central hemodynamics in full. Meanwhile, there are non-invasive algorithms for evaluating the parameters of central hemodynamics based on the principle of volumetric compression oscillometry, which have proved themselves to be no worse than invasive techniques.
Gloal of Study: To evaluate the effect of sevoflurane and desflurane on myocardial contractility and central hemodynamics in patients undergoing laparoscopic cholecystectomy.
Materials and Methods: A single-center randomized study was conducted, including 50 patients of both sexes aged 36 to 68 years who underwent laparoscopic cholecystectomy for gallstone disease. Patients were divided into two groups depending on the inhaled anesthetic used: group 1 (n = 25, 53±9 years) - sevoflurane, group 2 (n = 25, 51±11years) - desflurane. The duration of anesthesia was 60.4 ± 5 min and 57.3 ± 8 min, respectively. Non-invasive monitoring of central hemodynamics by volume-compression oscillometry: BP, HR, cardiac output, CI, stroke volume, stroke index (SI), SRV. The assessment of central hemodynamic parameters and level was carried out at the following stages: I - before induction; II - after induction, intubation and the beginning of the supply of an inhaled anesthetic; III- after application of carboxyperitoneum; IV - after clipping of the gallbladder; V - suturing.
Results and Discussion: The indicators of BP, HR did not have significant differences throughout at all stages of the study. When assessing hemodynamic profile indicators, statistically significant differences were revealed. Group 1 showed lower values (p <0.05) of BPmean (103.9 ± 17 and 113.3 ± 24, respectively) and SI (31.7 ± 13 and 44.3 ± 6) at stage III of the study, with higher rates of SRV at the same stage in comparison with group 2 (1526 ± 200 and 1449 ± 205). Differences were also recorded in stage II — lower indicators of SV in group 1 — 82.4 ± 14, in comparison with group 2, where this parametr was — 94.0 ± 15.
Conclusion: Compared with sevoflurane, desflurane has a less effect on myicardium contarctility, both at the stage of saturation with an anesthetic and under conditions of carboxyperitoneum.

4636

The cytokine response of different anesthesia regimens in healthy volunteers

Bosch D.[1], Van Meurs M.[1], Jongman R.[1], Heeringa P.[1], Abdulahad W.[1], Struys M.[1]
[1]UMCG - Universitair Medisch Centrum Groningen - Groningen (Netherlands)

Background and Goal of Study: Anesthesia is assumed to influence patients' immune response. During cancer surgery, a well-functioning immune response is pivotal. The aim of this study was to examine the immunological response of intravenous anesthetics in healthy volunteers without surgical insult.
Materials and Methods: Serum samples of 93 healthy volunteers, from previously published studies, were collected before and eight hours after induction. Thirty-one received propofol, 30 received propofol/remifentanil, 17 received dexmedetomidine and 15 received dexmedetomidine/remifentanil. The anesthetic regimens were standardized. Serum level of interleukin (IL)-2 , IL-4, IL-6, IL-10, IL-17, IL-18, IL-21, IL-22, IL-23, C-X-C motif ligand 8 (CXCL8), Interferon gamma (IFNγ), E-selectin, L-selectin, MHC class I chain-polypeptide-related sequence (MIC)A, MICB, Granzyme A, and Granzyme B (Table 1), were measured by LUMINEX.
Results and Discussion: After anesthesia with propofol alone, IL-4 (p=0.021), IL-6 (p=0.018), IL-21 (p=0.034), IL-22 (p=0.001), CXCL8 (p=0.004), MICB (p=0.040) and Granzyme A (p=0.045) were significantly increased. Propofol combined with remifentanil; IL-17 (p=0.027), IFNγ (p=0.001) and MICA (p=0.003) were significantly decreased, only L-selectin (p=0.000) was significantly increased. Th1/Th2 ratio was significantly decreased; 0.651 vs 0.434 (p=0.001). After dexmedetomidine alone, IL18 (p=0.002), L-selectin (p=0.010), E-selectin (p=0.002) and Granzyme B (p=0.023) decreased significantly. Dexmedetomidine with remifentanil resulted in no significant changes.

Conclusion: In this study with healthy volunteers, cytokine release after propofol alone was associated with pro –and anti-inflammatory immune responses and in combination with remifentanil the Th1/Th2 ratio decreased. Dexmedetomidine, also in combination with remifentanil, had less immune activation and was shown to have primarily anti-inflammatory properties. Anesthesia with propofol and dexmedetomidine might be an ideal combination during cancer surgery, but dosage and magnitude of the immune response should be further investigated in prospective adequately powered clinical trials.

Cytokine/chemokine	
Interleukin 2	Adaptive immune response. Th1 cytokine. Released by activated T-lymphocytes (CD4 and CD8) and NK cells. Important for proliferation of T, B and NK cells.
Interleukin 4	Adaptive immune response. Th2 cytokine, inhibits Th1 response. Anti-inflammatory cytokine. Associated with humoral immunity.
Interleukin 6	Innate immune response. Th2 cytokine. Pro-inflammatory cytokine. Down-modulation of the cytotoxic activity of NK cells
CXCL8 (Interleukin 8)	Chemokine produced by macrophages. Innate immune response. Pro-inflammatory cytokine. Potent promotor of angiogenesis.
Interleukin 10	Innate immune response. Anti-inflammatory cytokine. Inhibits the synthesis of IL2, IL12, IFN-γ and TNF-α. Suppress NK cells, but not NK T cell activation
Interleukin 17	Released by innate immune cells. Inducing and mediating pro-inflammatory responses. Production of many cytokines like IL6, IL8, TNF-α, and prostaglandins
Interleukin 18	Pro-inflammatory cytokine. Activation of cytotoxic T cells and NK cells. Dual effects Th1 and Th2 inflammatory responses.
Interleukin 21	Pro-inflammatory cytokine. Up-regulate Th1 response. Activate NK cells. Anti-tumor effects through continued and increased cytotoxic T cell and NK cell response
Interleukin 22	Belongs to IL10 family. Produced by activated NK and T-cells. Inflammation/cancer promoting as well as restraining functions have been described
Interleukin 23	Pro-inflammatory cytokine. Stimulates IFN-γ secretion by NK cells. Promotes tumorigenesis by driving pro-tumor inflammation to suppress antitumor effector cells.
IFN-γ	Adaptive immune response. Pro-inflammatory cytokine. Produced by Th1 cells. Enhance cytotoxic effects of NK and T cells. Cellular immunity
L-selectin	Adhesion molecule. L-selectin on NK cells and L-selectin ligands on endothelial cells are essential for NK cell recruitment to lymph nodes.
E-selectin	Adhesion molecule. Recruiting leucocytes to the site of injury. Mediates the adhesion of tumor cells to endothelial cells
MICA/B	Major histocompatibility complex class I molecules. Signaling of cellular distress and evoke immune responses. Expression of MHC class I is frequently impaired in virus-infected or tumor cells, which results in lack of engagement of inhibitory receptors and thus activation of NK cells.
Granzyme A/B	Released by cytoplasmic granules within cytotoxic T cells and NK cells. Eliminating cells that have become cancerous or are infected with viruses or bacteria

Table 1. Brief description of the investigated cytokines and chemokines.

4648

The investigation of factors associated with postoperative shivering

Kammura Y.[1], Ikeda M.[2], Shirozu K.[1], Yamaura K.[1]
[1]Kyushu University Hospital - Fukuoka (Japan), [2]Hamanomachi Hospital - Fukuoka (Japan)

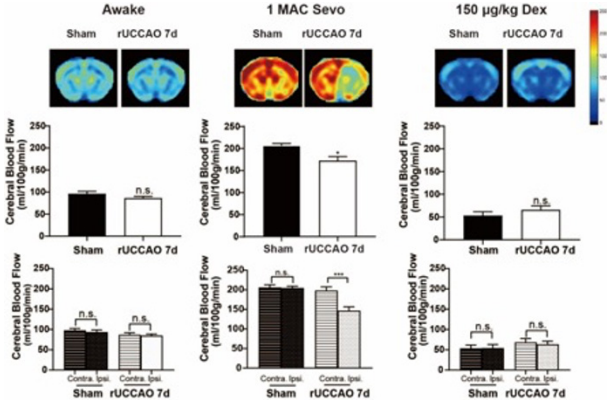
Background and Goal of Study: It is well known that the incidence of postoperative shivering is inversely associated with core body temperature. However, it has been reported that the threshold of shivering could be affected by peripheral temperature or anesthetic agents. These reports are dated, though, and anesthesia techniques have since advanced considerably. Thus, the purpose of this study is to investigate the factors associated with postoperative shivering in current practice.
Materials and Methods: The institutional clinical research ethics committee of Kyushu University approved the study protocol (IRB Clinical Research number 2019-233). This retrospective study involved 340 patients who underwent radical surgery to treat endocervical or uterus cancer under general anesthesia in our center from December 2012 to June 2019. The incidence of shivering after general anesthesia was extracted from the electronic anesthesia records. Multiple logistic regression analysis was performed to estimate the odds ratio (OR) for postoperative incidence of shivering. The following covariates were also collected from the anesthesia records: pharynx/fingertip temperature 10 min before the end of surgery, administration of NSAIDs/acetaminophen, epidural anesthesia, amount of bleeding, age, body mass index, and duration of surgery.
Results and Discussion: Among 340 patients, postoperative shivering developed in 109. The OR of postoperative shivering was significantly smaller in patients whose core temperature was over 37.5°C compared with those whose core temperature was under 37.0°C (OR 0.48, 95%CI 0.24–0.94; P=0.033). Peripheral body temperature was not associated with incidence of shivering. The use of acetaminophen significantly decreased the OR of postoperative shivering (OR 0.46, 95%CI 0.24–0.89; P=0.022). The OR of postoperative shivering were smaller in patients under 30 years old compared to patients over 50 years old (OR 0.10, 95%CI 0.04–0.27; P<0.001). In a recent randomized triple-blind trial, acetaminophen was reported to inhibit the incidence of shivering, consistent with the results of this study.
Conclusion: This study indicated that development of shivering under current anesthesia technique in our hospital was associated with postoperative core body temperature, use of acetaminophen and age.

4773

Sevoflurane but not dexmedetomidine impairs ipsilateral cerebral blood flow autoregulation in mice after unilateral common carotid artery occlusion

Hao R.[1], Fang F.[1], Liang Z.[2], Cang J.[1]
[1]Zhongshan Hospital, Fudan University - Shanghai (China), [2]Institute of Neuroscience, Chinese Academy of Sciences - Shanghai (China)

Background and Goal of Study: Sevoflurane is a widely used general anesthetic. It was reported that 1 MAC (minimum alveolar concentration) of sevoflurane did not influence cerebral blood flow (CBF) autoregulation. Yet evidence is lacking in pathological state with carotid artery disease. Carotid artery disease occurs with a prevalence rate of 2-3% in patients over 60. And it contributes to approximately 10% to 15% of all ischemic strokes. Mouse model of unilateral common carotid artery occlusion (UCCAO) mimics its pathogenesis and results in cerebral hypoperfusion and vascular remodeling. This study aims at investigating the effect of sevoflurane on CBF autoregulation in mice with right UCCAO (rUCCAO).
Materials and Methods: 10w male C57 mice were randomly assigned to Sham and rUCCAO group. MAC value of sevoflurane in mice were determined before surgery. MAC was calculated as the average of greatest inspired concentration that permitted movement in response to tail clamp and the smallest concentration that prevented movement. Then, using Bruker BioSpec 9.4T animal MRI system and Pseudo-Continuous Arterial Spin Labeling (pCASL) technique, we calculated cerebral blood flow (CBF) of mice with 1 MAC sevoflurane (SEVO), 100 μg/kg dexmedetomidine (DEX) (intraperitoneal injection) or in awake state without anesthetics 7 d after surgery.
Results and Discussion: 1 MAC of SEVO for mice was 2.76%±0.19 (n = 6). Global CBF was not disrupted in awake mice 7d after rUCCAO. Under SEVO anesthesia, but not in awake state or with DEX, CBF of ipsilateral hemisphere was significantly lower than contralateral hemisphere 7d after rUCCAO (P < 0.001, n = 6). SEVO has direct vasodilatory effect in contradiction to high dose DEX, which causes mild cerebral vasocontraction and decreased CBF. Lower CBF of ipsilateral hemisphere might be associated with its paradoxical vasodilatory response to SEVO.



Conclusion: Our results suggested that CBF autoregulation in ipsilateral hemisphere was disrupted under SEVO anesthesia but not DEX 7 days after UCCAO.

5246

Sevofluane inhalation enhanced thermogenesis of the flower, Nelumbo nucifera (Lotus)

Adachi H.[1], Adachi Y.[2]
[1]Osaka University - Suita (Japan), [2]Nagoya University Hospital - Nagoya (Japan)

Background and Goal of Study: Thermogenesis in plants is rare, but some flowering plants i.e., Nelumbo nucifera (Lotus) shows to generate heat to raise the temperature (Temp). Lotus flowers can actively warm up a large obconical receptacle. Recently Yokawa et al. (Ann Bot 2018; 122: 747) reported that anaesthetics inhibit plant organ active movements in diverse species. Both inhalational and topical anaesthetics might modify endocytic vesicle trafficking and produce loss of responses to stimuli. Anaesthetics might alter the homeostasis of the plant. Thus, we preliminary investigated the effect of sevoflurane inhalation on the Temp of lotus.
Materials and Methods: Lotus was purchased from the gardening farmer. We placed the flowerpots of lotus on the sunny ground and supplied water including minerals. In summer, 5 blossoming were observed. On the day of blooming, the lotus was transferred into the laboratory room separated from the other cooled space. The lotus were enveloped a large polyethylene bag. One hour after the stabilization, the lotus was randomly inhaled air or 8% sevoflurane 2 hours, in a cross over manner. The Temp of the receptacle, the leaf surface and the ambient were measured using the non-contact infrared thermometer (AD-5617, AND, Tokyo, Japan). The Temp changes from baseline values corrected by the ambient Temp were statistically analyzed using t-test.
Results and Discussion: Before the inhalation, the Temp of the receptacle and the ambient were 31.0 ± 2.1 and 27.3 ± 1.3 ℃ (mean ± SD). The corrected Temp of the receptacle was significantly higher in the sevoflurane group (Figure). The leaf surface Temp significantly rose at the middle point of the anaesthesia.
Lotus inspires the air through the stoma on the leaf surface and transfers the air to the rhizome. The prolonged effect of inhalation might be explained by the gas flow. Whereas, the rising of Temp in the leaf surface might be a result of inhibition of evaporation through the stoma.
Conclusion: Although the study was preliminary and trial experiments, there was a possibility that inhalational anaesthesia induce diverse physiological changes not only in animals but also plants.

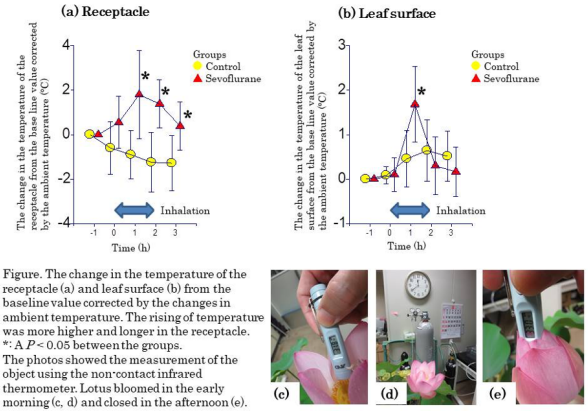


Figure. The change in the temperature of the receptacle (a) and leaf surface (b) from the baseline value corrected by the changes in ambient temperature. The rising of temperature was more higher and longer in the receptacle. *: A $P < 0.05$ between the groups.
The photos showed the measurement of the object using the non-contact infrared thermometer. Lotus bloomed in the early morning (c, d) and closed in the afternoon (e).

5232

STAT3 involved in cellular vulnerability to isoflurane

Ma Z.[1], Gu X.[1], Yang Y.[1], Liu Y.[1], Sun Y.[1]
[1]Affiliated Drum Tower Hospital of Medical School of Nanjing University - Nanjing (China)

Background and Goal of Study: Isoflurane causes widespread neuronal apoptosis in the developing brain, whereas the mature brain appears resistance. Signal transducer and activator of transcription-3 (STAT3) is crucial in cell survival during the neural network establishment period. Notably, this period roughly corresponds to the restricted time window of neural vulnerability to isoflurane. The present research used a combination of in vitro and in vivo study to determine whether isoflurane would target STAT3 to deliver its cytotoxicity.
Materials and Methods: Mice at postnatal day 7 or 21, primary cortical neurons cultured for 5 or 14 days and human neuroglioma U251 cells were treated with isoflurane. An anti-sense oligonucleotide and a specific inhibitor of STAT3, a plasmid containing human wild-type STAT3, a proteasome inhibitor MG-132 and a calcineurin inhibitor FK506 were utilized to evaluate the influence of STAT3 levels on isoflurane-induced cytotoxicity.
Results and Discussion: We found that the stage-dependent pro-apoptotic effect of isoflurane was accompanied by a developmental regulation of STAT3. A decrease in calcineurin activity as well as with a decrease in the ability of isoflurane to trigger calcineurin activity was observed in more mature brain or neurons. STAT3 disruption in U251 cells exaggerated isoflurane-induced oxidative stress and apoptosis. Whereas STAT3 overexpression mitigated these cytotoxicities, and its anti-oxidative effect was linked to its canonical activity as a nuclear transcription factor. Finally, our study revealed that inhibiting the activity of calcineurin by FK506 attenuated the isoflurane-induced loss of dendritic spines in primary neurons and isoflurane-induced cognitive dysfunction in mice.
Conclusion: The present study demonstrated that the impaired STAT3 pathway contributed to the cellular vulnerability to isoflurane, and provided a new insight into the molecular mechanisms underlying developmental isoflurane neurotoxicity.
Acknowledgements: This study was supported by the National Natural Science Foundation of China(81600932, 81771142), Key Project supported by Medical Science and technology development Foundation, Nanjing Department of Health(QRX17137), Jiangsu Planned Projects for Postdoctoral Research Funds(1701006A) and China Postdoctoral Science Foundation(2017M621730).

5091

Dexmedetomidine alleviates the long-term impact on the synaptic plasticity and hippocampal neurons induced by neonatal repeated exposure of sevoflurane

Liang X.[1], Liu C.2, Zhu Z.1, Zhang Y.3
[1]The Affiliated Hospital of Zunyi Medical University - Zunyi (China), [2]Zunyi Medical University - Zunyi (China), [3]The second affilated hospital of Zunyi Medical University - Zunyi (China)

Background and Goal of Study: To investigate the effect of dexmedetomidine (DEX) preconditioning on long-term lesion of synaptic plasticity and neuronal apoptosis in hippocampus induced by neonatal repeated exposure of sevoflurane.
Materials and Methods: 60 rats were randomly assigned into sevoflurane group (S), DEX preconditioning group (D) and control group. Rats in group S and D were intraperitoneally injected with 3ml/kg saline or 20μg/kg Dex in 3ml/kg saline respectively before inhaling 2.6% sevoflurane for 4h at P7, P14 and P21. Rats in group C inhaled carrier gas for 4h after saline injecting. Then, at juvenile and adult stage, spatial learning and memory, hippocampal long-term potentiation (LTP), paired-pulse facilitation (PPF) ratio, neuronal apoptosis and the expression of cleaved-caspase-3 in the hippocampus in all groups were tested.
Results and Discussion: At both juvenile and adult age, rats in group D performed better in escaping latency and showed more times in crossing the target quadrant than those in group S. The increments of field excitatory postsynaptic potential (fEPSP) slope after high frequency stimulation in group S were remarkably lower than group C and D, while PPF ratio of group S was significantly higher than group C and D at multiple stimulus intervals (FIG.1), suggesting that DEX can protect synaptic plasticity from the adverse effect of sevoflurane. In addition, the number of TUNEL positive cells and the expression of cleaved caspase-3 in group D were remarkably lower than group S (FIG.2), indicating a neuroprotective role of DEX
Conclusion: Dexmedetomidine can reduce the hippocampus neuronal apoptosis and ameliorate the abnormal changes of synaptic plasticity, and thereby protect the long-term learning and memory ability from repeated neonatal sevoflurane exposure.

5493

Prophylactic use of Anti-emetics. Concern for patient safety and outcome

Talreja V. K.[1], Malik Z.[1], Lal S.[1]
[1]*Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)*

Background and Goal of Study: Postoperative nausea and vomiting (PONV) is very common unwanted effect of general anaesthetics leading to prolonged post-anaesthesia care unit (PACU) stay, unanticipated delayed discharge from hopsital, patient's dissatisfication along with significant burden on health care facility. The incidence of PONV is between 30% - 80%. Thus appropriate patient risk identification, risk documentation and implementation of interventions may reduce the burden of PONV to both patients and health care system. Aim: Compliance with patient's risk stratification and documentation along with the administration of PONV prophylactic agents against the current recommended given by NHS guidelines.
Materials and Methods: We did prospective audit on 60 patients undergoing general/regional anaesthesia for surgery at Our Lady of Lourdes Hospital, Drogheda, over period of 4 weeks. Patients having Apfel scoring between 0-4 were included after approval from local audit committee. We followed the practice of documenting prophylactic antiemetic intraoperatively and for postoperative period till recovery.
Results and Discussion: In our audit 10/60 patients were having Apfel score 0 for PONV and same number of patients fall into Apfel score of 3, both groups of patients received same prophylactic anti-emetics. None of the patient fullfilled criteria of Apfel Score 4. While the rest were (40 patiens) scored 2 and 3 according to Apfel scoring system and surprisingly received the same treatment as compared to others.
Conclusion: We found that there is gap in risk stratification, documentation and compliance with NHS guidelines according to Apfel scoring system for PONV.
Recommendation: Risk Stratification for PONV should be part of pre-op assessment. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety
References:
1. Risk Stratification for PONV should be part of pre-op assessment.
2. PONV prophylaxis should be administered according to NHS guidelines to stick with AAGBI patient safety.

5593

Saving the Planet and the NHS - Reducing Desflurane use at Forth Valley Royal Hospital

Campbell R.[1], Jack E.[1]
[1]*Forth Valley Royal Hospital - Larbert (United Kingdom)*

Background and Goal of Study: Halogenated inhalational anaesthetic agents contribute to global warming. The 20 year global warming potential (GWP), Carbon dioxide equivalent (CDE20) and atmospheric lifetime is significantly higher for Desflurane (3714; 187,186g; 14 years) in comparison to Sevoflurane (349; 6980g; 1.1 years)[1,2]. To reduce this environmental impact, Forth Valley Royal Hospital implemented measures starting in 2017 to reduce the use of desflurane.
Materials and Methods: Weekly expenditure data in pounds sterling (£) of Sevoflurane and Desflurane from 2016 onwards was collected from pharmacy. In 2017, departmental suggestions of reducing Desflurane were communicated. Desflurane vapourisers were subsequently removed from theatres in November 2018 however, remained available if requested by the clinician.
Results and Discussion: Weekly average expenditure and therfore use of Sevoflurane and Desflurane between 2016 to November 2018 were similar. For Desflurane, this equated to £579 between 2016-2017 and £590 between 2017-November 2018, indicating no change from verbal requests to reduce its usage. Once the Desflurane vapourisers were removed in November 2018, weekly average expenditure dropped to £64 due to re-stocking. There has been no further purchase of Desflurane since December 2018, a saving of £580 per week and an annual saving of > £30, 000. The weekly average spend of Sevoflurane has remained equivocal, £1203.
Conclusion: Theatre utilisation and unit cost of each volitile did not change during the study period, showing a reduction in expenditure and use of Desflurane. One bottle of Desflurane has a CO2 equivalency (CO2e) of 886Kg, therefore reducing its use from 7 bottles weekly (6,202Kg CO2e/week) to Zero, is a 100% reduction. This is equates to 322,504Kg CO2e to date (December 2019), equivalent of 107 return flights from London to New Zealand. Also, the cost benefit of saving £580 per week is likely underestimated, as the savings in electrical cost in heating the vapouriser has not been established. We therefore encourage others to reduce their use of Desflurane for the future of sustainable anaesthesia.
References:
1. Ryan SM et al. Global warming potential of inhaled anaesthetics: Application to clinical use. Anesthesia & Analgesia. 2010;111(1):92-98.
2. Sulbaek Anderson MP et al. Atmospheric Chemistry of Isoflurane, Desfluarne and Sevoflane. The Journal of Physical Chemistry A. 2012;116(24):5806-5820.

5748

The effects of deep neuromuscular blockade in patients undergoing robotic thyroidectomy using a gasless, transaxillary approach

Bai S.[1], Yoo Y. C.[2]
[1]*Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea),* [2]*Yonsei University College of Medicine - Seoul (South Korea)*

Background and Goal of Study: In previous studies, continuous deep neuromuscular blockade (NMB) was shown to not only improve surgical conditions during surgery but also attenuate the intensity of postoperative pain and fasten postoperative recovery in patients undergoing laparoscopic or robot assisted laparoscopic surgery. This study aimed to determine whether continuous deep NMB attenuate postoperative pain and facilitate surgical site sensory change recovery in patients undergoing robotic thyroidectomy using a gasless, transaxillary (TAA) approach.
Materials and Methods: Eighty patients undergoing robotic thyroidectomy using a gasless TAA were randomly assigned to a moderate NMB group (Group M) or the deep NMB group (Group D). Patients in both groups received rocuronium infusion until removal of external retractor, maintaining a train of four count of 1-2 in the Group M and a post-tetanic count of 1-2 in the Group D, respectively. Postoperative pain was measured in all patients at three times point (postoperative care unit(PACU), 24 and 48 hours after surgery) and in three surgical sites (neck, chest and axilla area) by using numeric rating scale. Degree of postoperative sensory preservation was measured by comparing to opposite non-surgical site at 24 and 48 hours after surgery.
Results and Discussion: Clinical and pathologic characteristics of patients, perioperative outcomes such as transient voice change, hypocalcemia, seroma, and hematoma were comparable between groups. Postoperative pain intensity was significantly lower in all measured site at 24 hours after surgery, and in neck and chest area at 48 hours after surgery. The number of patients with moderate to severe pain was also significantly less in all measured site at 24 and 48 hours after surgery. Degree of sensory change tended to be less in the chest area. (Table 1)
Conclusion: Continuous deep NMB during anesthesia led to attenuate the intensity of pain in patients undergoing robotic thyroidectomy using a gasless, TAA approach, which will contribute to improve the patient's postoperative satisfaction.

Table 1. Postoperative pain and sensory change

			Group M	Group D	P-value
NRS	PACU	Neck	4.6 ± 2.4	3.8 ± 2.0	0.279
		Chest	4.2 ± 2.6	2.9 ± 2.4	0.307
		Axilla	5.8 ± 2.3	5.6 ± 2.2	0.332
	24 h	Neck	3.4 ± 2.3	1.3 ± 1.4	<0.001
		Chest	3.7 ± 2.0	1.5 ± 1.5	0.047
		Axilla	4.1 ± 2.2	2.4 ± 1.7	0.049
	48 h	Neck	1.9 ± 2.0	1.1 ± 1.2	0.001
		Chest	2.2 ± 2.1	0.9 ± 1.1	<0.001
		Axilla	2.3 ± 1.9	1.7 ± 1.6	0.516
Moderate to severe pain [n(%)]	PACU	Neck	22(55)	18(45)	0.371
		Chest	20(50)	14(35)	0.175
		Axilla	33(82.5)	32(80)	0.775
	24 h	Neck	16(40)	4(10)	0.002
		Chest	20(50)	7(17.5)	0.002
		Axilla	22(55)	9(22.5)	0.003
	48 h	Neck	7(17.5)	1(2.5)	0.025
		Chest	13(32.5)	2(5)	0.002
		Axilla	10(25)	3(7.5)	0.034
Sensory	24 h	Neck	58.0 ± 37.8	66.0 ± 40.0	0.509
		Chest	10.3 ± 23.1	19.8 ± 35.1	0.007
	48 h	Neck	60.5 ± 45.1	67.6 ± 41.5	0.465
		Chest	36.5 ± 43.9	46.8 ± 42.6	0.329

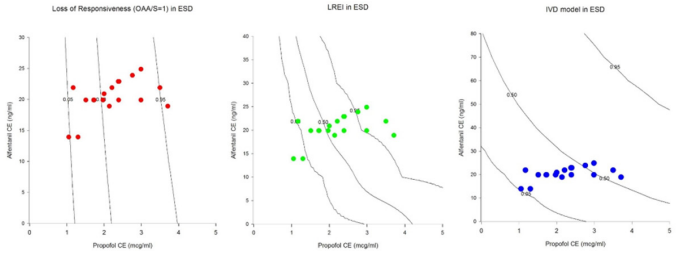
NRS, Numeric Rating Scale; PACU, post anesthetic care unit

6096

Previously published drug interaction models do not predict patient response well in endoscopic submucosal dissection procedure sedation

Lee M. Y.[1], Tsou M. Y.[1], Liou J. Y.[1], Su F. W.[1], Ting C. K.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan)

Background and Goal of Study: In recent years, endoscopic submucosal dissection (ESD) was developed to be therapeutic procedures of gastric cancer to enable en bloc lesion resection. Proper sedation is required not only for patient's comfort but also adequate surgical condition to ensure precisely curative resection and reduce surgical complications. The aim of this study was to validate the accuracy of the previously published response surface model (RSM) during ESD in the clinical setting.
Materials and Methods: Twenty enrolled participants from 30 to 80 years old were sedated by propofol combined alfentanil target controlled infusion. We recorded loss of response (LOR), loss of response to esophageal instrumentation (LREI), and intolerable ventilator desaturation (IVD) pharmacokinetic profiles including plasma and effect-site concentrations by using the TIVA trainer simulation program. The modified model was built by plotting the 5%, 50%, and 95% isoboles to predict propofol-alfentanil effect-site concentrations that produced an equivalent effect (figure1). The model prediction accuracy was determined as calculating the difference of accurate predictions percentage between the true response and the model-predicted probability.
Results and Discussion: Our study is the first one to evaluate the accuracy of three response surface models (LOR, LREI, and IVD) in patients undergoing sedation for ESD procedures. The LOR and LREI model seemed to express the trend of probability; however, the prediction accuracy was still poor. Besides, we noted that the patient actually required alfentanil-propofol dosage might be lower than what the original model predicted. Although the majority of our patients fall below the 50% isobole, the IVD model did not predict the two inadequate ventilation episodes.
Conclusion: The previously reported drug-interaction RSMs for upper gastrointestinal endoscopy can predict LOR but not LREI in ESD procedure. The IVD model didn't predict desaturation periods well. Further researches are needed to improve the quality of ESD procedure sedation to aid clinical decision making and practice.



6177

Deep neuromuscular blockade with sugammadex reversal for cervical spine surgery may not be less costly than standard clinical practice of rocuronium bolus and neostigmine reversal

Amorim P.[1], Nunes C. S.[1], Casal M.[1], Santos I. A.[1], Machado H.[1], Esteves S.[1]
[1]CHUP - Centro Hospitalar e Universitário do Porto - Porto (Portugal)

Background and Goal of Study: Deep NMB blockade, now easily feasible due to sugamadex availability, does not have a wide use because current indications are limited mostly to laparoscopic surgery and because of constraints related to the cost of sugamadex. We recently concluded a RCT designed to assess if deep NMB and sugamadex reversal reduced anesthetic requirements in patients subjected to cervical spine surgery. 63 patients were randomized to two groups: 1) rocuronium (bolus+infusion) to maintain 1 to 2 Post-Tetanic Counts until the end of surgical dressing, with sugamadex (4mg/kg) for reversal; 2) rocuronium bolus for intubation and reversal with neostigmine if TOF<90%. We found that deep NMB reduced propofol, remifentanil and ephedrine consumption as well as the duration of the procedures and the time from end of surgery to extubation. Here, we present a sub-analysis of the trial results that examines how the differences between the two study groups in terms of drugs consumed and OR occupancy could impact on costs
Materials and Methods: The average difference between groups in the doses of propofol, remifentanil, rocuronium, sugamadex and ephedrine were multiplied by their costs according to the prices applied in our National Health Service. The difference, in €, between the added cost of using a rocuronium infusion and sugamadex (A) and the savings obtained by the reductions in the other drugs (B) was calculated (C). The average difference in OR time, in minutes, between the two groups was obtained (D). The formula X=(60*C)/D was used to obtain the value for the cost per hour of OR occupancy for which the cost of using Deep NMB and sugamadex would be balanced by the savings in drugs used and OR occupancy. The value obtained for X was compared with published values for OR costs at our institution
Results and Discussion: Average doses (mg) for G1 and G2 were: propofol 715 vs 1082; remifentanil 833 vs 1069; Rocuronium for infusion 55,9 vs 0; Sugamadex 284 vs 0. Ephedrine used in 4 pts in G1 and 11 in G2. Neostigmine used only in 5 patients. Time (min) from end of surgery to extubation was G1 3,9 and G2 7,7. Total procedure time (min) was G1 131 and G2 146. Results were: A 113€; B 4,04€; C 109€; D 18,3min. Xwas 357,4€. Hourly OR costs at our institution are much lower: 474€ and 978€ without or with personnel.
Conclusion: Deep NMB and sugamadex may be cost effective due to less use of drugs and OR time.

6197

Rocuronium for the prevention of incidental surgical movement without deepening laryngeal mask airway anesthesia

Mendes J.[1], Bello Dias M. B.[1], Pestana C.[1]
[1]Hospital da Luz Lisboa - Lisboa (Portugal)

Background and Goal of the Study: Neuromuscular blocking agents (NMBAs) like rocuronium are historically associated with postoperative complications such as residual neuromuscular blockade and postoperative recurarization. These have decreased drastically since the approval of sugammadex. NMBAs are not formally indicated for general anesthesia with laryngeal mask airway (GA-LMA) nor are necessary for lower limb venous surgery. However, NMBAs improve surgical conditions by abolishing intraoperative involuntary reflex movements (IIRM) without increasing anesthetic depth, associated with postoperative delirium and cognitive dysfunction. Our aim was to assess if deep neuromuscular blockade (DNMB) using rocuronium abolished IIRMs and improved surgical conditions while maintaining an appropriate anesthetic depth in patients scheduled for varicose vein surgery under GA-LMA.
Materials and Methods: We conducted a 2-month observational prospective study in patients scheduled for varicose vein surgery under GA-LMA. After informed consent was obtained, demographic, anthropometric and medical data were collected. Some patients' anesthetic management included rocuronium administration and DNMB. Our primary outcomes included IIRMs, surgical conditions (as assessed by the surgeon on an ordinal 1-5 scale) and mean bispectral index (BIS) values. Secondary outcomes included mean percentual intraoperative time with BIS < 40 and presence/absence of ≥ 1 episode of BIS < 40 for ≥ 5 minutes.
Results: We included 16 patients, aged 57.3 ± 14.5 years. Most were women (81,3%) and American Society of Anesthesiologists Physical Status (ASA-PS) I or II (93,8%). 7 underwent surgery under no NMBA and 9 under DNMB. Groups had similar demographics, anthropometric values and ASA-PS. When compared, no differences were found in IIRMs (0,14 vs 0 per surgery, p=0.36), surgical conditions as assessed by the surgeon (4.86 vs 5.00, p=0.36) and mean BIS values (43.0 ± 1.66 vs 48.5 ± 7.5, p=0.08). However, patients who underwent surgery under no NMBA were more commonly overanesthetized. All (100%) showed BIS values < 40 during > 30% of the intraoperative period (vs 22.2% of patients under DNMB). All (100%) had ≥ 1 episode of BIS < 40 for ≥ 5 minutes (vs 37.5%). At last, mean percentual intraoperative time with BIS < 40 was 39.4% (vs 18,5%, p=0.023).
Conclusion: These results suggest that rocuronium and DNMB avoid an increase in anesthetic depth and correlated adverse outcomes in GA-LMA.

6245

Fish bone impactation in distal oesophagus – a multidisciplinary challenge. Case report

Coroa M.[1], Silva M.[1], Marcos A.[1]
[1]Centro Hospitalar Vila Nova de Gaia/ Espinho - Vila Nova de Gaia (Portugal)

Background: Fish bone are one of the most dangerous foreign bodies to be removed endoscopically from the upper gastrointestinal (GI) tract.1 A multidisciplinary approach is essential in potentially fatal scenarios.
Case Report: A 81-year-old male was admitted to the emergency department with retrosternal discomfort and dysphagia after swallowing a fish bone. CT-scan showed a linear foreign body (24mm) with transverse orientation, impacted on the distal esophagus with the medial tip adjacent to descending aorta. Considering the risk of aortic laceration requiring emergent endovascular aortic repair during fish bone removal, a multidisciplinary discussion betwen anaesthesiology, gastroenterology, cardiothoracic, general and vascular surgery decided to do endocospic removal in angiography room. General balanced anesthesia with invasive arterial pressure was performed. Percutaneous femoral access was primarily done by vascular surgeon. Upper GI endoscopy showed multiple blood clots and abundant blood, which led to fish bone mobilization to the stomach. After initial need of fluid and blood resuscitation to restore intravascular volume, patient gradually became hemodinamicaly stable. In the end, he was transferred mechanically ventilated to the intensive care unit. He was extubated with no complications 2 days after.
Discussion: Fishbone penetration of the esophagus can cause major vascular trauma, significant hemorrhage or aortoesophageal fistulas.1 An integrated, multidisciplinary team approach can help optimize potencial life-threatening complications and reduce mortality. This case highlights the relevance of careful planning that conducted to a safe, effective and efficient treatment.
References:
1. S. Chaudhary et all. Endoscopic Removal of a Fish Bone Piercing in Lower Esophageal Mucosa. CGH journal: 2015 Jul; 13(7): e95.
Learning points: Prompt recognition and planned retrieval of ingested fish bones by multidisciplinary teams can reduce morbidity and the mortality.

6260

Procedural packs: Considering the environmental impact

Umar M.[1], Rattenberry W.[1]
[1]Nottingham University Hospitals NHS Trus - Nottingham (United Kingdom)

Background: The National Health Service committed to reducing waste in the NHS Long Term Plan 2019. Procedural packs have become commonplace; simplifying procurement, improving efficiency and potentially reducing costs. We hypothesise that many items in the procedural pack are not used and this generates unnecessary waste.
Methods: We performed a survey of 42 anaesthetists, in October 2019, at Nottingham University Hospital to establish items not commonly used. Individuals were shown photographs of the local CVC procedural packs that includes 30 separate items (excluding the CVC itself). Respondents were asked to state whether they 'always', 'sometimes' or 'never' used each item.
Results and Discussion: Results indicate there is significant waste of unused items. Of 1260 responses, there were 713 'always', 174 'sometimes' and 373 'never'. Only three of the items provided in the pack (guidewire, blade and drape) were used 'always' by all respondents. In contrast, the forceps, scratch pad, syringe labels and Luer caps provided were 'never' used by the majority of respondents. The metal forceps, scratch pad and metal needle holders are provided with the intention of minimising risk of needle stick injury. Whilst 88% reported 'always' using the needle holders, only 19% reported 'always' using the forceps; likely to reflect variation in teaching of suturing. The syringe labels are rarely used, and we believe this reflects how the majority of respondents were taught to use alternative methods of identifying syringes prior to the introduction of these labels. Hand towels and a gown are present to facilitate the mandated fully sterile technique. However, 36% 'never' use the hand towels and 43% 'never' use the gown, choosing to use a separate surgical gown pack.
Conclusion: Our results demonstrate that many items in our CVC procedural pack are not used. This is likely to be explained by variation in training and subsequent individual practice. It is essential that we minimise waste where possible through considerate procurement. Items have been included for a specific safety or practical reason. However, there is a clear difference in 'work as prescribed' and 'work as done'. Addressing this by forming a national consensus on items essential for optimal CVC insertion could potentially reduce needlestick injuries, line infections but also waste. In the meantime, we should all consider providing items that are rarely used separately.

6340

Challenges in anesthetic management of cold agglutinin autoimmune hemolytic anemia in a woman undergoing adrenalectomy

Tomás A. S.[1], Salvador S.[1], Amadeu E.[1]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Cold agglutinin autoimmune hemolytic anemia (AIHA) is described as a paraneoplastic syndrome (PNS) mainly associated with lymphoproliferative disorders but also reported in solid tumors. Treatment is difficult once it is highly refractory to corticosteroids and resection surgery of the responsible neoplasia is the best option for remission. Anesthetic management of this patients requires a team work in order to minimize the hemolysis. Our case report illustrates our approach in this case.
Case report: A 70-year-old woman with an adrenal tumor diagnosed in a routine exam was undergoing adrenalectomy. During the study of an anemia 7 weeks previous to the surgery a cold agglutinin AIHA was diagnosed, as a probable PNS. Despite all the heat measures and the corticosteroids there was a need to transfuse 10 red blood cell units (RBCU) until the surgery. During perioperative period we needed to reserve RBCU; raise the air temperature of the operation room; place force warm air blankets; cover exposed areas with cotton bandage; heat administer fluids and transport containers; monitoring continuously core and peripheric temperature and use non-invasive hemoglobin measure (Rainbow SET®). During the procedure the minimal core temperature was 37,8ºC and hemoglobin ranged from 6.7 g/dL to 5,6 g/dL, after a blood loss of 2L and 2 RBCU. The patient was hemodynamically stable until the laceration of inferior vena cava which dictated the needed to start norepinephrine perfusion. She was transferred to the intensive care unit (ICU) sedated, ventilated, with vasoactive support and heating measures. In the ICU they could not reverse the shock, which the cause was not hemorrhagic, despite all the support and she died after 2 days. The result of pathological anatomy revealed diffuse large B-cell lymphoma.
Discussion: In cold agglutinin AIHA all heating measures are very important once it has a high impact in decreasing hemolysis. Plasmapheresis is an option for optimizing these patients before surgery and it could have been helpful. However, we were able to maintain hemoglobin variation between acceptable rages and we believe that the incomplete exeresis of the mass was the main contribution to the outcome.
References:
1. Paul L. Swiecicki et al. Cold agglutinin disease. Blood. 2013, vol 122.
Learning points: The cold agglutinin AIHA is an example of how simple measures can have a huge importance in order to optimize the patient to the surgery.

6400

Use of Dexmedetomidine in a patient with Takotsubo Syndrome during laparoscopic surgery, a case report

Ruiz Velasquez E. J.[1], Moreno V.[1], Carre X.[1], Colet L.[1], Sala P.[1]
[1]Hospital Sant Joan de Reus - Reus (Spain)

Background: The recently described Takotsubo syndrome, clinical presentation similar to an acute myocardial infarction and is triggered by an excess of catecholamines in a situation of physical or emotional stress, such as the current ones during the perioperative period, being of interest to us for timely diagnosis, treatment and prevention.
Case Report: 77-year-old female patient with hypertensive hypertrophic cardiomyopathy and Takotsubo syndrome, proposed for laparoscopic Toupet fundoplication. It is premedicated with Midazolam, Dexmedetomidine 50mcg in charge and we start perfusion at 0.6mcg/kg/h. Induction with Lidocaine, Fentanyl, Propofol, Cisatracurium and, Dexamethasone. Orotracheal intubation, without incidents. Maintenance with TCI propofol of 0.7-1 mcg/ml, Cisatracurium and fentanyl. After pneumoperitoneum, there is an increase in blood pressure (TAM: 70-90 mmHg), the perfusion of Dexmedetomidine increases to 1 mcg/kg/h, with a return to baseline (65 mmHg). Rest of the surgery and stay in post-anesthesia care unit without incident.
Discussion: 1% of acute coronary syndromes, are Takotsubo syndrome, with an important incidence during the perioperative period, due to emotional, psychological and non-psychological factors that affect its appearance. The keys to its prevention are: anxiolysis, mild induction, pain control and intraoperative hemodynamic changes, and avoiding the use of amines. See the use of Dexmedetomidine in its prevention, for its anti-inflammatory effects and inhibition of catecholamine release at the central level.
References:
1. Agarwal S, Sanghvi C, Odo N, Castresana MR. Perioperative takotsubo cardiomyopathy: implications for the anesthesiologist. Ann Card Anaesth 2019; 22: 309-15.
2. S.-H. Kang, Y.-S. Kim, T.-H. Hong, M.-S. Chae, M.-L. Cho, Y.-M. She and J.

Lee. Effects of dexmedetomidine on inflammatory responses in patients undergoing laparoscopic cholecystectomy. Anaesthesiol Scand 2013 Act; 57: 480–487.
3. Hessel, E.A. Takotsubo cardiomyopathy and its relevance to anesthesiology: a narrative review. Canadian Journal of Anesthesia (2016) 63: 1059.
Learning points: The clinic of Takotsubo Syndrome, similar to acute coronary syndrome, forces to manage following the latter's therapeutic algorithms, until discarded. The most important thing is its prevention, where Dexmedetomidine acts by inhibiting the release of catecholamines and by its effects of anxiolysis, sedation, analgesia and hemodynamic stability.

4735

Presentation of reverse Takotsubo cardiomyopathy during laparoscopic adrenalectomy: a case report

Douma A.[1], Vavoura A.[1], Georgiou K.[1], Devadze G.[1], Maniatis C.[1], Dimakopoulou A.[1]
[1]General Hospital of Athens George Gennimatas, Athens - Athens (Greece)

Background: Takotsubo cardiomyopathy (TTC) is an acute often reversible left ventricular (LV) dysfunction triggered by emotional or physical stress (1). Reverse Takotsubo cardiomyopathy (rTTC) is a rare variant of TTC. This is the case of a patient who developed rTTC intraoperatively, during an elective laparoscopic adrenalectomy.
Case Report: A 46 years old asymptomatic woman with no past medical history was planned to have a laparoscopic adrenalectomy for a non-secreting tumour, according to laboratory findings. Intraoperatively, during surgical manipulation of the tumour, a hypertensive crisis occurred, that lasted 40 minutes despite the administration of high doses of sodium nitroprusside, nitrates and remifentanil. After complete surgical excision of the adrenal gland, haemodynamic stability was re-established but a progressive hypoxaemia was noticed, that did not considerably respond to alveolar recruitment manoeuvres, PEEP and O2 inspired fraction increase. A chest X-ray and a transthoracic Echo (TTE) demonstrated pulmonary oedema and rTTC with Left Ventricle Ejection Fraction (LVEF) 25-30%. ECG alterations and troponin increase were also noted when in the Cardiac Care Unit. A week later, TTE showed LVEF:35-40%, mid-ventricular and basal akinesia of the LV, along with a small pleural effusion. Histological examination of the tumour confirmed the suspected diagnosis of pheochromocytoma.
Discussion: Undiagnosed and preoperative untreated pheochromocytoma can cause severe intraoperative complications, due to the extreme catecholamine release, secondary to surgical manipulation of the tumour. Pheochromocytoma-associated TTC is reported, though rTTC is a rare variant (2). It is not recognized as readily as traditional TTC, though early recognition and appropriate management are crucial for survival and avoidance of recurrence. It is characterized by basal akinesia associated with apical hyperkinesia, new ECG abnormalities, elevated cardiac markers and is typically seen in young women. It is often complicated by pulmonary edema, pleural effusion and cardiogenic shock In this case, hypoxaemia because of pulmonary edema was the first sign of rTTC.
References:
1. Gupta S et al. Association of Endocrine Conditions With Takotsubo Cardiomyopathy: A Comprehensive Review. DOI:10.1161/JAHA.118.009003.
Learning points: Hypoxaemia can be the first symptom of rTTC, a rare variant of TTC presented in young women.

4753

Anesthesia management for adult patient with congenital heart disease for non-cardiac surgery: case report

Ilieva Georgievska E.[1], Gjorcevska E.[1], Mojsova-Mijovska M.[1], Petruseva A.[1], Stavridis S.[2], Gavrilovska-Brzanov A.[1]
[1]University Clinic of Anesthesia Reanimation and Intensive care - Skopje (Republic of North Macedonia), [2]University Clinic of Urology - Skopje (Republic of North Macedonia)

Background: Ventricular septal defect (VSD) and atrial septal defect (ASD) are congenital heart diseases (CHD) rarely encountered in adult patients presenting for elective non-cardiac surgery. Adults with CHD demonstrates specific and complex anatomy and physiology (1). Therefore, anesthetic management is very challenging, multimodal and multidisciplinary.
Case Report: We present ASA III, 62 year old women scheduled for right nephrectomy, without cardiac symptomatology, but with systolic murmur on physical exam and ECG bradyarrihythmia. Pre-operative investigations revealed signs for pulmonary hypertension, ASD on echocardiography and VSD confirmed with pulmonary angiography. She received combined general and epidural anesthesia. We placed invasive hemodynamic monitoring and started infusion with magnesium sulfate. Due to perioperative hypotension and bradycardia, we started continuous phenylephrine infusion. Intraoperative, the surgeon found thrombus invasion in the inferior vena cava (IVC), an additional factor for complication and possible hemodynamic destabilization. After clamping IVC and evacuation of the thrombus, we continued with radical nephrectomy without significant hemodynamic destabilization. The mean arterial pressure (MAP) was above 80 mm/hg. Patient was extubated in OR and transferred to WARD. The postoperative period was uneventful and she was discharged from the hospital on the fifth postoperative day.
Discussion: Acyanotic CHD may be relatively asymptomatic until later in life, due to balance between systemic and pulmonary circulation. Such patients could be presented in OR for non-cardiac surgery. The main goal is maintaining hemodynamic stability and balance between systemic and pulmonary vascular resistance, avoiding predisposing factors that lead to pulmonary hypertension, excessive airway pressures, use of adrenergic agents and correction of reversible factors.
References:
1. Maxime Cannesson, M.D. at all. Anestheia for Noncardiac surgery in Adults with Congenital heart Disease. Anesthesiology 8 2009, Vol.111, 432-440.
2. Sandip Waman Junghare and Vinayak Desurkar. Congenital heart diseases and anesthesia. Indian Journal of Anestheia .2017 Sep; 61(9): 744-752.
Learning points: Patients with CHD, undergoing non-cardiac surgery have increased risk of mortality and morbidity (2). Anesthetic management is complex and it depends on the experience of the anesthesiologist, type of non-cardiac surgery and hemodynamic condition of the patient.

4894

Association between uncontrolled hypertension before induction of anesthesia and postoperative acute kidney injury

Morozumi K.[1], Satomoto M.[1], Hanai Y.[1], Ochiai R.[1]
[1]Toho University Omori Hospital - Ota-ku (Japan)

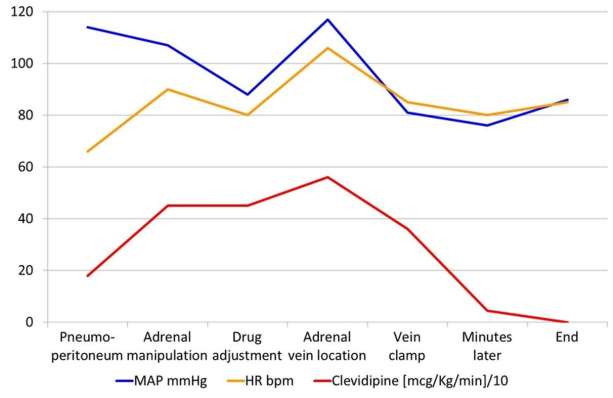
Background and Goal of Study: Since the development of postoperative acute kidney injury (AKI) is associated with worse outcomes, it is important to evaluate the risk factors of postoperative AKI. Chronic hypertension (HT) has been recognized as one of the important risk factors. Whereas uncontrolled HT before the induction of anesthesia is often encountered, there are few reports conducting the relationship between this HT and postoperative AKI. The aim of this study is to elucidate the relation between uncontrolled hypertension before the induction of anesthesia and prevalence of postoperative AKI and to identify perioperative risk factors of that.
Materials and Methods: We conducted a retrospective observation study of 213 patients with uncontrolled HT who underwent scheduled non-cardiac surgery with general anesthesia from January 2016 to December 2018. AKI was diagnosed in accordance with the Kidney Disease Improving Global Outcomes (KDIGO) classification within 48hr after the surgery. Patient demography coexistent diseases, anesthetic data, and laboratory data were extracted manually from the patients' electronic medical records. We investigated the prevalence and significance of postoperative AKI as primary outcome and perioperative risk factors for postoperative AKI as secondary outcome. Perioperative risk factors for postoperative AKI were extracted by using multivariable logistic regression analysis.
Results and Discussion: Twenty-six (12.2%) patients with AKI were found in our patient group, which was higher than that previously reported prevalence of the disease in non-cardiac surgery. Multivariable analysis showed an independent association between postoperative AKI and preoperative low eGFR (56.8±18.1 versus 69.6±18.8, $p<0.05$) and the high amount of fluids during surgery (1912±1383 versus 1441±1033, $p<0.05$). Conversely, preoperative chronic HT was not found as an independent risk factor in patients with uncontrolled HT before induction of anesthesia.
Conclusion: Uncontrolled HT before the induction of general anesthesia may be related with higher prevalence of postoperative AKI. In addition, lower eGFR in preparation term might induce postoperative AKI.
References:
1. Bellomo R, et al. Intensive Care Med 2007; 33: 409–13.
2. Xiujuan Wu, et al. Journal of Clinical Anesthesia 2017; 43: 77–83.

4919

Clevidipine infusion for haemodynamic management during laparoscopic pheochromocytoma resection in a young man

Ahern H.[1], González O.[1], Valencia Ó.[1]
[1]*Hospital 12 de Octubre - Madrid (Spain)*

Background: Pheochromocytoma extirpation poses significant challenges for anaesthetists in blood pressure (BP) control. If undiagnosed, mortality can reach 50% during anaesthetic induction. Correct preoperative pharmacological preparation is necessary to prevent haemodynamic instability. Intraoperative events such as intubation, pneumoperitoneum and surgical manipulation of the tumour often cause massive catecholamine secretion and a peak in BP. Hypotensive episodes may occur after tumour clamping due to rapid decrease of blood circulating catecholamines or to the residual effect of hypotensive drugs.
Case Report: Preoperative alpha and beta blockade was used. Clevidipine 0.45 mcg/Kg/min infusion was started prior to induction in laparoscopic left adrenalectomy of a nineteen year old male. No changes in HR or BP were registered during laryngoscopy and endotracheal intubation. For haemodynamic changes see Fig. 1 below. As pneumoperitoneum was removed clevidipine and esmolol infusion were stopped. There were no hypotensive episodes or evident hemodynamic changes after adrenal vein clamping and tumour removal. The patient was extubated without complications and was transferred to ICU and discharged to the ward 24 hours later.
Discussion: Clevidipine butyrate is a dihydropyridine calcium channel blocker with a two to four minutes onset of action, allowing for rapid titration to control BP1. Fast metabolism by plasma and tissue esterases provides a short duration of action, avoiding hypotensive episodes after tumour clamping. It compares well to sodium nitroprusside, but it has a lower risk of excessive hypotensive episodes due to its shorter half-life and greater arterial specificity. Compared to nicardipine, it has a faster offset.
References:
1. Graffagnino C, Bergese S, Love J, et al Clevidipine Rapidly and Safely Reduces Blood Pressure in Acute Intracerebral Hemorrhage: The ACCELERATE Trial. Cerebrovasc Dis 2013 Oct 12;36(3):173-80.
Learning points: Intraoperative clevidipine has better response in patients who are resistant to other antihypertensive drugs, more rapid distribution as well as less hypotension after tumour clamping due to shorter half-life.



5145

Postoperative hypotension as a risk factor for Myocardial Injury in Non-cardiac Surgery (MINS) and Major Adverse Cardiac and Cerebrovascular Events (MACCE) after elective non-cardiac surgery. Preliminary results at 30-day follow-up

Nunez M.[1], Bosch L.[1], Román L.[1], Sabaté S.[2], Mases A.[1], Beltrán De Heredia S.[1]
[1]*Parc de Salut Mar - Barcelona (Spain),* [2]*Fundació Puigvert. IUNA. - Barcelona (Spain)*

Background and Goal of Study: Intraoperative hypotension (IH) has been associated with MINS but the role of postoperative hypotension (PH) has not been clearly studied. The goal of the study was to evaluate IH and/or PH and their relationship with MINS and MACCE at 30-day postoperative follow-up.
Materials and Methods: Prospective, single center cohort study that recruited patients from May 2017 to May 2019. Eligible subjects were patients 45 years or older who underwent general and/or neuraxial anesthesia, high cardiac risk non-cardiac elective surgery or patients with clinical risk factors (RF) undergoing intermediate cardiac risk non-cardiac surgery (table 1). Troponin T was obtained at baseline, 3 hours postoperatively and on the 1st, 2nd and 3rd postoperative day. Hypotension was defined as mean arterial blood pressure (MAP) <60mmHg for more than 15minutes (intra/postoperative). It was recorded intraoperatively and during the first three postoperative days. Dependent variables were MINS and any MACCE until 30th postoperative day. Chi square and Fisher exact test were used to assess the association between hypotension and outcomes.
Results and Discussion: A total of 158 out of 746 patients presented MINS. Blood pressure data of 2 patients were missing.

Table 1: Demographic data

Age, yr. (Median (IQR))	72	(64-78)
Gender, male n (%)	503	67.4%
Physical status (ASA) n (%)		
I	1	0.1%
II	181	24.3%
III	518	69.5%
IV	45	6.0%
Preoperative chronic kidney disease n (%)	175	28.4%
Hypertension n (%)	528	70.9%
Diabetes Mellitus n (%)	287	38.6%
Dyslipidemia n (%)	421	56.5%
Preoperative coronary artery disease n (%)	186	24.9%
Preoperative heart failure n (%)	80	10.7%
Preoperative dysrhythmia n (%)	138	18.5%
Peripheral artery disease n (%)	275	36.9%

PH was associated with MINS when compared to patients without MINS, 36 out of 158 (23%) vs 81 out of 587 (14%) patients, P= 0.009. Splitting up between IH, PH, both or none. the following results were obtained (table 2):

Table 2: Cardiovascular outcomes at 30 days

	Intraoperative hypotension (MAP<60mmHg >15minutes)	Postoperative hypotension (MAP<60mmHg >15minutes)	Intraoperative + postoperative hypotension	Non-hypotension	
N =	39	91	26	588	*P*
MINS n (%)	8 (20.5)	27 (29.7)	9 (34.6)	114 (19.4)	0.049
MACCE n (%)	5 (12.8)	19 (20.9)	3 (11.5)	50 (8.5)	0.003
Acute myocardial infarction (AMI) n (%)	1 (2.6)	6 (6.7)	0 (0)	8 (1.4)	0.009
Angina n (%)	0 (0)	3 (3.4)	1 (4.3)	7 (1.2)	0.231
Congestive heart failure n (%)	1 (2.6)	7 (7.9)	0 (0)	18 (3.1)	0.105
Arrhythmia n (%)	2 (5.3)	2 (2.2)	2 (8.7)	16 (2.7)	0.316
Stroke n (%)	1 (2.6)	2 (2.2)	0 (0)	5 (0.9)	0.478
Pulmonary thromboembolism n (%)	0 (0)	0 (0)	1 (4.3)	3 (0.5)	0.077
Cardiac arrest n (%)	1 (2.6)	2 (2.2)	0 (0)	2 (2.3)	0.09
Mortality n (%)	1 (2.6)	5 (5.5)	4 (16.0)	9 (1.5)	<0.001
MACCE + MINS n (%)	12 (31.2)	36 (40.4)	12 (46.2)	138 (23.7)	0.007

Conclusion: In our patients, PH but not IH was associated with MACCE and AMI. The association of IH plus PH was a risk factor for MINS, mortality and MACCE (MINS included) at 30-day follow-up. Many studies have shown IH as a predictor of MACCE and MINS but there are no studies regarding PH. PH could be a confounding factor to consider.

5432

Ischemic vascular disease and 8-year mortality in emergency abdominal surgery patients

Tvarno C.[1], Nicolai Lohse, Morten H. Møller, Ann M. Møller, Morten Vester-Andersen
[1]University Hospital of Copenhagen - Copenhagen (Denmark)

Background and aim: Emergency abdominal surgery patients carries a high mortality. Sugery carries a high risk of perioperative cardiac instablity. Surgery patients are elderly and often have co-existing diseases. We aimed to examine the association between ischemic vascular disease and long-term mortality.
Methods: We included adult emergency major abdominal surgery patients operated on 13 Danish hospitals between 1st January 2009 and 31st December 2010. Appendectomies were excluded. The surgical procedure codes were retrieved from the National Patient Register (NPR) and linked to the Danish Anaesthesia Database (DAD) by the civil registry number. Preoperative ischemic vascular disease status (IVD) was defined as both cardiac vascular disease and extra-cardiac vascular disease and was retrieved from the NPR using ICD-10 diagnostic codes registered five years before the index surgery. The primary outcome, all-cause mortality one year postoperative to eight years postoperative (1-8 year), was retrieved from the Danish Civil Registry System (CRS). We evaluated mortality as mortality rates (events/100 person years at risk) and compared patients with IVD to patients without IVD with a cox regression analysis; crude and adjusted for age and sex.
Results: A total of 4864 patients underwent emergency abdominal surgery, mean age 67 (IQR 54 – 78) and 50.7% female. Some, 20.9% (1019/4864) had preoperative IVD. In the IVD-group 72.8% of patients had registered ASA-score at 3 or above compared to 40.3% in the non IVD-group. Surgical characteristics did not vary between groups. Overall-mortality were 18.2 % at 30 days, 15.6% at 31-365-days, 32.9% at 1-8-years and cumulative mortality was 53.7%. Mortality rates per 100 person years at risk after surgery for IVD patients where 374.2 at 30 days, 28.37 at 31-365-days and 10.8 at 1-8-years. The corresponding age and sex adjusted hazard ratios (95% CI) comparing IVD patients with non-IVD patients were 1.27 (1.10 - 1.47), 1.31 (1.09 - 1.57), 1.52 (1.33 -1.74) and cumulative eight year HR 1.37 (1.26 -1.50).
Conclusion: Emergency abdominal surgical patients have a high long-term mortality. Preoperative ischemic vascular disease was associated to increased mortality risk at both short and long-term.

5616

Measurement of baseline NT-ProBNP and baseline Troponin T as predictors of Myocardial Injury in Non-cardiac Surgery (MINS). Preliminary results

Román L.[1], Rueda M.[1], Beltrán De Heredia S.[1], Sabaté S.[2], Núñez M.[1], Mases A.[1]
[1]Department of Anaesthesia and Intensive Care Medicine, Hospital del Mar - Barcelona (Spain), [2]Department of Anaesthesiology. Fundación Puigvert. IUNA. - Barcelona (Spain)

Background and Goal of Study: MINS is associated with short and long term morbidity and mortality. Measurement of baseline NT-proBNP and Troponin T (TnT) has been proposed as a screening tool to improve preoperative cardiac risk estimation in non-cardiac surgery. Our goal was to evaluate which biomarker would best predict the occurrence of MINS and Major Adverse Cardiovascular and Cerebrovascular Events (MACCE).
Materials and Methods: Prospective single center cohort study (MINSMAR study) recruiting patients from May2017-May2019. Eligible subjects were patients 45 years or older undergoing:1) high cardiac risk non-cardiac surgery or 2) intermediate cardiac risk non-cardiac surgery with clinical risk factors. All were elective procedures under general and/or neuraxial anaesthesia. Demographic data and factors related to surgery were recorded. Baseline measurements of NT-proBNP and TnT were obtained after anaesthesia induction. Postoperative TnT surveillance was accomplished at 3h,1st,2nd and 3rd day. Basal NT-proBNP was classified as <300 or >300 pg/mL and TnT as <30 or >30ng/L. Dependent variables were MINS and MACCE at 30 days after surgery. MINS was defined as at least a TnT value ≥30 ng/L with a rise and/or fall ±20% regarding the baseline. Logistic regression was used to obtain the OR (95% CI) for MINS and MACCE.
Results and Discussion: We recruited 746 patients. MACCE occurred in 78 patients (10.6%) and MINS in 158 patients (21.2%).Global mortality was 2.6%. Table1 shows patients' clinical characteristics. Baseline NT-proBNP was recorded in 687 patients and TnT in 722, of which 254 (37%) had a basal NT-proBNP>300pg/mL and 91 (12.6%) a basal TnT>30ng/L respectively. Results are shown in table2.
Conclusion: Baseline NT-proBNP and TnT are both strong predictors of MINS and perioperative MACCE after non-cardiac surgery in our sample of moderate-high risk patients.

Table 1. Preoperative clinical characteristics. N=746

Age, years [median(IQR)]	72 (64 - 78)
Gender, male [n (%)]	503 (67.4)
Hypertension [n (%)]	528 (70.9)
Diabetes Mellitus [n (%)]	287 (38.6)
Coronary Artery Disease (CAD) [n (%)]	186 (24.9)
Congestive Heart Failure (CHF) [n (%)]	80 (10.7)
Peripheral Artery Disease (PAD) [n (%)]	275 (36.9)
Stroke/TIA [n (%)]	137 (18.4)
Chronic Kidney Disease (CKD) [n (%)]	175 (23.5)

Table 2. OR for MINS, MACCE and MACCE+MINS for each biomarker at 30 days after surgery

	N (%)	MINS	OR (95% CI)	MACCE	OR (95% CI)	MACCE + MINS	OR (95% CI)
Total NT-ProBNP	687	148 (21.5%)		74 (10.8%)		186 (27.1%)	
NT-ProBNP>300 pg/mL	254 (37)	93 (36.6%)	**3.97** (2.71 -5.81) ***p<0.0001****	42 (16.5%)	**2.48** (1.52 - 4.04) ***p<0.0001****	110 (43.3%)	**3.58** (2.52 - 5.09) ***p<0.0001****
NT-ProBNP<300 pg/mL	433 (63)	55 (12.7%)		32 (7.4%)		76 (17.6%)	
Total TnT	722	147 (20.4%)		78 (10.8%)		187 (25.9%)	
TnT> 30ng/L	91 (12.6)	59 (64.8%)	**11.37** (7.00 - 18.49) ***p<0.0001****	16 (17.6%)	**1.95** (1.07 - 3.56) **p=0.031**	61 (67%)	**8.14** (5.05 - 13.15) ***p<0.0001****
TnT< 30ng/L	631 (87.4)	88 (13.9%)		62 (9.8%)		126 (20%)	

5874

Quantification of Metabolic Equivalents (METs) by Means of the MET-REPAIR Questionnaire: A Validation Study

Jäger C.[1], Bolliger D.[1], Seeberger E.[1], Pfister O.[1], Lurati Buse G.[2], Mauermann E.[1]
[1]University Hospital Basel - Basel (Switzerland), [2]University Hospital Düsseldorf - Düsseldorf (Germany)

Background and Goal of Study: We hypothesized that self-reported METs based on a questionnaire used in a large, ongoing study examining self-reported METs and mortality and morbidity (www.met-repair.org) would correlate with measured METs using spiroergometry. Specifically, we hypothesized that Pearson's r of a linear regression would be > 0.2. We also analogously examined the Duke Activity Status Index (DASI) as well as BNP.
Materials and Methods: It's a prospective cohort study in adult patients undergoing clinical spiroergometry during ambulatory cardiac rehabilitation following various cardiac events (surgery, hospitalization due to heart failure, etc.) at a single university hospital. The primary endpoint was self-reported METs by the met-repair questionnaire, which we compared to measured METs. METs by the DASI and BNP were secondary endpoints. Questionnaires were completed prior to spiroergometry. An analysis of METs by questionnaire was analysed by two means of rating successive activities with increasing METs: the "first no method" (by which maximal METs were determined by the level of activity just prior to the first activity a patient could no longer perform, and 2) the "last yes method" (by which the activity with the highest MET score was taken as the maximum). We hypothesize a larger then weak positive correlation (H0: r=0.2) between self-reported METs and VO2. We calculated the sample size for the first main objective at 140 patients (H0: r=0.2; H1: r= 0.45, one tailed α=0.05, β=0.05).
Results and Discussion: Of a total of 332 screened patients, 140 returned complete questionnaires. Self-reported METs by the met-repair questionnaire correlated with measured METs by spiroergometry for both the first no and last yes methods (slope 0.45, intercept 2.91, P<0.001, r=0.45 and slope 0.48, intercept 2.77, P<0.001, r=0.48, respectively). Similar values were found for self-reported METs from the DASI again by both methods (slope 0.46, intercept 3.37, P<0.001, r=0.52, and slope 0.52, intercept 2.91, P=0.005, r=0.37, respectively.) NT-proBNP was inversely related with measured METs (slope -0.001 per ng/ml, P=0.037, r=-0.31). Self-reported METs estimate METs measured by spiroergometry in patients with a history of cardiac events to a fairly well.
Conclusion: The preliminary analysis of this study validates the MET-REPAIR Questionnaire, making it an alternative to the DASI or NT-proBNP measurements in select populations.

5976

Takotsubo cardiomyopathy after thyroidectomy – a surprise diagnostic due to atypical presentation

Cruz A. R.[1], Maldonado F.[1], Pereira M.[1], Gomes B.[1], Rodrigues G.[1]
[1]Unidade Local de Saúde de Matosinhos - Hospital Pedro Hispano - Matosinhos (Portugal)

Background: Takotsubo cardiomyopathy (TTC) is characterized by transient left ventricular dysfunction in patients without coronary artery disease. Clinical presentation includes chest pain or dyspnea with ECG changes and mild elevation of cardiac enzymes(1). We report a case of TTC with an atypical presentation after a total thyroidectomy.
Case Report: A 59 year-old female, ASA II, was submitted to a total thyroidectomy and had normal preoperative evaluation. Monitoring was according to ASA standards and surgery was performed under general anaesthesia. Surgery and anaesthesia were uneventful, despite an increase in heart rate at the end of the procedure. In Post-Anaesthesia Care Unit, she remained tachycardic and showed low peripheral O2 saturations, without dyspnea, chest pain or other symptoms, lung sounds were normal and there was no response to FiO2 increase. CT angiography showed bilateral pulmonary opacity. We considered the hypothesis of negative pressure pulmonary edema, started non-invasive ventilation with only mild response and she was admitted to ICU. Investigation showed T wave inversion and troponin elevation leading to suspicion of acute myocardial infarction. Echocardiography and cardiac catheterization showed left ventricular dysfunction and changes of contractility, excluding coronary artery disease. TTC was suspected and the patient managed accordingly. Respiratory dysfunction was solved and analytic cardiac markers normalized. At day 8, left ventricular function was normal and contractility restored. The patient was discharged clinically asymptomatic and oriented to outpatient Cardiology for follow-up.
Discussion: This case satisfied InterTAK Diagnostic Criteria(2). Although enhanced sympathetic stimulation due to surgery seems to be the pathogenesis, the mechanism by which catecholamine excess precipitates myocardial stunning is still unknown(2). In this case the diagnostic was unexpected because the patient lacked the classical symptoms such as dyspnea and chest pain and we assumed the low PaO2 was due to a respiratory cause related to anaesthesia and the tachycardia was a consequence of hypoxia.
References:
1. Eur Heart J. 2006 Jul; 27(13):1523-9.
2. Eur Heart J. 2018 Jun 7; 39(22): 2032–2046.
Learning points: Although typical signs and symptoms of TTC are mostly present, some cases have an atypical presentation and a high grade of suspicion is needed. Despite increased awareness to TTC, it remains an exclusion diagnosis.

5985

Correlation between intraoperative hypotension and high sensitivity troponin T level in joint replacement surgeries

Apine M.[1], Kobzeva J.[1], Stepanovs J.[1], Vikmanis A.[1], Ozoliņa A.[2], Mamaja B.[2]
[1]Riga East Clinical University Hospital - Riga (Latvia), [2]Riga East Clinical University Hospital, Riga Stradiņš University - Riga (Latvia)

Background and Goal of Study: It is hypothesized that myocardial injury demonstrated by changes in high sensitivity troponinT (hsTnT) may be caused by intraoperative hypotension (IOH). The aim was to investigate the association between intraoperative hypotension and postoperative changes in high sensitivity troponin T levels.
Materials and Methods: Totally, 33 orthopedic patients ASA II – III, 8 male, 25 female, with average age 67 ± 8.4 years were included in prospective observational study, 63.3% undergoing knee replacement (n=21) and 36.4% hip replacement surgery (n=12). Demographical data, co–morbidities, routine medications, ECG changes were fixed. All patients presented chronic compensated cardiovascular diseases in their anamnesis. HsTnT was evaluated at two time points: T1 in operating room before the surgery and T2 - on the first postoperative day. Intraoperative data as non-invasive mean arterial blood pressure (MAP), ECG and heart rate were obtained. IOH was defined as MAP <65 mmHg lasting at least 5 minutes. Significantly increased hsTnT level was defined as >14 ng/L or >20% from T1 measurement if it was >14 ng/L.
Results: Preliminary results from 33 patients demonstrates that significantly increased levels of hsTnT postoperatively were in 24.2%. One patient had high hsTnT levels 268.9 ng/L at T1 and was excluded from further analyse. The average operation time for hip replacement was 79 ± 23.6 minutes and for knee replacement 84 ± 25.9 minutes without intergroup difference. Major blood loss was not detected during surgeries. Mean hsTnT level at T1 was 9.91 ± 6.13 ng/L and at T2 12.7 ± 9.36 ng/L without significant difference. For 8 patients hsTnT level at T2 increased by 56.7% when compare to T1. The incidence was equal between those who underwent hip and those with knee replacement 4/12 vs. 4/21; p = 0.3. Elevated hsTnT levels postoperatively were demonstrated in 21.4% for those with IOH compared to 26.3% in those without IOH, p = 0.72. There was not found significant correlation between IOH and postoperative hsTnT changes (p = 0.77). In postoperative period any cardiovascular events were not recorded.
Conclusion: HsTnT levels increases after joint replacement surgery and IOH seems significantly not to affect the increament of hsTnT levels. For future results a greater sample size should be analysed.

6417

Incidence and risk factors for new onset atrial fibrilation following major abdominal surgery. A retrospective analysis

Papadima A.[1], Gika A.[2], Christodoulou K.[3], Westzaan N.[2], Grigoraki A.[2], Louizos A.[2]
[1]Ippoktrateio - Athens (Greece), [2]Hippocration General Hospital - Athens (Greece), [3]Hippocration General Hospital - Athens (Greece)

Background and Goal of Study: Atrial fibrilation (AF) after cardiac surgery is associated with increased morbidity and hospital length stay.(1) There are few data on postoperative AF after non ardiac surgery. The purpose of this study was to investigate the incidence of the postoperative AF after major abdominal surgery in patients without preexisting AF.
Materials and Methods: The present study was designed as a retrospective analysis of patients between January 2017 and November 2019. All consecutive elderly patients undrergoing major abdominal surgery (age>68) at Hippoctation General Hospital, Athens were screened for this observational study. Elective, urgent or emergency, open or laparoscopic procedures were all included. Patients with a preoprerative history of supraventricular arrhythmias requiring treatment were excluded. The primary endpoint of the analysis was the incidence of postoperative AF and the identification of risk factors. The data set included demografic information, clinical outcome characteristics such as, duration of surgery and anaesthesia, the occurrence of postoperative atrio-ventriculas block, epinephrine or dobutamine administration during the surgery, anaesthetic technique and length of in-hospital stay were also investigated. Statistical analysis was computed using SPSS version 20 statistical software (IBM SPSS Inc.).
Results and Discussion: The final sample consisted a total of 1845 patients. The profile for patients affected by postoperative AF was considerably different with regard to demographics and operative data. Patients affected by postoperative F in the overall surgery were oder than those who were not affected (74,7+/-4,9 versus 68,1 =/-1,8years,p<0,0001). The rate of postoperative AF varied by operation and was highest in abdominal aortic aneurysm surgery 912,2%) and lowest in open colectomy surgery (1,1%). The most patients who developed postoperative AF have used general anaesthesia. Postoperative AF mainly occurred within 48h postoperatively (median 2 days). Perioperative drug regimen influence the development of AF. The use of b-blockers (p<0.05) was associated with a decreased AF risk, but not the use of calcium antagonists,angiotensin-converting enzyme inhibitors and statins (p>0,05).
Conclusion: New onset postoperative AF are associated with adverse clinical outcome of major abdominal surgery patients.
References:
1. Shen J, et al. J Thorac Crdiovasc Surg. 2011;141:559-570.

4399

Liver transplantation in patient with hereditary hemorrhagic telangiectasia or Rendu-Osler-Weber disease: case report

Calderon Barajas Z. A.[1], Levstek M.[1], Ruiz De Las Heras J.[1], Cortés Guerrero M.[1], Olea Vielba C.[1], Silva Garcia J.[1]
[1]University Hospital Doce de Octubre - Madrid (Spain)

Background: Hereditary hemorrhagic telangiectasia (HHT) is a disorder in vascular endothelium causing angiodysplastic lesions in various organs. Liver involvement (LI) causes serious and mortal complications (biliary ischemia, portal hypertension (PHT), heart failure (HF)). The only definite cure is orthotopic liver transplantation (OLT).
Case report: 40y old woman with HHT type 2, presenting epistaxis, mucocutaneous telangiectasias, liver arteriovenous malformations (AVM), chronic hyperbilirubinemia and elevated cardiac output (CO) with hyperdynamic systolic function and pulmonary hypertension (PH). OLT is suggested. Before OLT her condition worsens, with admissions due to decompensated HF, GIT bleeding, respiratory infections and hepatic encephalopathy. For OLT basic monitoring is set and pulmonary artery catheter is placed before induction of general anesthesia (GA). The initial data shows moderate PH and hyperdynamic state. After the GA a transesophagel ultrasound shows moderate dilation of right cardiac chambers and hyperdynamic contractions. During hepatectomy there is moderate bleeding with signs of PHT. In anhepatic phase there is no need for vasopressors. In reperfusion phase epinephrine, ephedrine, calcium chloride and sodium bicarbonate are used for hemodynamic changes and metabolic acidosis. There was no postreperfusion syndrome. In neohepatic phase norepinephrine infusion (0.2 mcg/kg/min) was initiated. Treatment with blood products was guided by ROTEM®. Lactic acid was descending at the time of transfer to the ICU.
Discussion: The worst complication in HHT patients with LI is HF due to shunts generated by AMV that raise CO by 25-58%. Right cardiac catheterization should be done preoperatively to assess pulmonary and cardiac pressures and to evaluate the shunt and contractile function. Possible treatment, when cardiopulmonary involvement is embolization or ligature of the hepatic artery, with side effects such as liver necrosis or failure. The OLT should be considered at an early stage to improve cardiopulmonary function and avoid the risk for hepatobiliary sepsis and offer a better life quality.
References:
1. Garcia-Tsao G et al., Liver Disease in Patients with Hereditary Hemorrhagic Telangiectasia. N Engl J Med 2000; 343:931-936.
Learning points: The OLT is considered to be the only curative treatment for patients with HHT and LI. It is important to perform an invasive cardiopulmonary assessment due to possibility of secondary PH.

4743

A case of intraoperative massive bleeding in patient with cranial metastasis of hepatocellular carcinoma on prone positioning

Matsumoto M.[1], Yamaki R.[1], Enomoto J.[1], Morishita J.[1], Tayama J.[1], Kumano H.[1]
[1]Higashiosaka City Medical Center - Higashiosaka (Japan)

Background: Neurosurgical procedures are often performed in the prone position for improved surgical access. Unexpected bleeding while in such an unusual position represents an additional challenge for anesthesiologists. We report a case of intraoperative massive bleeding from cranial metastatic tumor and difficult management of intravenous line because of prone positioning.
Case report: A 61-year-old female presented with enlargement of cranial metastatic tumor following liver resection of cancer. Enhanced computed tomography of the brain showed a hypervascular tumor about 10 cm in size extending to inside and outside occipital bone. Feeder embolization was performed successfully on the day before surgery. Induction of general anesthesia was uneventful, and she was placed in the prone position. However, on the skin incision, she became hemodynamically unstable as a result of bleeding from tumor. Severe hypotension (50-60 mmHg) was persisted, requiring administration of vasoactive agents and massive transfusion. Although she had 18- and 20-gauge intravenous peripheral catheter, in addition, 18-gauge catheter was placed for fluid therapy. The bleeding was almost entirely controlled after closing dura mater, and her hemodynamics appeared to be stable under dopamine and noradrenaline infusion. In total, 6275 ml of crystalloid and colloid, 5250 ml of albumin, 5040 ml of red blood cells, 3120 ml of fresh-frozen plasma, and 400 ml of platelets had been administered for 13576 ml of blood loss. She was transferred to intensive care unit with mechanical ventilation. The trachea was extubated on the third postoperative day. There was no rebleeding event in the postoperative period.
Discussion: We encountered a case of difficult intravenous access because of operative position. A previous report showed ultrasound-guided internal jugular catheter insertion in prone position during spinal surgery[1]. However, in our case, it was difficult because of surgical field. Moreover, considering that immediate chest compression is difficult in this case, preoperative placement of a central line might be needed.
References:
1. Anagnostopoulos D. Ultrasound-Guided Internal Jugular Catheter Insertion in Prone Position. J Cardiothorac Vasc Anesth. 2019 Oct 11.
Learning points: In case of prone positioning with intraoperative large blood loss expected, even if endovascular embolization was performed, preoperative assessment of anesthetic management should be made more carefully.

4931

Comparison of the use of fresh frozen plasma during liver transplantation in three different liver transplant centres

Gomes A.[1], Milan Z.[2], Rao K.[3], Alexander L.[4], Schofield N.[4], Cirkovic A.[5]
[1]Hull York Medical School - Hull (United Kingdom), [2]King's College Hospital - London (United Kingdom), [3]Leeds Teaching Hospital - Leeds (United Kingdom), [4]Royal Free Hospital - London (United Kingdom), [5]Belgrade School of Medicine - Belgrade (Serbia)

Background: We identified 79 patients at Leeds Teaching hospital, 181 patients at King's College Hospital and 117 patients at Royal Free Hospital undergoing liver transplant surgery. Recipient characteristics were obtained through patient notes and online charts. This included age, gender, PLT and MELD scores. Transplant characteristics were also collected including the use of a donor, type of graft and use of FFP. We divided our patients into re-do transplantation and non-re-do transplantation with their respective characteristics. We then focussed on the use of blood products for all patients and compared these characteristics between the three hospitals. For statistical analysis, we compared each of the three hospitals with One-Way ANOVA with Tuckey post hoc testing, Mann-Whitney U and Chi-square testing.
Case report: It was found that KCH used significantly more Cell Saver, FFP, cryotherapy and colloid as compared to Leeds Teaching hospital and the Royal Free hospital. This significant difference was found in both non-re-do transplantations and re-do transplantations. KCH was found to have more re-do transplants as compared to Leeds Teaching hospital and the Royal Free hospital.
Discussion: There is obvious disparity between the three hospitals with the use of blood products, especially in regard to the use of FFP. Possible explanations for such include KCH being an incredibly large transplant centre and thus dealing with more complex cases. In addition, KCH have a larger amount of paediatric cases and thus would have more re-do transplantations as donated liver tissue does not last forever. Lack of uniform protocols across the different sites could also explain the difference in the use of blood products. Influences of the use of blood products are vast, and include center volume, surgical skills, low CVP strategy and the use of TEG or ROTEM preoperatively and intraoperatively. All these reasons could contribute to the discrepancy found in our results.
Conclusion: Reasons for such difference in the use of blood products are large, many of which would require extensive research into. We believe that the reason for such difference lies in the difference in size between the three centres and the lack of uniform protocols. We hope that this study would aid the development of protocols for fluid replacement that would be rolled out across the UK and thus unify practice in the whole country with the six liver transplant centres.

4950

Effect of noradrenaline infusion on hepatic and portal pressures: preliminary results of a prospective observational trial

Wolfskeil M.[1], Van Limmen J.[1], Wyffels P.[1], Berrevoet F.[1], De Baerdemaeker L.[1], De Hert S.[1]
[1]University Hospital Ghent - Gent (Belgium)

Background and goal: Noradrenaline is used as treatment for intraoperative hypotension1. Animal studies have shown that noradrenaline has minimal effect on hepatic pressures2, but human studies are lacking. The aim of the present study was to evaluate the effect of noradrenaline infusion on hepatic and portal pressures.
Materials and Methods: After ethical committee approval and written informed consent, 12 patients scheduled for pancreaticoduodenectomy were included. Anaesthesia consisted of a target-controlled infusion of propofol and remifentanil. Goal-directed haemodynamic therapy was guided by PulsioflexTM. After measurement of baseline haemodynamic variables (T1), noradrenaline infusion was started. Mean arterial pressure (MAP) was titrated to respectively 10 – 20% (T2) and 20 – 30% (T3) of baseline MAP. After reaching target MAP, portal and caval vein pressures were measured using a 25-gauge needle, which was directly placed in the vein and connected to a pressure transducer. To calculate portal vascular resistance (PVR), portal hepatic blood flow (HBF) was measured using ultrasound transit time flow measurements (Medi-Stim AS) and related to portal pressure. Hence, the PRV equals portal HBF divided to the portal pressure. Data were analysed using ANOVA for repeated measurements.
Results and Discussion: Noradrenaline significantly increased MAP ($p < 0.01$) but had no effect on central venous, caval or portal vein pressures. Both cardiac output and portal HBF remained similar. Although SVR significantly increased (< 0.01), noradrenaline had no effect on PVR ($p = 0.17$).
Conclusions: Noradrenaline had no effect central venous, caval and portal pressures. SVR increased significantly while PVR remained unchanged. The underlying mechanisms for this different response on vascular resistances remains to be elucidated.
References:
1. Futier E. JAMA. 2017;318(14):1346-1357.
2. Hiltebrand LB. Anesthesiology. 2011;114(3):557-564.

	T1	T2	T3
MAP (mmHg)	71 (10)*	85 (10)*	91 (11)*
CO (L.min^{-1})	6.0 (1.2)	6.1 (1.1)	6.1 (1.2)
Portal HBF (ml.min^{-1})	653 (220)	590 (196)	578 (200)
PVR (dyn.sec.cm^{-5}.m^{-2})	9.0 (4.7)	7.7 (4.9)	7.4 (4.6)
SVR (dyn.sec.cm^{-5}.m^{-2})	905 (127)*	1058 (131)*	1159 (180)*
Portal Venous Pressure (mmHg)	7 (3)	8 (4)	8 (4)
Caval Venous Pressure (mmHg)	5 (3)	6 (4)	5 (4)
CVP (mmHg)	4 (3)	5 (3)	5 (3)

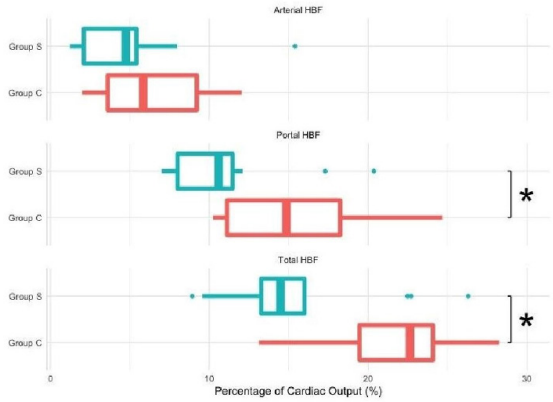
Data were expressed in mean (SD). * $p < 0.05$

5107

Effect of somatostatin on system haemodynamics and hepatic blood flow

Thierens H.[1], Van Limmen J.[1], Wyffels P.[1], Berrevoet F.[1], De Baerdemaeker L.[1], De Hert S.[1]
[1]Ghent University Hospital - Gent (Belgium)

Background and Goal of Study: Previous studies have suggested that somatostatin may affect hepatic blood flow (HBF) in the presence of presence of portal hypertension1. The clinical effects of somatostatin administration on HBF however remain ill-defined2. In the present study we aimed to assess these effects by comparing HBF in patients with and without intra-operative somatostatin administration.
Materials and Methods: After ethical approval and written informed consent, patients scheduled for pancreaticoduodenectomy were included and divided in 2 groups, according to the surgical indication for somatostatin administration. Anaesthesia was provided for all patients using propofol TCI (Schnider model) and remifentanil TCI (Minto model). All patients received goal-directed haemodynamic therapy guided by PulsioflexTM (Getinge Group). HBF was measured using ultrasound transit time flow measurements (Medi-Stim AS). Arterial, portal and total HBF, indexed to the cardiac output, were compared using Wilcoxon rank sum-test.
Results and Discussion: A total of 22 patients were included. 13 patients received somatostatin (group S) whereas 9 patients did not (group C). Cardiac output, systemic and portal pressures were similar in both groups. Total HBF was significantly lower in group S (14.5% [13.3 – 16.0]) compared to group C (22.6% ([19.5 – 24.1]) ($p = 0.04$). The difference between portal HBF's (10.6% [8.0 – 11.5] vs 14.9% [11.1 – 18.2] ($p = 0.04$)) revealed a statistical significant difference between both groups. Arterial HBF's (4.8% [2.1 – 5.4] vs 5.8% [3.6 – 9.2] ($p = 0.21$)) were similar in both groups (see figure).
Conclusion: Somatostatin had no effect on systemic haemodynamic variables but significantly reduced total HBF. The present study suggest that this is related to a reduced portal HBF with somatostatin.
References:
1. Moitinho E et al. Journal of Hepatology. 2001;35(6):712-718.
2. Sonnenberg GE et al. Gastroenterology. 1981;80(3):526-532.



5188

Intraoperative factors associated with acute kidney injury after a liver transplantation - single centre experience

Medved K.[1], Franušić L.[2], Pavičić Šarić J.[1], Vukičević Štironja D.[1], Mrzljak A.[1]
[1]University hospital of Merkur - Zagreb (Croatia), 2General hospital Dubrovnik - Dubrovnik (Croatia)

Background and Goal of Study: Acute kidney injury (AKI) after liver transplantation (LT) can increase mortality and foster the development of chronic renal dysfunction. In this study, we analysed intraoperative factors associated with AKI in patients who underwent LT.
Materials and Methods: This retrospective study consisted of 191 adult patients who underwent LT during two consecutive years. AKI was determined using KDIGO classification (Kidney Disease Improving Global Outcomes) as an increase in serum creatinine by 26.5 µmol/l within 48 hours or an increase in serum creatinine to 1.5 times baseline after LT. We analysed volume resuscitation (ml) with a red blood cells transfusion (homologous or/and autologous blood); fresh frozen plasma; crystalloids, colloids, albumins and noradrenaline dosage (mcg/min) during LT. Student t-test was used for analysis.
Results and Discussion: The patients were comparable in terms of age, BMI, etiology of liver cirrhosis and comorbidities (diabetes mellitus, chronic kidney disease, arterial hypertension). The incidence of AKI was 24,6%. MELD-Na was significantly higher in patients with AKI (21.7 ± 8.1 vs 17.2 ±7.1; $p < 0.001$) as well as preoperative serum creatinine (116.5±95.4 vs. 84.3±51.45 µmol/l; $p < 0.003$). Patients with AKI received significantly more intraoperative red blood cells via transfusion (2578±1685 vs. 2076±1441 ml; $p= 0.0484$) in comparison with non AKI patients, as well as noradrenaline dosage used during LT (11±13 vs. 7.5±9 mcg/min; $p=0.0491$). Among all other analysed factors, we found no significant differences.
Conclusion: In this study we have shown that almost one quarter of patients developed AKI after a LT. Patients with AKI received more red blood cells via transfusion and higher doses of noradrenaline during LT. The aforementioned is consistent with the knowledge that higher doses of noradrenaline cause vasoconstriction of renal vasculature leading to renal failure.(1)
References:
1. Wyssusek KH, Keys AL, Yung J, Moloney ET, Sivalingam P, Paul SK.Evaluation of perioperative predictors of acute kidney injury post orthotopic liver transplantation. Anaesth Intensive Care. 2015 Nov;43(6):757-63.

5377

Influence of inhalation anesthetics on liver function of patients with toxic hepatitis during surgical treatment of pulmonary tuberculosis

Volchkov V.[1], Skorokhod K.[2], Li V.[2], Kovalev S.[2]
[1]St. Petersburg State University - St. Petersburg (Russia), [2]Research Institute of Phthisiopulmonology - Saint-Petersburg (Russia)

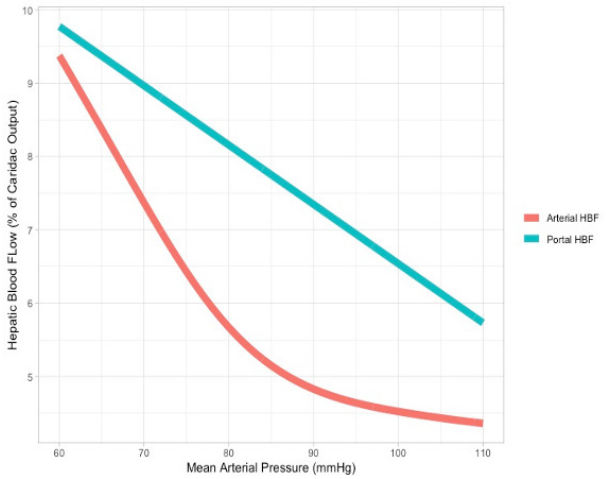
Background and Goal of Study: Leading place among 29% of patients with adverse reactions after polychemotherapy (PCT) for treatment of tuberculosis (TB) is occupied by toxic hepatitis (TH). Therefore, 30% of the patients require surgical treatment under general anesthesia, as a result of therapy. However, there is less information about influence of inhalation anesthetics on liver function, in case TH. The aim of this study was to evaluate effects of sevoflurane (SF) and desflurane (DF) on liver function of patients with toxic hepatitis caused by anti-TB PCT during surgical treatment of pulmonary TB.
Materials and Methods: 45 patients with combination of TB and TH were studied for liver function after anesthesia with SF (23 patients) or DF (22 patients). Groups were similar with respect to sex, age, ASA status, forms of TB, duration of anesthesia. Level of aspartate aminotransferase (AST), alanine aminotransferase (ALT), total bilirubin (TBil), alkaline phosphatase (ALP), gamma-glutamyl transpeptidase (GTP), lactate dehydrogenase (LDH), alpha-glutathione S transferase (alphaGST) were measured before, 1,6, 24 hours, 7,14 days after surgery. Hemodynamic monitoring with PiCCO technology was carried out during operation to prohibit reduction of hepatic blood flow.
Results and Discussion: ALT level was 4 times higher than normal in both groups at start of the study. In the future, there was a tendency to decrease. It had reached near normal levels by 14 days after surgery. Initialy AST level was 2 times above norm and then it was remaining within these limits in both groups throughout the study. Before intervention, level of GTP was twice reference range in both groups. In the group of SF, there was a decrease it to normal values, during 1 hour after the operation, followed by increase after 6 hours and normalisation to 24 hours. In the desflurane group, level of GTP had a steady downward trend. Level of alphaGST was initially comparable in both groups and it was 3 times higher than normal. In desflurane group, level of alphaGST was rising during first hour with subsequent reduction to the norm level after 24 hours. In SF group indicator was descending. Levels of ALP, LDG, Tbil were remaining within reference intervals throughout the study.
Conclusion: SF and DF do not worsen the studied markers of liver function in case of stable hemodynamics during operation in patients with combination of TB and TH both in the early and late postoperative period.

5433

Effect of noradrenaline on hepatic blood flow: preliminary results of a prospective observational trial

Verougstraete M.[1], Van Limmen J.[1], Wyffels P.[1], Berrevoet F.[1], De Hert S.[1], De Baerdemaeker L.[1]
[1]University Hospital Ghent - Gent (Belgium)

Background and Goal of Study: Noradrenaline is used to maintain adequate blood pressure1. Animal studies suggested that noradrenaline has no effect on hepatic blood flow (HBF)2, however human studies are lacking. The aim of the present study was to evaluate the effect of noradrenaline infusion on HBF.
Materials and Methods: After ethical committee approval and written informed consent, patients scheduled for pancreaticoduodenectomy were included. All patient received target-controlled anaesthesia with propofol (Schnider model) and remifentanil (Minto model). Haemodynamic data were measured, recorded and guided by PulsioflexTM. These data were related to HBFs which were measured using ultrasound transit time flow measurements (Medi-Stim AS). After baseline measurements, noradrenaline infusion was started, and mean arterial pressure (MAP) was titrated to respectively 10 – 20% and 20 – 30% of baseline MAP. Haemodynamic variables and simultaneously measured HBF`s were recorded at each time interval. Arterial, portal and total HBF were indexed to cardiac output (CO). The effect on HBF`s related to MAP was analysed using a random effect GAM modelling, a multivariate regression method based on splines.
Results and Discussion: A total of 12 patients were included. CO was similar at the different times of measurement. Noradrenaline significantly increased MAP but reduced total HBF ($p < 0.01$). This was due to a concomitant dose-dependent decrease in both portal ($p < 0.01$) and arterial ($p < 0.01$) HBF. This effect was linear for portal flow. For arterial HBF however the relationship was non-linear with a more pronounced decreased flow in the lower MAP range (see figure).
Conclusion: Noradrenaline reduced total HBF. This was related to a dose-dependent decrease in both arterial and portal HBF. The underlying mechanisms for the different response pattern between arterial and portal HBF remain to be elucidated.
References:
1. Futier E. JAMA. 2017;318(14):1346-1357.
2. Hiltebrand LB. Anesthesiology. 2011;114(3):557-564.



5523

Transperitoneal versus extraperitoneal robot-assisted laparoscopic radical prostatectomy on the postoperative hepatic and renal function

Iee W.[1], Cang J.[1], Fang F.[1], Tang J.[1]
[1]Zhongshan Hospital Affiliated to Fudan University - Shanghai (China)

Background and Goal of Study: Through retrospective method, we evaluated the hepatic and renal function changes of patients undergoing robotic-assisted laparoscopic radical prostatectomy (RALP) during and after surgery. We also aimed to describe the effects of pneumoperitoneum via transperitoneal (TP-RALP) and extraperitoneal (EP-RALP) approaches on liver and kidney function in patients after operation. To provide clinical data support for anesthesia management of patients with RALP and choose the appropriate surgical scheme for ones with hepatic insufficiency.
Materials and Methods: This study retrospectively collected 159 prostate cancer patients who met the inclusion criteria from 2015 to 2019. By comparing the laboratory tests of hepatic and renal function before and after surgery in patients with different surgical approaches (transperitoneal or extraperitoneal).
Results and Discussion: Postoperative total bilirubin (TB) and bound bilirubin (CB) in the two groups were both significantly higher than before surgery, while total protein (TP), albumin (ALB), and globulin (GLO) were significantly less than before surgery ($p<0.05$). There were no statistical differences in the preoperative hepatic function between the two groups. But TP, ALB and GLO of the EP-RALP group were significantly higher than TP-RALP group after operation ($p <0.05$). In TP-RALP group, urea, serum creatinine (Scr) and uric acid were significantly less than before surgery ($p<0.05$), In EP-RALP group, urea and uric acid were significantly less than before surgery ($p<0.05$). There were no statistical differences in estimated glomerular filtration rate (eGFR) and Creatinine Clearance (CCR) in the two groups. There were no statistical differences in the renal function between the two groups whether before or after surgery.
Conclusion: RALP has a significant effect on hepatic function after transperitoneal and extraperitoneal approaches. TP, ALB, and GLO of EP-RALP group were significantly higher than TP-RALP group. It is suggested that different pneumoperitoneal pathways may have different effects on protein consumption in the body. But it may have less effect on renal function.

6000

Post-operative laboratory analysis of patients submitted to ortotopic liver transplantation

Colacio D.[1], Rodrigues Nascimento J. C.[1], Rodrigues Nunes R.[1], Nobre Muniz F.[1], Guanabara Teixeira Reis N. M.[1], Silva De Paiva F. D.[1]
[1]Hospital Geral de Fortaleza - Fortaleza (Brazil)

Background and Goal of Study: There is no single laboratory test capable of detecting complications after liver transplantation, however, they can be used to monitor the patient both by their absolute value and by analyzing their trend values. We evaluated the laboratory profile of patients in the first 30 days after orthotopic liver transplantation (OLT), aiming to analyze their tendency over the days, as well as the moment of return to normality.
Materials and Methods: This is a retrospective study in which laboratory exams were collected from 50 patients from the 1st to the 30th day after transplantation in the Fortaleza General Hospital, from January 2016 to December 2016, of both genders, at 18 years and over, with varied causes of loss of liver function. Included were hemoglobin, hematocrit, platelet count, INR, Partial Thromboplastin Time (PTT), Aspartate Aminotransferase (AST), Alanine Aminotransferase (ALT), total bilirubin, urea, creatinine, alkaline phosphatase (AF), gamma glutamyl transpeptidase (GGT).
Results and Discussion: In this study, INR and PTT presented normalization on average on the 3rd and 5th days after TOF, respectively, with a significant reduction in their values from the 3rd day. Other studies have shown that the persistence of coagulopathy indicates severe organ dysfunction. Transaminases did not return to normal within 30 days following liver transplantation. However, there was a reduction in the value with statistical significance from the 5th postoperative day for the AST and the 9th day for the ALT. Regarding bilirubins, the mean was not normalized at 30 days postoperatively, however there was a statistically significant reduction from the 12th day. AF and GGT did not have their means normalized during the study period, however they showed an upward trend from the first day after surgery. This pattern is similar to that observed in other studies, where it was found that AF and GGT are the last to normalize. Elevation of AF, bilirubins, AST, ALT are known to be typical of acute but nonspecific rejection, also occurring in other conditions such as hepatobiliary dysfunctions.
Conclusion: In the present study it was possible to follow with statistical significance the variation of the values during the time of most of the evaluated exams (7 from a total of 12). The importance of knowing this patient profile stems from the fact that complications inherent to surgery can be detected early by laboratory tests.

4371

Anesthetic considerations in patients with Gorham's disease: a case report of three surgeries and postoperative follow-up for 7 years

Wu N. H.[1], Peng T. C.[1], Tzeng S. T.[1], Kao M. C.[1]
[1]Taipei Tzu Chi Hospital - New Taipei City (Taiwan)

Background: Gorham's disease (vanishing bone disease) is a rare disorder characterized by massive bone resorption. It mostly affects the mandible, ribs, and spine. To date, there are only around 200 cases reported, with little data regarding anesthesia management or long-term postoperative follow-up.
Case presentation: Seven years ago, a 42-year-old Asian male with Gorham's disease was admitted to our hospital due to persistent low back pain. Image study showed severe kyphosis and bony destruction over the T12-L1 vertebrae and the left lower ribs. The patient then underwent his first surgery, T12-L1 vertebral column resection and T5-L4 posterior fusion with instrumentation. A rescue and revision surgery was arranged a year later due to the loosening of some fixing rods. General anesthesia with endotracheal intubation was performed in these two surgeries. This patient had an uneventful recovery without any neurological sequelae [1]. He was admitted again in October 2019 for cystostomy due to neurogenic bladder with complicated urinary tract infection. Because of the worsening pulmonary function from progressive chest wall deformity, only light intravenous sedation with local anesthetic wound infiltration was performed.
Discussion: Anesthetic considerations mainly lie in airway management, ventilation setting, and postoperative pain control. A difficult airway is often anticipated when a patient has mandible lesions with limited mouth opening. Manual in-line stabilization during intubation should be applied for C-spine protection. Positioning can be difficult if the patient presents severe kyphosis. Patients with Gorham's disease often develop restrictive lung disease because of kyphosis and chylothorax. Pressure-control mode ventilation with lung protective strategy including low tidal volumes (6-8 kg/mL) and optimal driving pressures is preferred. Multimodal analgesia should be considered, while epidural analgesia can be troublesome due to spine lesions.
References:
1. Huang SY, Lee YM, Tzeng ST, Su CP, Huang SF, Wu YK, et al. Gorham syndrome with postoperative respiratory failure and requiring prolonged mechanical ventilation. Respir Care. 2013;58:e144–8.
Learning points: Anesthesia for patients with Gorham's disease can be challenging due to the extensive involvement of the skeletal system, particularly airway management. Increased risks of anesthesia due to worsening pulmonary function necessitates special care.

4459

Successful therapy of an intraoperative lactic acidosis by using high-caloric parenteral nutrition in a patient with MELAS-syndrome

Roth S.[1], Nickel F.[1], Kindgen-Milles D.[1], Kienbaum P.[1], Huhn R.[1]
[1]University Hospital Duesseldorf - Duesseldorf (Germany)

Background: Mitochondrial encephalomyopathy, lactic acidosis and stroke-like episodes syndrome (MELAS syndrome) is one of the most frequent mitochondrial disorders. Due to a defect of oxidative phosphorylation, there is an impaired mitochondrial energy production with consecutive metabolic disorders, especially in situations with increased stress, e.g. during an operation. With regard to the anesthesiological management, MELAS syndrome patients therefore represent a challenging cohort. To date, literature concerning the correct treatment of these patients is rare so that this case report is supposed to support decision making for anesthesiologists in the therapy of patients with MELAS syndrome.
Case Report: We report the case of a 34 years old female with known MELAS syndrome who underwent an elective laparoscopy due to endometriosis that changed in a laparotomy in the course of the operation. General anesthesia was induced with Remifentanil, Thiopental and Rocuronium. Arterial and central venous catheters were inserted. General anesthesia was maintained with Desfluran and Remifentanil. The first arterial lactate value at the beginning of the operation was 1.4 mmol/l. In the following two hours, the patient developed a lactic acidosis with increasing lactate levels (arterial lactate concentrations every 30 minutes, [mmol/l]: 1.4; 2.0; 2.5; 3.7; 3.9). A liberal crystalloid infusion therapy and the application of Glucose 40% (10ml/h) could not stop this progress. At a lactate level of 4.2 mmol/l high-caloric parenteral nutrition was started (SMOFkabiven 1600 kcal, 60ml/h). This therapy led to a normalization of lactate level (arterial lactate concentrations every 30 minutes, [mmol/l]: 3.8; 3.0; 2.4; 1.6). After 4 hours of operation time, the patient could be extubated without any complications and was transferred to the intensive care unit.
Discussion: In this case report, the application of high-caloric parenteral nutrition was associated with the normalization of a progressive lactic acidosis. Possibly, a prophylactic parenteral nutrition may reduce the risk for the development of lactic acidosis in patients with MELAS syndrome. Further research is needed to investigate this aspect in the future.
Learning points: The application of high-caloric parenteral nutrition seems to be a suitable approach in the therapy of patients with MELAS syndrome and intraoperative lactic acidosis.

4662

Anesthetic management of an insulinoma: a case report

Da Silva Ramos S.[1], Leite A. I. D.[2], Almeida V.[1], Inácio R.[1], Vilhena I. R.[1]
[1]Centro Hospitalar Universitário de Coimbra - Coimbra (Portugal), [2]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Insulinoma is a functioning pancreatic neuroendocrine tumor and a rare cause of recurrent hypoglycemia.1 It's manifested by recurrent episodes of hypoglycemia and adrenergic and neuroglycopenic symptoms.1 The aim of the anesthesiologist is to prevent periods of hypoglycemia, which may cause irreversible neurological damage, and episodes of hyperglycemia following the lesion's excision.
Case Report: Female, 45 years-old, history of morbid obesity and obstructive sleep apnea syndrome. She had frequent episodes of unconsciousness and adrenergic symptoms, with low blood glucose levels, correlated with a pancreatic lesion suggestive of insulinoma. She was submitted to laparoscopic enucleation of the lesion under balanced general anesthesia. Monitored by the ASA standard, blood glucose was measured every 30 minutes until tumor resection and then every 15 minutes. These levels were titrated by crystalloid infusion with 5% glucose. There were no postoperative complications.
Discussion: Pancreatic neuroendocrine tumors are rare and insulinoma is the most common subtype. Laparoscopic resection is the gold-standard treatment. However, the hemodynamic changes caused by pneumoperitoneum lead to the release of

catecholamines, vasopressin and, indirectly, cortisol, which stimulate endogenous glucose production, whose perioperative levels are already uneven.1 Anesthetic evaluation should include documentation of neurological damage resulting from severe hypoglycemic episodes.1 Intraoperatively, the anesthesiologist should prevent hypoglycemic episodes during tumor management and post-resection hyperglycaemia. The most accepted approach is that the patient should start on a 10% glucose solution continuously and that glucose levels should be assessed every 30 minutes to maintain glycemic levels between 100-150 mg/dL.1 Anesthetic technique should include drugs that decrease the cerebral metabolic rate of oxygen, such as propofol or thiopental.

References:
1. Goswami J, Somkuwar P, Naik Y. Insulinoma and anaesthetic implications. Indian J Anaesth 2012;56:117-22.

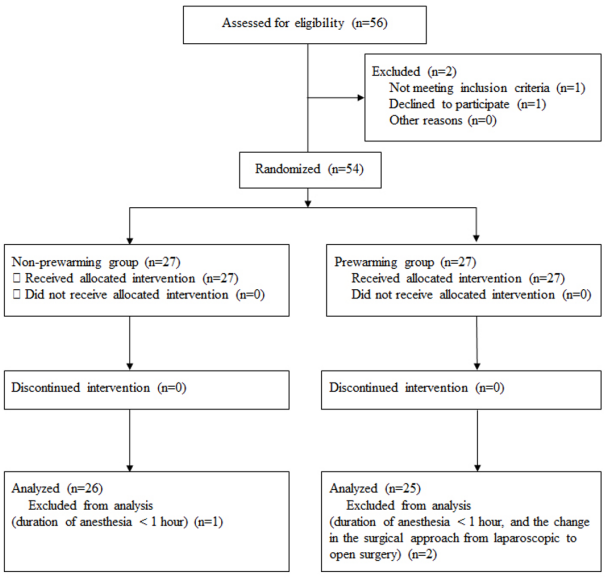
Learning points: Despite its rarity, an insulinoma represents a major challenge, particularly due to the variation of intraoperative blood glucose. Anesthesiology plays a crucial role in these patients' management because, although the ultimate treatment is the surgical removal, proper control of glucose levels can prevent neurological damage, providing a better outcome for the patient.

4516

Effect of 10 min-prewarming on core body temperature during gynecologic laparoscopic surgery under general anesthesia

Jung J.[1], Woo S.[1], Byun S.[1]
[1]Daegu Catholic University Hospital - Daegu (South Korea)

Background and Goal of Study: Previous research has shown beneficial effect of prewarming on preventing inadvertent perioperative hypothermia. Nevertheless, there are not many researches on effects of short period prewarming, especially in gynecologic laparoscopic surgery.
Materials and Methods: Fifty-four patients are randomly assigned to 2 groups (Fig.1). Patients in non-prewarming group was warmed only intraoperatively with forced air warming device and for those in prewarming group, warming started 10 min before anesthetic induction. The primary outcome was incidence of intraoperative hypothermia.



Results and Discussion: Intraoperative hypothermia was observed in 73.1 percent in non-prewarming group, while it occurred in 24 percent of patients in prewarming group (P <0.001). There were significant differences in changes of core temperature between the non-prewarming group and all the prewarming groups (p < 0.001). Postoperative shivering occurred in 8 out of 26 (30.8%) in non-prewarming group, and in 1 out of 25 (4.0%) in prewarming group (P = 0.024).
Conclusion: Forced air warming for 10 min before induction combining with the intraoperative warming is effective method to prevent hypothermia in patients undergoing gynecologic laparoscopic surgery.

4520

Evaluation of comfort under moderate/deep sedation with dexmedetomidine/propofol during endoscopic ultrasonography: a prospective, randomized, controlled study

Tu H.[1], Wang X.[1], Wang X.[1], Cai L.[1], Du G.[1], Hu B.[1]
[1]West China Hospital of Sichuan University - Chengdu (China)

Background and Goal of Study: Endoscopic ultrasonography (EUS) is a more complicated procedure than conventional endoscopy. Dexmedetomidine (DEX) and propofol are common sedatives for endoscopy, both of them have advantages and disadvantages, we chiefly aimed to compare the patients' comfort of dexmedetomidine (moderate sedation) and propofol (deep sedation) undergoing the EUS.
Materials and Methods: This is a prospective, randomized and controlled study. patients who underwent the EUS and the EUS-FNA were randomly allocated to received dexmedetomidine (group D) or propofol (group P). Group D received DEX at a loading dose of 1 ug kg-1 lasting for 10 min followed by a maintenance infusion rate of 0.2-0.3ug kg-1 h-1 throughout the whole procedure. When the Modified Observer's Assessment of Alertness/Sedation Scale (MOAA/S) reached 3 to 4, starting the procedure. Patients in the group P were given propofol 1mg kg-1 intravenously, and the practice was started when the MOAA/S reached 1 to 2. A single dose of sufentanil 1 ug kg-1 was administered before the procedure in all patients. The primary endpoint was patients' comfort score based on visual analogue scale (VAS), and the secondary endpoints included postoperative comfort index, sedation related adverse events and endoscopists' satisfaction.
Results and Discussion: 60 patients were eventually enrolled each group in the current study. The patients' comfort score was lower in the group D than that in the group P(P <.001). There was no significant difference about postoperative comfort index excepted nausea and vomiting which were more common in patients with DEX after the procedure (p <.05). The incidence of desaturation, hypotension and apnea were significantly higher in patients with propofol (all P <.05), but there were more patients had bradycardia in the group D (P <.05). And the endoscopists' satisfaction score was also significantly lower in the group D (P <.05).
Conclusion: Compared with Propofol, DEX provided lower patients' comfort and endoscopists' satisfaction during EUS. But it was relatively safer for patients with DEX undergoing EUS and caused less hemodynamic and respiratory depression.

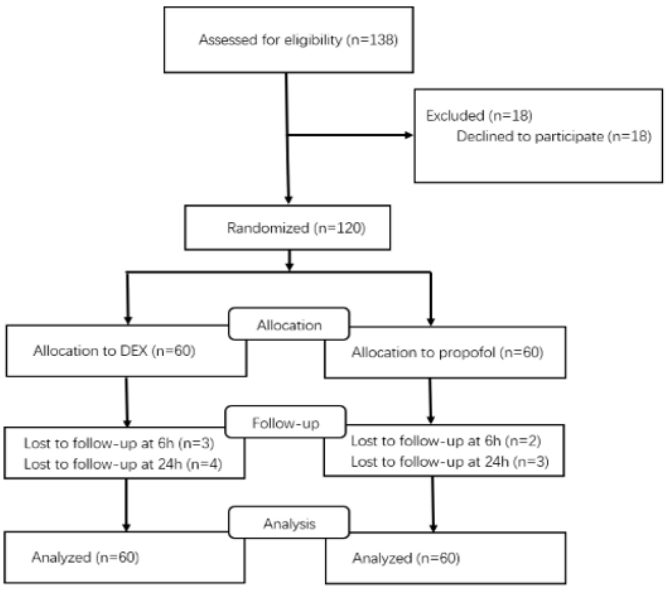


Figure 1. Flow diagram of patient enrollment. DEX, dexmedetomidine.

4764

Anaesthetic management in Irreversible Electroporation (IRE): Four year experience

Vicente Orgaz M.[1], Abadal Viyallandre J. M.[1], Orozco Vinasco A.[1], Ramos Luengo A.[1], Márquez Garrido G.[1], Gholamian Ovejero S.[1]
[1]Hospital Universitario Severo Ochoa - Madrid (Spain)

Background and Goal of Study: IRE is a non-thermal ablation technology based on the application of electrical energy to the target cells. It is often used as alternative of surgery in unresectable, locally advanced malignant disease. The aim of this study was to evaluate perioperative anaesthetic management and safety of this technique.
Materials and Methods: Retrospective review was performed of patients who received IRE by percutaneous or laparotomy approach between July 2015 and November 2019. Anaesthetic management, perioperative complications, stay in Postanesthesia Care Unit (PACU) and survival per year were analyzed.
Results and Discussion: 19 patients were included: 6 pancreatic, 5 liver, 7 kidney and 1 thyroid cancer. The descriptive analysis showed a mean age of 62,05 (± 9,21 SD) and most patient were ASA III. We evaluated two differents groups: percutaneous (8) and laparotomy approach (11). All patients required high doses of opioids and neuromuscular blockade to avoid cardiac arrhythmias and muscle contractions. All patients underwent a Train Of Four ratio and double ECG monitorisation, one to synchronize the IRE pulses with the ECG. Most patients in the percutaneous group (kidney and thyroid IRE) had no intraoperative incidences. However, 2 patients had cardiac events related to the electric impulse (arterial hypertension or tachycardia). 3 patients in the laparotomy group (pancreatic and liver IRE) had arterial hypertension too and 2 patients had accidental sections of large vessels adjacent to tumour during surgery. The mean surgical time was 270 min (± 1,05 SD). No patient developed severe complications due to the IRE such a malignant arrhythmias, rhabdomiolisis or seizures. Incidence of postoperative complications due to surgical technique was similar in both groups (37%). However, the severity of these increased in the laparotomy group, resulting in a higher mean PACU stay. Overall, one year survival rate was of 73,7%.
Conclusion: The main advantage over other ablative methods is that there isn´t heating or freezing damage surrounding tissues and that the heat sink effect does not occur. It is considered a safe procedure to treat tumours near vital vascular and ductal structures. Given the anatomic location of pancreas and liver, an open technique is indicated, however, the rate of complications increases. The Analgesia Nociception Index (ANI), could be used to measure sympathetic activity during application of electrical impulse.

5020

What's the best anaesthesic aproach in a patient with amyotrophic lateral sclerosis?

Gregório M.[1], Fonseca J.[1], Silva E.[1]
[1]Centro Hospitalar de Leiria - Leiria (Portugal)

Background: ALS is a rare neurological disorder characterised by degeneration of higher and lower motor neurons with progressive muscle weakness. One should be aware of the risks and benefits of performing any kind of anesthesia in this patients in order to not aggravate or exacerbate their previously condition.
Case report: A 54 year-old male of ASA physical status class 4, with advance amyotrophic lateral sclerosis, was scheduled for percutaneous endoscopic gastrostomy. The patient had dysarthria, dysphagia, restrictive pulmonary disease and tetraparesis. To do the procedure a target controlled infusion (TCI) with 195 mg of propofol and 50 mg of ketamine was programmed in the effect-targeting model and adjusted acording to the patient's haemodinamic state and the painful stimulus of the procedure. The procedure lasted 40 minutes and went without complications. The patient went home the next day without worsening of neurological condition.
Discussion: ALS has multiple anaesthetic concerns that makes the preoperative review of functional status a imperative guide for decision-making in the optimal anesthetic management of these patients. In this case, we choose a propofol based sedation in order to avoid more serious complications of general anesthesia as life-threatening hyperkalemia if succinylcholine is used or residual muscle weakness that require postoperative mechanical ventilation1. PEG placement under propofol sedation in patients with ALS is safe and acute respiratory complications are rare2. Also, the use of TCI other than bolus for conscious sedation can contribute for a more stable haemodinamic profile avoiding apnea and hipoventilation3. Good evaluation of the patient, no technical difficulties during the procedure and proper use of propofol TCI were certainly factors that contributed for the success of our anesthetic aproach.
References:
1. 1.doi.org/10.1007/s00540-019-02611-x; 2.European Respiratory Journal 2011 vol 38: p2071;3.doi: 10.1111/1751-2980.12101.
Learning points: Nowadays as more therapies become available, more anesthesiologists may encounter ALS and a better understanding of anesthetic-related adverse outcomes is needed to raise awareness and to develop clinical pathways to aproach these patients in the best way possible. Sedation in patients with ALS is safe and acute respiratory complications are rare.

5265

Effects of Osteotomy on Hemodynamic Parameters and Depth of Anesthesia in Rhinoplasty Operations

Gencay I.[1], Bayar Muluk N.[2], Yazici I.[3], Aydin G.[2], Akcaboy Z. N.[2], Buyukkocak U.[4]
[1]Kirikkale University School Of Medicine - Kirikkale (Turkey), [2]Kirikkale University - Kirikkale (Turkey), [3]Medipol University - Istanbul (Turkey), [4]Yuksek Ihtisas University - Ankara (Turkey)

Background and Goal of Study: Bleeding during rhinoplasty leads to many undesirable effects, such as loss of vision in the surgery area, complications during the procedure, and postoperative complications. Considering that osteotomy is the most challenging process in rhinoplasty, this study aimed to examine the hemodynamic changes during osteotomy and changes in the depth of anesthesia.
Materials and Methods: A total of 50 patients, who underwent osteotomy during rhinoplasty under general anesthesia, were examined retrospectively. The patients underwent general anesthesia induction. Before the surgery, they received remifentanil 1 µg/kg as an intravenous bolus followed by 0.5 µg/(kg × min) as intravenous infusion until the end of the surgery. The hemodynamic parameters and bispectral index (BIS) values of the patients were examined before anesthesia, 10 min before osteotomy, during osteotomy, and 10 min after osteotomy.
Results and Discussion: A significant difference was found in heart rate (beats/min), systolic and diastolic blood pressures (mm Hg), and BIS values of the patients measured before, during, and after osteotomy ($P < 0.001$). The heart rate, systolic and diastolic blood pressures, and BIS values were significantly higher during osteotomy.(Fig 1,2) Until the 10th min after osteotomy, all four parameters nearly reached the values measured before osteotomy. In rhinoplasty surgeries with osteotomy, it is very important to control hemodynamic changes to prevent an increase in bleeding, facilitate the surgical intervention, and prevent possible postoperative effects. A deep and balanced anesthesia method is necessary to ensure stable hemodynamic parameters and no pain stimuli. The present study showed these changes in the depth of anesthesia due to osteotomy and the resultant increased hemodynamic response.
Conclusion: Osteotomy directly affects hemodynamic parameters and depth of anesthesia. Hence, it is of utmost importance that the analgesic need and depth of anesthesia are adequately monitored and adjusted during osteotomy. By suppressing hemodynamic stress responses, the amount of bleeding can be reduced, thus increasing the surgical success.

4462

Effect of pretreatment with a low-calorie diet on liver function in obese patients undergoing laparoscopic sleeve gastrectomy

Takeuchi M.[1], Takasaki Y.[1], Nishihara T.[1], Abe N.[1], Sekiya K.[1], Yorozuya T.[1]
[1]Ehime university hospital - Toon (Japan)

Background and Goal of Study: Preoperative weight loss facilitates surgery. This retrospective study of laparoscopic sleeve gastrectomy (LSG) investigated the effect of pretreatment with a low-calorie diet on liver function during the perioperative period.
Materials and Methods: We recruited 26 adult obese patients (16 women and 10 men; age, 46 ± 10 years; body mass index, 39.2 ± 6.4 kg/m2) who underwent LSG consecutively from January 1, 2017 to October 31, 2019. Their medical and anesthesia records were retrospectively reviewed and data pertaining to the serum concentrations (IU/L) of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were collected as an index of liver function. A low-calorie diet was prescribed individually to approximate 1000 kcal/day for 2 weeks. The serum concentrations of AST and ALT were measured four times on the admission day as a baseline value, within 8 days before the surgery (T1), and on the 1st and 7th postoperative day (T2 and T3). Serial changes in AST and ALT concentrations were analyzed by repeated-measures analysis of variance and followed by a post-hoc test. $P < 0.05$ was considered statistically significant.
Results and Discussion: Pretreatment with a low-calorie diet yielded a weight loss of 5.2 ± 1.6%. The duration of the surgery was 171 ± 34.9 min. A significant

difference was observed between ALT concentration at T1 and the baseline value. A subgroup analysis regarding sex and %weight loss revealed that, in men, the mean AST concentration at T1 and T2 (62.2 ± 38.2 and 73.6 ± 35.1) and the mean ALT concentration at T1 (99.0 ± 67.9) were significantly higher than their respective baseline values (42.5 ± 29.0 and 69.4 ± 49.2). In patients with weight loss exceeding 5% (n = 15), the mean AST concentration at T1 and T2 (54.2 ± 39.9 and 64.5 ± 32.9) and the mean ALT concentration at T1 and T2 (72.5 ± 59.0 and 75.5 ± 52.1) were significantly higher than their respective baseline values (41.5 ± 30.9 and 56.6 ± 46.9). The significant preoperative increase in both AST and ALT concentrations did not worsen by surgically associated insults and up to the 7th postoperative day, liver function almost improved.
Conclusion: This study suggests that a low-calorie diet administered preoperatively for 2 weeks may temporally deteriorate liver function, particularly in males and patients with weight loss exceeding 5%.

4590

Evaluation of usability of ultrasound parameters in the assessment of intravascular volume status in patients under general anaesthesia

Pikulska A.[1], Zegan-Baranska M.[1], Zukowski M.[1], Kotfis K.[1]
[1]Pomeranian Medical University Szczecin - Szczecin (Poland)

Background and Goal of Study: Using POCUS by a clinician in therapeutic decision making is becoming a standard procedure. One of the parameters thus evaluated is measuring intravascular volume status, based on the assessment of respiratory movement of inferior vena cava or the ration between the maximum size of inferior vena cava and aorta. This study has been conducted in order to assess how ultrasound parameters (IVC–CI, IVC–DI, IVC–Ao) are influenced by mechanical ventilation (MV) with various values of PEEP, initially assessed during spontaneous breathing (SB) at a stable intravascular volume status.
Materials and Methods: Prospective, observational study was conducted on 78 adult ASA I,II patients, undergoing non-abdominal operation under general anaesthesia (GA). All USG examinations were performed in supine position. The measurements of inferior vena cava (IVC) and aorta were made in three measurement points: one during SB before induction of anaesthesia and two measurements in a patient under GA and MV with PEEP5 cmH2O(MV5) and PEEP10 cmH2O(MV10).
Results and Discussion: Maximum size of IVC (maxIVC) during expiration (SB 17,35±4,85mm) and during inspiration (MV) at pre-defined points (MV5 20,11±3,68mm, MV10 21,87±3,06mm) were significantly different (p<0,0001), as well as minIVC dimenstions during expiration SB (10,95±4,71mm) and at the time of MV inspiration (MV5 17,96±3,81mm, MV10 20,21±3,36mm). MaxIVC, along with MinIVC dependend significantly on PEEP during MV. The inferior vena cava collapsibility index (IVC-CI) during SB (SPONT-0,374) was statistically significantly different from the IVC distensibility index (IVC–DI) (p<0,0001). There is correlation between IVC–Ao index and the patients' age, and the value of plateau pressure during MV5 and 10.
Conclusion: MV affects the changes in the value of the IVC distensibility index (IVC–DI), established earlier in a SB patient. IVC-DI should not continue to be used in the assessment of the vascular bed filling in a situation where the patient requires MV. The IVC–DI and IVC-Ao may be used for a non-invasive assessment of the intravascular volume status in MV ventilated patients only if the ventilation conditions are not changed during fluid therapy (i.e.PEEP). However for IVC-Ao normograms for the age should be determined. There is a varied value of IVC–Ao index during ventilation at various levels of PEEP in patients with a stable hydration level.

5014

Evaluation of Effect of Intra Abdominal Pressure to Optic Nerve Sheath Diameter on Total Laparoscopic Hysterectomy

Bayramov T.[1], Kılıçaslan B.[2], Boyraz G.[2], Akinci S. B.[2]
[1]Istanbul University Faculty of Medicine, - Istanbul (Turkey), [2]Hacettepe University School of Medicine - Ankara (Turkey)

Background and Goal of Study: Pneumoperitoneum (PP) and the consequent increased intraabdominal pressure can have many systemic physiological consequences. There is growing evidence that demonstrates a positive correlation between intra-abdominal pressure (IAP) and intra-cranial pressure(ICP). Ultrasonographic evaluation of optic nerve sheath diameter (ONSD) has been shown to be especially valid in cases where the ICP≧ 20mm Hg. The study objective was to evaluate the changes in ICP and correlate those by means of ONSD in a controlled model of acute elevation of IAP and in Trendelenburg position (TP) who was undergoing total laparoscopic hysterectomy procedure.
Materials and Methods: Data was prospectively collected from patients who underwent Total Laparoscopic Hysterectomy procedure between April and November 2017. The ONSD was measured by ultrasound sagittally with a 10-MHz transducer 4 times: T0-immediately after induction of general anesthesia in hemodynamically stable patient in the horizontal position for baseline; T1-3 min. after PP at 20 mm Hg on horizontal position; T2-3 min. after PP at 15 mm Hg on TP;T3-After deflation of PP on horizontal position. And each time measured by three trained anesthesiologists separately. And parallel to these measurements simultaneously were measured mean arterial pressure (MAP), EtCO2 and PaCO2. Statistical analysis was performed using SPSS version 23.0 software. Tests were considered statistically significant if P<0.05.
Results and Discussion: There were 59 female between 22-74 years old , ASA I-II-III patients. Basal value of (T0) ONSD measured as 5.63 ± 0.53 mm; After 20 mm Hg PP, there was a statistically significant increase in the horizontal position (T1) (5,97 ± 0,49 mm) and 15 mm Hg PP with TP (T2) (5,95 ± 0,57 mm)) (p<0.05). At the end of the operation (T3) was determined that the value of ONSD (5,72 ± 0,47 mm) was approaching the baseline value again ($p < 0.05$). There was no correlation between ONSD and MAP, EtCO2 and PaCO2 values (p> 0.05).
Conclusion: In laparoscopic procedures; we showed that both the position and especially the elevated intraabdominal pressure increases ONSD and at the end of the operation the ONSD values reached the basal values. We believe ultrasound guided measurement of ONSD could be used during laparoscopic procedures or clinical follow-up especially in patients at risk for intracranial hypertension.

5622

Oxygenation monitoring using Oxygen Reserve Index (ORI™) in Major Ambulatory Surgery in a humanitarian aid environment

Martinez Hurtado E.[1], Sanchez Merchante M.[2], Kabriri Sacramento M.[1], Aracil Escoda N.[1], Ripolles Melchor J.[1], Abad Gurumeta A.[1], GEVAD, GVAH
[1]Hospital Universitario Infanta Leonor - Madrid (Spain), [2]Hospital Universitario Fundación Alcorcón - Madrid (Spain)

Background: Oxygenation is fundamental during induction and under general anesthesia. The unique indicator that can evaluate the adequate oxygenation status is end-tidal oxygen concentration (EtO2). More than 90% of EtO2 has been considered as an adequate oxygenation status. Oxygen saturation is the fraction of oxygen-saturated hemoglobin relative to total hemoglobin (unsaturated + saturated) in the blood. At around 90% oxygen saturation increases according to an oxygen-hemoglobin dissociation curve and approaches 100% at partial oxygen pressures of >10 kPa. Pulse oximetry is a method used to estimate the percentage of oxygen bound to hemoglobin in the blood. It is particularly convenient for noninvasive continuous measurement of blood oxygen saturation. This approximation to SaO2 is designated SpO2 (peripheral oxygen saturation). Oxygen reserve index (ORi), is a novel noninvasive indicator of blood oxygenation, measured with an index between 0.00 and 1.00.
Materials and Methods: Ori increases with oxygen administration, but is not a measurement of partial pressure of oxygen (PaO2). We therefore investigated the relationship between Radical-7 Pulse Co-Oximeter (Masimo) ORi and SpO2 during oxygenation during surgery. Twenty-seven ASA 1 and 2 patients undergoing herniorrhaphy surgery in humanitarian aid provided in the Hospital of Redentor Love in Dangbo, Republic of Benin, were included in analysis. After obtaining surgery informed institutional ethical consent, patients informed consent forms were signed. Patients was managed with ambu aura once disposable laryngeal mask, and normal end-tidal carbon dioxide partial pressure (35-45 mmHg). We measured the time to peak of ORi and time to 90%, determined when the ORi increased by

oxygenation plateaued and did not change for more than one minute. SpO2 and ORi values were also recorded every minute, and the correlation analyzed.
Results: Mean time to peak (sec) of ORi were 227 ± 43. We believe ORi values were significantly correlated with SpO2, and modifications in FiO2 correlates winth PRi values.
Conclusion: Patient management in some specific scenarios is not only related to patient's condition but also with austere and hostile environments. It is specially usefull that Radical-7 Pulse Co-Oximeter is portable, because ORi can be a new indicator for pre-oxygenation and that peaked ORi indicates adequate oxygenation status before anesthetic induction and during surgery.

5615

Monitored anaesthesia care for a patient with a mediastinal mass: may spontaneous breathing be with us

Alvaro-Gracia Heredero L.[1], Martinez Marivela T.[2], Cortés Guerrero M.[3]
[1]Hospital Universitario de Torrejon - Madrid (Spain), [2]Hospital Universitario Infanta Sofia - Madrid (Spain), [3]Hospital Universitario 12 de Octubre - Madrid (Spain)

Background: Anaesthetic management of patients with a mediastinal mass is always challenging. Mediastinal masses entail a high risk of airway obstruction and/or cardiopulmonary collapse during general anaesthesia (GA). Preoperative symptoms can vary widely, but some such as dyspnoea, supine cough or syncope should alert of an increased perioperative risk. In these cases, GA should be avoided whenever possible.
Case Report: A 42-year-old female presenting with acute right lower limb ischemia for emergency reperfusion having a previous diagnosis of Small Cell Lung Cancer stage IV metastasized as an anterior mediastinal mass. CT scan (fig.1) showed infiltration of both pulmonary arteries, trachea and main bronchi causing critical supracarinal stenosis. Compression of left cardiac chambers induced right chambers dilation. All of this led to a severe pulmonary hypertension (PSP 85 mmHg) and posterior pericardial effusion on TTE with normal systolic function. Clinical manifestations included dyspnoea and stridor. A thrombectomy via femoral artery was performed. Prior basic and intra-arterial blood pressure monitoring, we proceed with local anaesthetic infiltration of puncture point and sedation with ketamine (fractionated doses, total 1mg/kg) and adjuvant midazolam (2mg total). We achieved a comforting hypnotic state with episode amnesia while maintaining spontaneous breathing, SpO2 > 97%, hemodynamic stability with mean blood pressure > 70 mmHg and sinus rhythm 70 bpm. No adverse events noted.
Discussion: Our aim was to maintain spontaneous breathing avoiding either any airway intervention in case of GA or a cardiovascular collapse due to a neuroaxial technique. That is why we chose ketamine over other drugs. Also, ketamine has a bronchodilator effect, beneficial in this particular situation. It could be discussed that ketamine can increase pulmonary vascular resistances and thus not be the most suitable option. We defend that, at low dose, this effect would not be of that importance and, prioritising its respiratory advantages, led us to a successful outcome.
References:
1. Slinger P, Karsli C: Management of the patient with a large anterior mediastinal mass: recurring myths. Curr Opin Anaesthesiol 20: 1-3, 2007.
Learning points: We emphasize the importance of maintaining spontaneous breathing and avoiding airway manipulation if possible, in a patient with a mediastinal mass. Ketamine pharmacodynamics and sedation profile are useful to prevent respiratory depression.

5639

Unexpected perioperative desaturation due to subcutaneous emphysema in a patient undergoing laparoscopic cholecystectomy

Diakomi M.[1], Diagoupi I.[2], Kolliopoulou G.[2], Sofianou A.[2], Bairaktari A.[2]
[1]General Hospital of Attica «KAT» - Kifissia, Athens (Greece), [2]General Hospital of Attica KAT - Kifissia, Athens (Greece)

Background: Laparoscopic cholecystectomy (LC) has been considered the «gold standard» for the surgical treatment of gallstone disease over the past 25 years. (1) Optimal anesthetic management requires thorough knowledge of the complications generated by the pneumoperitoneum, to manage adverse perioperative effects. (2) We present the case of a patient who underwent LC, complicated by subcutaneous emphysema leading to unexpected perioperative desaturation.
Case Report: A 63-year old, ASA II, female patient was scheduled for LC due to chololithiasis. After uneventful induction of anesthesia and endotracheal intubation, the patient was mechanically ventilated and anesthesia was maintained with desflurane in O2/air mixture. Ten minutes following initiation of pneumoperitoneum (IAP 14 mmHg), pulse oximetry saturation (SpO2) dropped from 100% to 87%, confirmed by blood gas analysis. Inspired O2 concentration was increased to 100%, the airway was checked and the patient was manually ventilated until the end of the 40 minute procedure, improving O2 saturation (92%). During emergence, uncovering of surgical drapes revealed subcutaneous emphysema on the upper part of right hemi –thorax, extending to the neck, while postoperative chest computed tomography was diagnostic of pneumomediastinum. The patient was managed conservatively and was discharged from hospital 7 days post –surgery.
Discussion: This case report aims to alert anesthesiologists towards the possibility of subcutaneous emphysema after LC, which may be complicated by pneumomediastinum or pneumothorax. (3) Along with published preventive measures (3), awareness and prompt recognition of the potential of CO2 extravasation beyond the intraabdominal cavity are crucial to modify anesthetic management, ensuring patient safety during LC.
References:
1. Yamashita Y et al. Surgical treatment of patients with acute cholecystitis: Tokyo Guidelines. J Hepatobiliary Pancreat Surg. 2007; 14(1): 91. Epub 2007 Jan 30.
2. Gerges FJ, Kanazi GE, Jabbour-Khoury SI. Anesthesia for laparoscopy: a review. J Clin Anesth. 2006 Feb; 18(1): 67-78. Review.
3. Ott DE. Subcutaneous emphysema--beyond the pneumoperitoneum. JSLS. 2014 Jan-Mar; 18(1): 1-7.
Learning points: Extravasation of CO2 beyond intra -abdominal cavity must be kept in mind during laparoscopy. The anesthesiologist should be aware of the potential of subcutaneous emphysema, which may appear in conjunction with pneumothorax or pneumomediastinum.

5644

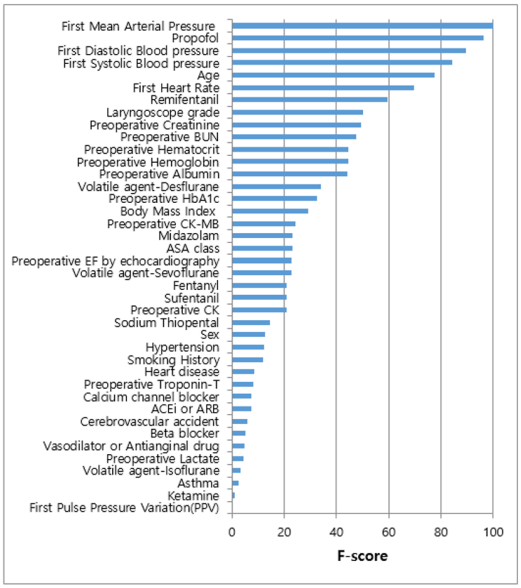
Supervised deep learning model for predicting postinduction hypotension in diabetic patients

Kim B.[1], Joo H. J.[2], Kim J. M.[2], Jung S.[2], Shin C. S.[2], Yoo S. K.[1]
[1]Yonsei University College of Medicine - Seoul (South Korea), [2]Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea)

Background and Goal of Study: Hypotension after induction of general anesthesia is very common. In particular, diabetic patients often have cardiac autonomic neuropathy. Therefore, it is hard to keep proper blood pressure in those patients. Recently, several studies have been attempted to predict patient's hemodynamic instability through deep-learning methods. In this study, we try to develop a machine-learning model for prediction of postinduction hypotension(PIH) in diabetic patients. Materials and Methods: We extracted data from the electronic health record of a single tertiary care center from January 2006 to December 2018 for patients over age 18 diagnosed with diabetes that underwent general anesthesia. We designed a deep learning model constituted by feedforward neural networks(FFN) with a multimodal input layer and four hidden layers. Deep learning model was used to predict PIH (mean arterial pressure lower than 20% of baseline or use of vasopressor within 30 minutes of induction) as primary outcome. Severe hypotension was defined as lower than 40% of baseline or need continuous infusion of vasopressor. Preoperative medical history, medication, laboratory and echocardiographic findings, intraoperative factors such as induction agents, vital signs were used as features.
Results and Discussion: Out of 25,055 cases, 15,523 (62.0%) experienced PIH and 4,652 (18.5%) of them were severe hypotension. Area under the receiver operating characteristic curve (AUROC) using FFN model was 0.811 for overall hypotension with specificity of 75.4% and sensitivity of 73.4%. AUROC for severe hypotension was 0.885 with specificity of 81.0% and sensitivity of 79.5%.
Conclusion: We successfully predicted PIH by machine learning model in diabetic

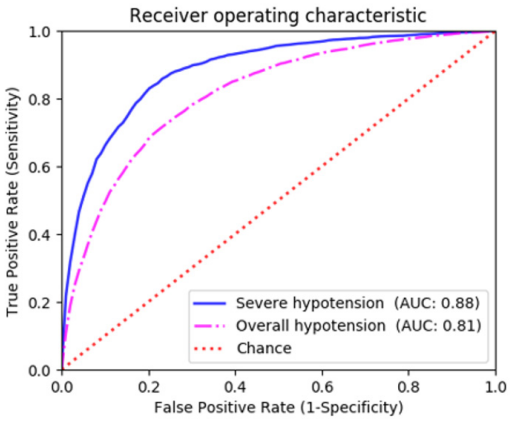
patients. Further study can be performed by external validation of our model in other center to prove feasibility for clinical application.

Figure 1. Variable importance of features



BUN : Blood Urea Nitrogen, HbA1c : Glycosylated Hemoglobin, ASA : American Society of Anesthesiologists, EF : Ejection Fraction, CK : Creatine Kinase, CK-MB : Creatine Kinase – MB, ACEi : Angiotensin Converting Enzyme inhibitor, ARB : Angiotensin II receptor blocker

Figure 2. Receiver operating characteristic curves of machine-learning methods for prediction of postinduction hypotension in the training data set



FFN : FeedForward Neural networks

5709

A Randomised Trial To Compare Two Different Types Of Anaesthesiology Methods On Optic Nerve Sheat Diameter And Intracranial Pressure In Elective Laparoscopic Cholecystectomy Surgery

Saglam S.[1], Kuzucuoglu T.[1], Saracoglu K. T.[1], Kuvvet Bilen M.[1], Hatip E.[1]
[1]Kartal Lutfi Kirdar Research and Training Hospital - Istanbul (Turkey)

Background and Goal of Study: We aimed to compare the effects of TIVA and desflurane-maintained general anesthesia on optic nerve sheat diameter (ONSD) and intracranial pressure (ICP) in patients undergoing elective laparoscopic cholecystectomy.
Materials and Methods: Following the Ethics Committee approval, written informed consents were taken from all patients. The data of 80 ASA I-II patients undergoing laparoscopic cholecystectomy were recorded. Patients were randomised into two groups (n=40, each). Anesthesia induction was performed using propofol 2 mg/kg, fentanyl 1mcg/kg, rocuronium 0.6 mg/kg and lidocain 1 mg/kg iv. After tracheal intubation, mechanical ventilaton was initiated in controlled mechanical ventilaton (CMV) mode. In Group 1 desflurane (1.0 MAC) and remifentanil (0.05-2 mcg/kg/dk), in Group 2 propofol (50-200 µg/kg/dk) and remifentanil (0.05-2 mcg/kg/dk) were used for the mainteinance of anaesthesia. After induction of CO2 pneumoperitonium was applied, patients were put into reverse-Trendelenburg position in order to provide optimal surgical vision. Electrocardiogram, heart rate, systolic, diastolic and mean blood pressure, SpO2, peak inspiratory pressure (PIP), PEEP, intraabdominal pressure, and BIS values were recorded. Maintenance of anaesthesia was adjusted to keep BIS values between 40-65%. Patients' ONSDs were measured using ocular Ultrasound before anesthesia induction (T0), following pnemoperitoneum (T1), after desufflation (T2) and after the end of anaesthesia (T3).
Results and Discussion: There was no statistically significant difference in blood pressures, EtCO2, PEEP, PIP, SpO2 and ONSD values between groups ($p>0.05$). In contrast, there was a significant increase in ONSD value from T0 to T1 ($p<0.01$) in both groups. Furthermore, a statistically significant decrease was observed in ONSD values from T1 to T2 and from T1 to T3 ($p<0.01$).
Conclusion: While there was no significant effect of desflurane and total intravenous anaesthesia, intraabdominal insufflation caused a rise in ONSD measurements in both methods. However, in our study this rise did not lead to any significant increase in ICP. This result might be changed in patients with slightly increased ICP during pneumoperitoneum. We are in the opinion that studies with larger sample size are required before considering ONSD measurement as a standart procedure in routine monitoring of laparoscopic surgery patients.

6059

Alveolar recruitment maneuvers during two levels of PEEP

Lambo M. S.[1], Pedrotti D.[2], Galante D.[3]
[1]Department of Anesthesia and Intensive Care, Hospital of Sulmona - Sulmona (Italy), [2]Department of Anesthesia and Intensive Care, Santa Chiara Hospital - Trento (Italy), [3]Department of Anesthesia and Intensive Care Hospital G. Tatarella, Cerignola, Italy - Foggia (Italy)

Background: The authors evaluated the effects of two levels of positive end-expiratory pressure (PEEP) associated with or without alveolar recruitment maneuvers (ARM) on oxygenation and respiratory compliance in patients undergoing surgery for scoliosis and neurosurgery procedures in the prone position (1).
Materials and methods: A systematic multicentric and retrospective review of our recorded data were analyzed. Inclusion criteria were: age > 18, ASA I-II. 54 patients, undergoing surgery for scoliosis and in prone position, were studied in 5 different surgical times: T0 (after intubation), T1 (after placing the patient in the prone position), T2 (after any maneuvers of alveolar recruitment with or without application of PEEP), T3 (after 1 h), T4 (before the extubation). For each time were recorded the static compliance of the total respiratory system (SCtrs), the total resistance (Rtot), with the technique of the interruption of the flow and the hemogasanalysis. Were evaluated the effects of a PEEP of 5 cm H2O and 10 cm H2O, with and without alveolar recruitment maneuvers, obtained by applying sequentially Peak Pressures / PEEP of 45/15, 40/10, 35/5 cm H2O, for 60 seconds versus the baseline (ZEEP). Analysis of the data were processed with Wilcoxon test.
Results: The prone position during scoliosis surgery induced a significant deteroration change in SCtrs that regred significantly following the application of PEEP 5 + ARM, PEEP 10 and PEEP 10+ARM (Tab. 1). Rtot had an increasing trend during the prone position that only after applying PEEP10 + ARM showed a significant reduction. The prone position during scoliosis surgery determined also a downward trend of gas excanges versus baseline which recovered with PEEP 5 ± ARM and PEEP 10 ± ARM without statistical significance (Tab. 1).
Conclusions: PEEP 10 e ARM + PEEP (5 e 10 cm H2O) showed to improve the SCtrs reduced by the prone position with a recovery trend of gas exchange suggesting a possible strategy fo mechanical ventilation during these conditions.

INCREASED P WAVE AMPLITUDE (%)	CVC TIP/ACJ DISTANCE (cm.)
25%	2.4±1.2 cm.
33%	1.8±1.0 cm.
50%	1.2±0.4 cm.

Table 1. ECG increased P wave amplitude vs CVC tip distancve from ACJ

6090

Utility of CPAP in obese patients with Obstructive Sleep Apnea

Lambo M. S.[1], Pedrotti D.[1], Galante D.[2]
[1]Department of Anesthesia and Intensive Care Hospital of Sulmona - Sulmona (Italy), [2]Department of Anesthesia and Intensive Care Hospital G. Tatarella, Cerignola, Italy - Foggia (Italy)

Background: The obese patient has a high risk of OSA (Obstructive Sleep Apnea) and would take multiple benefits with the use of preoperative CPAP.
Materials and methods: A retrospective review of our recorded data were analyzed. Were enrolled 24 patients with BMI> 40 kg /m2 started to general anesthesia for abdominal surgery. All patients underwent preoperative respiratory STOP-BANG evaluation. Rx chest, spirometry and EGA were performed. The patients were divided into 2 groups. Group A: it was planned preoperative CPAP therapy if indicated after polysomnographic examination in patients with respiratory pattern disease and the presence of risk factors (sleep apnea, BMI> 35 kg/m2, neck circumference > 40 cm). Grup B: In the absence of the criteria previously exposed was not carried preoperative CPAP. It was also evaluated the occurrence of respiratory complications (SpO2 <90% in air, upper airway obstruction, pulmonary edema, bronchospasm, pneumothorax).
Results: According to the above criteria 112 patients were included in Group A and 130 patients in Group B. In Group A 67 patients with pulmonary restrictive pathology, hypoxemic chronic respiratory failure, STOP-BANG> 3, underwent a polysomnography (PSG) and perioperative CPAP with diagnosis of OSA; 45 patients with major risk factors to STOP-BANG questionnaire were undergoing treatment for perioperative auto-CPAP. In Group B 52 patients required respiratory monitoring (1-12h) after extubation for obstruction of the upper airways (SpO2 <90% on air) and respiratory care by CPAP with improvement of EGA; in 9 patients was required reintubation and the use of invasive ventilation due to bronchospasm.
Discussion and conclusion: Studies report the benefits of CPAP in the perioperative period: improves SpO2, reduces complications, hospitalization, the need for reintubation, allows to handle the administration of analgesic without complications. In the patient with morbid obesity to be subjected to intervention, it is essential the use of PSG to make diagnosis of OSA and start CPAP therapy or simply clinical judgment and the use of devices APAP (Automatic Positive Airway Pressure, auto-CPAP).

6136

Effects of CO2 pneumoperitoneum during laparoscopic cholecystectomy and appendectomy on the lung dynamic compliance, A prospective study

Jovanovska S.[1], Zafirova D.[2], Kolevska I.[3], Maksimovski D.[4], Peltekovski A.[5]
[1]PHI Special hospital for gynecology and obstetrics Mother Theresa - Cair, Skopje - Skopje (Republic of North Macedonia), [2]PHI University Clinic for Anesthesia, Reanimation and Intensive Care, Mother Theresa, Skopje - Skopje (Republic of North Macedonia), [3]PHI General Hospital Kumanovo, Department for Anesthesia and Intensive Care - Kumanovo (Republic of North Macedonia), [4]PHI General Hospital Tetovo, Department for Anesthesia and Intensive Care - Tetovo (Republic of North Macedonia), [5]PHI University Clinic for Gynecology and Obstetrics, Mother Theresa, Skopje, Department for Anesthesia and Intensive Care - Skopje (Republic of North Macedonia)

Background and Goal of Study: As a minimally-invasive procedure, laparoscopy has many benefits in the overall patients' treatment. However, the pneumoperitoneum needed to perform the laparoscopy increases the intra-abdominal pressure, which causes some disturbances in the physiology of many systems, mainly the circulatory and respiratory system. The aim of this study was to evaluate the effects of the duration of the pneumoperitoneum during laparoscopic cholecystectomy and appendectomy on the respiratory system.
Materials and Methods: In this study we included 43 patients, both male and female, ASA 1-3, that underwent elective laparoscopic surgery for cholecystectomy (n=33) or appendectomy (n=10). The upper limit of intra-abdominal pressure was set to 12 mmHg. We measured the peak inspiratory pressure (PiP), positive end-expiratory pressure (PEEP), end-tidal CO2 (etCO2), peripheral capillary oxygen saturation (SpO2), tidal volume (VT) and mean arterial pressure (MAP), at the moment of intubation, insufflation of CO2, 15-30 minutes after pneumoperitoneum and before extubation. We calculated the dynamic compliance using this formula: Cdyn=VT/ PiP-PEEP.
Results and Discussion: There was a decrease in the dynamic compliance that was in correlation with the duration of the pneumoperitoneum. The Pearson correlation coefficient was -0.3149, $p<0.05$, which meant that there was a statistically significant negative correlation between the pneumoperitoneum duration and the dynamic compliance. There was a positive correlation between the PiP and the duration of the pneumoperitoneum, 0.3813, $p<0.05$. There was no correlation between the duration and the changes in the MAP. From the time of intubation until 15 – 30 min after CO2 insufflation there was a 17% increase in the etCO2, 28% increase in the PiP and 2.2% decrease in the MAP.
Conclusion: These results suggest that CO2 pneumoperitoneum has a great impact on the respiratory function. The duration of pneumoperitoneum significantly decreases the dynamic compliance and increases the PiP. As anesthesiologists we should take these changes into consideration, in order to prevent or minimize the complications that may occur.

4707

Expiratory flow-limitation during laparoscopy surgery in Trendelenburg position is associated with increased risk of postoperative pulmonary complications

Fogagnolo A.[1], Falvo P.[1], Finetti C.[1], Moro F.[1], Spadaro S.[1], Volta C. A.[1]
[1]Ospedale Sant'anna - Ferrara (Italy)

Background: Expiratory flow-limitation (EFL) is a pathological condition characterized by a reduction of expiratory flow, associated with small airways instability and pro-inflammatory mechanisms. Patients experiencing EFL after induction of general anesthesia are at increased risk of post-operative pulmonary complications (PPC), while the clinical effects of occurrence of intraoperative EFL are less known. Both laparoscopy and Trendelenburg position can increase the risk of developing EFL through a reduction in FRC. The aim our study is to describe the incidence of EFL during laparoscopic surgery in Trendelenburg position and to analyze its clinical effects.
Methods: Patients undergoing laparoscopic gynecological surgery with expected mechanical ventilation> 2 hours were enrolled. Exclusion criteria were: age < 18, hemodynamic instability, ASA> 3, heart failure, COPD GOLD stage>2. All patients were ventilated with a tidal volume of 7 ml/kg and a PEEP between 3-5 cmH2O before pneumoperitoneum and 5-7 cmH2O during pneumoperitoneum. The presence of EFL was evaluated with PEEP test, while the V/Q variations with ALPE system. All measurement were taken after anesthesia induction (T1), after pneumoperitoneum with a 30° Trendelenburg (T2) and at the end of surgery in supine position (T3). Spirometry was performed before and after surgery; PPC development was evaluated over 7 post-operative days.
Results: Sixty-six patients were enrolled in the study; 9 (13%) already had EFL at induction while 16 (25%) developed EFL during surgery. Patients with EFL were older (64±10 vs 55±9;p=0.02), had greater BMI (32±9 vs 25±5;p=0.003) and more rate of hypertension (52% vs 19%;p=0.02). The median PEEP value able to reverse EFL was 8±2 cmH2O in the supine position and 13±4 cmH2O in the Trendelenburg position (p=0.001). During surgery, patients with EFL experienced greater V/Q mismatch, had higher driving pressure and lower PaO2/FIO2 ratio (Figure 1,2). In the post-operative period, patients with EFL were more likely to develop hypoxemia (44% vs 17%,p=0.03) and hypercapnia compared to non-EFL patients (80% vs 32%,p<0.001). During the follow-up, patients with EFL showed higher rate of PPC (24% vs 0%,p=0.002).
Conclusion: The development of EFL during laparoscopic surgery was associated with higher incidence of PPC, and worse intra-operative V/Q mismatch. The PEEP value able to reverse intraoperative EFL during laparoscopic surgery in Trendelenburg position is higher than usual.

4740

The effects of Gynaecologic Oncologic Surgery on lung aeration and oxygenation monitored with Lung Ultrasonography

Frassanito L.[1], Sonnino C.[1], Pitoni S.[1], Filetici N.[1], Settanni D.[1], Draisci G.[1]
[1]IRCSS Policlinico Agostino Gemelli - Rome (Italy)

Background and Goal of Study: Atelectasis formation is considered the major cause of hypoxemia during general anesthesia (GA)1. Gynaecologic oncologic surgery (GOS) often requires pneumoperitoneum and steep bed angulation that further reduce lung compliance by shifting bowels and diaphragm2. The aim of our study was to assess the impact of intraoperative variables on lung aeration using Lung Ultrasound Score (LUS) and their correlation with postoperative oxygenation in women undergoing GOS.
Materials and Methods: 80 patients scheduled for GOS were enrolled. After pre-oxygenation, GA and standard mechanical ventilation (MV) were administered (tidal volume of 8 ml/kg of predicted body weight, FiO2 40%, I:E ratio of 1:2 and PEEP 5 cm H2O). LUS (considering 12 pulmonary areas3) and arterial blood gas analysis were performed before GA (T1) and in recovery room (T2).
Results and Discussion: T test for dependent samples for normally distributed data, Wilcoxon and Mann-Whitney tests for non-normally distributed data, and Pearson's and Spearman's correlation to correlate changes in LUS (ΔLUS) with the other parameters were used. Linear regression analysis was performed to determine whether Trendelenburg (TR) time was related to ΔLUS. LUS increased significantly between T1(1.79+2.39) and T2(11.08+4.40, ΔLUS=9.29+4.10, p<0.05), mostly in basal and posterior areas (fig1A). Changes in LUS correlated significantly with time of MV (r=0.246, p<0.05), cumulative time in TR (r=0.321, p<0.05) and worsening in oxygenation (ΔPaO2/FiO2, r=-0.260, p<0.05). ΔLUS significantly correlated with colloid infusion. The linear regression analysis showed that TR time can predict ΔLUS (F1,78=8.97, p=0.004). The slope of the regression line was 0.014 (fig1B): for every 71.43-minute increase in TR time ΔLUS increased by 1 point. No correlation was found with pneumoperitoneum, apnoea time at induction and TR angle.
Conclusion: Aeration loss after GOS detected using LUS correlates with TR time, MV time, colloid infusion and worsening in oxygenation.
References:
1. Anesthesiology.2019;131(1):46-57.
2. J Clin Anesth.2001;13:361-5.
3. Anesth Analg.2017;124(2):494-504.

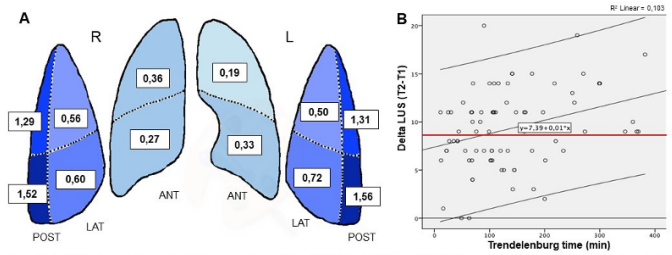


Figure 1. A: Distribution of changes in LUS score between T1 and T2. The right (R) and left (L) lungs were divided into 12 segments, anterior (ANT), lateral (LAT), and posterior (POST) segment for both lungs, further subdivided into cranial and caudal subsegments. The numbers within each one of the lung segments represent ΔLUS, and the colour intensity is related to the increase in value. B: Relationship between changes in LUS scores and cumulative Trendelenburg time using Spearman correlation coefficients.

4909

The effects of surgical position on flow resistance of heat-and-moisture exchangers with HEPA filter

Onishi M.[1], Hirose Y.[1], Mizutani T.[2], Yamamoto S.[3]
[1]University of Tsukuba Hospital - Tsukuba (Japan), [2]Ibaraki Western Medical Center - Chikusei (Japan), [3]Univ. of Tsukuba - Tsukuba (Japan)

Background and Goal of Study: The heat-and-moisture exchangers (HMEs) are commonly used to heat and to humidify the inspired gases during general anesthesia. Excessive moisture absorption may increase the flow resistance and cause to increase the work of breathing in patients being weaned. We often experience incidents where a large amount of water is trapped in HMEs during general anesthesia, especially in prone position. To evaluate the effect of surgical position on the extent of HMEs' moisuture absorption, the weight of HMEs was measured before and after surgery. In addition, to verify the effect of the moisture absorption by HMEs on the flow resistance, resistance was evaluated in vitro using a lung model system.
Materials and Methods: The HME with pleated medical HEPA filter (Smith Medical) was used. The weight of HME was measured before and after surgery to compare the change in weight per hour in the different positions. HMEs resistance was studied using a lung model system connected to a mechanical ventilator (COVIDIEN-840™, Medtronic) to provide spontaneous breathing (tidal volume 500 ml). A test lung (Model 1600, Dual Adult TTL™, Michigan Instruments Inc.) was connected to a MR730™ humidifier (Fisher & Paykel) to simulate the physiological expired air. FlowAnalyzer PF-300™ (IMT analytics AG) was used to measure the resistance.
Results and Discussion: A total of 41 HMEs were evaluated, 5 were used in prone position and 36 in supine position. The increaced weight of HMEs was associated with prolonged duration of operation (R2=0.46, R2=0.45; for prone and supine respectively). The amounts of water absorbed per minute during anesthesia were greater in prone than in supine position (8.2±3.1 mg/min, 4.1±2.5 mg/min respectively, P=0.002). The maximum change in weight of HMEs measured was 5.66 g during a surgery in prone position for 510 minutes. By evaluating the flow resistance using a lung model system where HMEs were filled with water of 1, 3 and 5 ml, the resistance was 1.56, 1.86 and 3.32 cmH2O respectively.
Conclusion: HMEs' weight was significantly increased in prone position than supine position. The flow resistance was increased in proportion to the amount of water added to HMEs using a lung model system. Therefore, the water-saturated HMEs may cause increased flow resistance during general anesthesia especially in long prone positioned surgery.

4974

Iatrogenic tracheal wall disruption after endotracheal intubation: a case report and literature review

Duarte Deprez L.[1], Franssen C.[2], Brichant J. F.[2]
[1]CHU de Liège - Liège (Belgium), [2]CHU de Liège - Liège (Belgium)

Background: Tracheal rupture is a rare (1/20000) iatrogenic complication of endotracheal intubation (ETI) more prevalent in women. Clinical manifestations include subcutaneous emphysema, dyspnea, dysphonia, pneumothorax and pneumomediastinum, which usually appear during surgery or in the immediate postoperative period1,2.We present a case of tracheal rupture after ETI.
Case Report: A 65yo woman with no significant medical history and no risk factor for difficult intubation was planned for frontal meningioma resection surgery. After IV induction of anesthesia and rocuronium administration, a single-lumen 7.5mm internal diameter endotracheal tube (ETT) was placed on the 1st attempt using a Macintosh nº3 blade with a Cormack grade I. The intracuff pressure wasn´t measured. TIVA was used for maintenance. The patient was extubated after the procedure and transferred to the ICU. 24hours after extubation,she developed a thoracic and cervical subcutaneous emphysema and nasal voice. CTscan showed a posterior tracheal rupture 36mm long from T1 to T3 with pneumomediastinum. Conservative therapy was applied successfully and the patient was discharged home on postoperative day11.
Discussion: Tracheal rupture after ETI consists most frequently in longitudinal laceration in the posterior pars membranosa. Risk factors may be mechanical causes (multiple forced attempts, intubation with stylet, overinflation of the ETT cuff, double-lumen and oversized ETT, coughing while the patient is intubated) or anatomic factors (tracheal abnormalities, inflammatory lesions)1,2.In this case, tracheal injury was probably induced by overinflation of the ETT cuff. Diagnosis is usually confirmed with bronchoscopy or CTscan. Treatment between conservative or surgical repair is controversial. Conservative management is associated with a better outcome and should be considered in clinically stable patients with small tears and no air leakage on spontaneous breathing2.
References:
1. Warner et al Direct Laryngoscopy and Endotracheal Intubation Complicated by Anterior Tracheal Laceration Secondary to Protrusion of Preloaded Endotracheal Tube Stylet, A&A Case Reports 2016;6:77-9.
2. Miñambres et al Tracheal rupture after endotracheal intubation: a literature systematic review,EJCTS 2009;35:1056-62.
Learning points: This case serves as a reminder to avoid overinflation of the ETT cuff. A tracheal rupture should be suspected in any patient with subcutaneous emphysema or respiratory distress after extubation.

4924

The Effect of Two Different Ventilation Modes on Lung Aeration in Patients Undergoing Robotic Radical Prostatectomy: An Ultrasonographic Evaluation

Turgut H. Z.[1], Ozdilek A.[1], Demirdag C.[1], Bakan S.[1], Dikmen Y.[1], Altindas F.[1]
[1]Istanbul University-Cerrahpasa, Cerrahpasa Medical Faculty - Istanbul (Turkey)

Background and Goal of Study: During laparoscopic procedures under general anesthesia, positioning and pneumoperitoneum lead to pulmonary aeration loss. The aim of this study is to compare the effects of pressure and volume controlled ventilation on oxygenation and lung ultrasound (LUS) findings in patients undergoing robot assisted laparoscopic radical prostatectomy (RALRP).
Materials and Methods: In this randomized, prospective, double blind study 74 ASA 1-3 patients, with ages of 18-75, undergoing RALRP surgery were randomly divided into two groups; volume ((VCV), (GrupV; N=37)) and pressure controlled ((PCV), (GrupP; N=37)). The operations were performed with 10-12 mmHg intraabdominal pressure and at 30° Trendelenburg position. Lung ultrasonography was performed in 12 quadrants of the thorax at 5 time points; before anesthesia induction (T1), after intubation (T2), at the end of surgery (Trendelenburg position) (T3), at the end of surgery (supine position) (T4), 60 minutes after the surgery (T5). At the same periods hemodynamic, respiratory and mechanical ventilation parameters were recorded. Transverse LUS images were recorded, and evaluated off line by a radiologist, blinded to the time point and patient group.
Results and Discussion: In the statistical analysis of the data, there were significant differences in LUS scores, in both groups when compared T1 to T3 and T4. In the PCV grup there were also significant LUS score increase between T1 to T2 and T5. PaO2/FiO2 values were significantly decreased in Group VCV compared to T1 in all periods except T5 and in Group PCV in all periods ($p<0,05$). There was no difference between the groups in terms of LUS scores and PaO2/FiO2 values. Moderate significant correlation was found between LUS score and PaO2/FiO2 values in both groups ($r=-0,440$ and $p<0,0001$).
Conclusion: During the operation, oxygenation was impaired in both groups as a result of position and pneumoperitonium, and LUS-detected lung parenchymal changes were correlated with this. It was concluded that ventilation modes were similar in this respect.

5006

Prognostic value of carboxyhemoglobin and methemoglobin in postoperative pulmonary complications

Gavrilovska-Brzanov A.[1], Shosholcheva M.[2], Mojsova-Mijovska M.[1], Paevanovska Petrush A.[1], Shoszafirovaholcheva D.[1], Kuzmanovska B.[1]
[1]Mother Theresa Clinical Complex - Skopje (Republic of North Macedonia), [2]University Clinic for General Surgery "St. NaumOhridski" - Skopje (Republic of North Macedonia)

Background and Goal of Study: CoHb and MetHb imped O2 transport and shift the oxygen dissociative curve to the left. Postoperative pulmonary complications (PPC) are still one of the major cause for postoperative morbidity and mortality. Therefor we evaluated the predictive value of COHb and MetHb as prognostic markers for PPC.
Materials and Methods: In this single center observational prospective study 120 consecutive patient from 18 until 60 years of age, ASA I/ II, who denied any known respiratory related medical history, were included. All patient underwent surgical intervention under general endotracheal anesthesia. Levels of COHb and MetHb were analyzed from arterial blood gases with spectrophotometer, at four time points. T0 – preoperative under respiration with room air; T1 - after pre-oxygenation, T2 – intraoperative and T4 in PACU under respiration with room air or oxygen inhalation with or without endotracheal intubation. The outcome were PPC recorded and analyzed for 30 postoperative days (1). We tested the statistical significance with univariate and multivariate logistic analysis.
Results and Discussion: The mean value for COHb was 1.07±0.97SD, and for MetHb was 0.34±0.25SD. With univariate binary logistic regression for predicting value of COHb we found ≥1.5% and it was statistically significant. As for MetHb we found value of 0.5% to be statistically significant for PPC. We confirmed all findings with multivariate logistic regression for MetHB p=0.000 and for COHb p=0.024. PPC were noted in 19 patients for the whole period of investigation and the most maintained were pneumonia and persistent cough. Other authors investigated the prognostic values of COHb and MetHb in pulmonary embolism and asthma. They found correlation between COHb/ MetHb and severity of illness in ICU patients.
Conclusion: Our analysis indicated that COHb/ MetHb could serve as markers for PPC. Although our preliminary observations require further validation to clarify the underlying mechanisms of COHb and MetHb as prognostic markers for PPC.
References:
1. Jammer, I., Wickboldt, N., Sander, M., et al. Standards for definitions and use of outcome measures for clinical effectiveness research in perioperative medicine: European Perioperative Clinical Outcome (EPCO) definitions. (2015) Eur J Anaesthesiol 32(2): 88-105.

5347

Preliminary study of PEEP setting based on transpulmonary pressure in robot-assisted laparoscopic prostatectomy

Kodaira A.[1], Nakazawa K.[1], Matsumoto R.[1], Matsushita T.[1], Ishida Y.[1], Uchino H.[1]
[1]Tokyo Medical University - Tokyo (Japan)

Background and Goal of Study: In the robot-assisted laparoscopic prostatectomy (RALP), formation of atelectasis and reduced functional residual capacity often become anesthetic concerns. PEEP is necessary against steep Trendelenburg position and pneumoperitonium, however, how to set PEEP levels during RALP is not determined. Usefulness of PEEP based on transpulmonary pressure (Ptp: airway pressure - esophageal pressure) has been reported in the ventilatory management of ARDS. The relationship between PEEP and Ptp during RALP is unclear, therefore, we have examined the usefulness and safety of the PEEP setting based on Ptp. Materials and Methods:We conducted a prospective intervention study on patients who are scheduled for RALP from April to September in 2019. Following placing a patient in a steep Trendelenburg lithotomy position with pneumoperitoneum, PEEP was stepwisely increased from 0 to 15 cmH2O (in step of 5 cmH2O) at an interval of 30 minutes. Then PEEP levels where end-expiratory Ptp exceed 0 (PtpEEP0) were determined. Measurements were performed after 30 minutes at each end of PEEP step. Airway pressure, esophageal pressure, cardiac index, blood gases and cerebral oxygen saturation (rSO2) were measured and Ptp, PaO2/FIO2 (P/F) ratio and thoracic lung compliance (Cst) were calculated. Statistical analysis was performed using the one-way analysis of variance and Dunnett test was performed. A p value <0.05 was considered significant.
Results and Discussion: Fourteen patients were eligible. The esophageal pressure at PEEP0 was 11±4.7cmH2O. The values of P/F ratio at PEEP10 or more were higher than those of PEEP0. The PEEP levels which showed PtpEEP0 was 14.6±2.7cmH2O. Cst was significantly higher at PEEP10 or more compared to PEEP0. Cardiac index showed no significant change. Considering oxygenation and compliance, it is desirable to add PEEP of 10 cmH2O or more during RALP.Cst and P/F ratio at such levels was superior without disturbing circulation or cerebral oxygenation.
Conclusion: PEEP setting based on Ptp may be safe and rational. It seems to be worth conducting randomized controlled trial to investigating the usefulness PEEP based on PtpEEP during RALP.

5444

Effects of lung-protective ventilation combined with Deep Neuromuscular Blockade on postoperative pulmonary complications during low pneumoperitoneum pressure laparoscopic colorectal surgery: a randomized controlled trial

Yan T.[1]
[1]Peking Union Medical College - Beijing (China)

Background and Goal of Study: Pulmonary complication is one of the most common postoperative complications. This study aimed to estimating the effects of lung-protective ventilation combined with deep neuromuscular blockade on postoperative pulmonary complications during low pneumoperitoneum pressure laparoscopic colorectal surgery (LCRS).
Materials and Methods: 120 patients undergoing LCRS were enrolled and randomized to receive eitherconventional pulmonary ventilation + moderate neuromuscular blockade + conventional pneumoperitoneum pressure (CMC group) or protective pulmonary ventilation + deep neuromuscular blockade + low pneumoperitoneum pressure (PDL group). The modified Clinical Pulmonary Infection Score (mCPIS) andthe visual analogue scale (VAS) Pain Score after surgery were measured. The time of anus exhaust defecation after operation, the

length of hospital stays, anesthesia-related complications and so on were also evaluated.
Results and Discussion: The postoperative mCPIS and the serumconcentrations of neutrophil elastasein patients with PDL strategywere significantly lower than that of CMC, especially when performing rectum/sigmoid colon surgical procedures or patients were older than 70-years. For the patients undergoing transverse/descending/ascending colon surgical procedures or BMI < 24, PDL strategy provided a better surgical condition. The time of anus exhaust defecation after surgery was also significantly earlier in PDL strategy. Furthermore, PDL strategy reduced postoperative pain and the use of opioids.
Conclusion: PDL strategy can effectively provide an optimal surgical condition and enhance postoperative recovery in certain patient subsets.

5572

Medium- flow oxygenation in a limited-resource setting

Gjorchevska E.[1], Gavrilovska-Brzanov A.[1], Petrusheva A.[1], Sivevski A.[1], Mojsova-Mijovska M.[1], Jovanovski-Srceva M.[1]
[1]University Clinic of Anesthesia, Reanimation and Intensive Care – Skopje - Skopje (Republic of North Macedonia)

Background and Goal of Study: Preoxygenation and apneic oxygenation have shown to be an essential component of the airway management. Although 15L O2 is available from the mechanical ventilators, regular preoxygenation is performed with 6L facial mask. We hypothesize that medium- flow nasal airway (HFNA) oxygenation with 15L O2, may increase oxygen reserve and extend safe apnea time in resources limited countries.
Materials and Methods: We conducted a prospective randomized evaluation in 22, ASA I/II healthy patients, undergoing elective surgery. Patients were allocated in two groups. Group I (n=11) was preoxygenated with 6L O2 facial mask and Group II (n=11) was preoxygenated with 15L O2 facial mask. Following general anesthesia induction, nasal airway was inserted and continuous positive airway pressure of 5cmHg was set in all patients. During the apnea period, Group I received 6L of O2 and Group II 15L of O2 via HFNA. All patients were intubated at 91-90% desaturation, or after ten minutes of apnea duration if no desaturation occurred. We measured SpO2 three times: before preoxygenation, after preoxygenation and after intubation. We took arterial blood gas analysis two times: T1- after preoxygenation and T2- after intubation. EtCO2 was noted immediately after intubation. Statistical analysis was made with two-sided t-test at a significance level of α=0.05.
Results and Discussion: Patients do not differ in age, sex, ASA score, BMI, or apnea duration. Patients on 15L O2 flow have an average of 12.04kPa higher PaO2 levels at the end of apnea, than patients on 6L flow. Higher level of O2 in the blood do not affects the SpO2 at the end of apnea, but affects the fall in SpO2 after intubation- in patients on 15L flow is 2% lower. In addition patients on 15L flow have 6.27 mmHg lower EtCO2 levels after intubation, than patients on 6L flow. Consistent with the initial hypothesis, whether 15L oxygenation can allow more time for airway manipulation, these results are in support of the hypothesis. High flow technique has certain limitations in our country. Equipment that provides O2 flow rate greater than 15/L per minute, is not available. The further question that needs to be addressed is: Do we have benefits of using all available O2?
Conclusion: The effects of the change in PaO2 and EtCO2 are high between the groups, which would likely give more time for airway manipulation, although patients with 6L flow also have normal range levels.

5723

Evaluation of the Frequency of Atelectasis by Lung Ultrasound in Patients Undergoing Laparoscopic Bariatric Surgery Under General Anesthesia

Erol D.[1], Arslantas M. K.[1], Tore Altun G.[2], Corman Dincer P.[1], Karadeniz A.[1], Ayanoglu H. O.[1]
[1]Marmara University, School of Medicine - Pendik- Istanbul (Turkey), [2]Marmara University Pendik Education and Research Hospital - Pendik-Istanbul (Turkey)

Background and Goal of Study: Nowadays, laparoscopic bariatric surgical methods are used frequently in the treatment of obesity which is the second most common cause of preventable death after smoking. Respiratory physiopathological changes in obese patients predispose to atelectasis. Lung ultrasound (US) is one of the current methods used in the diagnosis of atelectasis, but there is no study in the literature about its use in obese patients yet. In our study, we aimed to demonstrate the frequency of atelectasis in patients undergoing laparoscopic bariatric surgery under general anesthesia by transthoracic lung ultrasound.
Materials and Methods: After ethics committee approval 143 patients between the ages of 18-65, BMI>30, ASA II-III who underwent laparoscopic bariatric surgery between October 2017 and November 2019 at Marmara University Pendik Training and Research Hospital were included in our prospective observational study. According to lung US protocol, both hemithorax (front, side and back areas which are divided into upper and lower zones) were scanned for a total of 12 areas preoperatively and in the postoperative first hour. In the perioperative period, vital parameters, blood gas analysis, and mechanical ventilation parameters were recorded. The images were evaluated blindly by two anesthesiologists experienced in the use of lung USG according to the modified lung ultrasound scoring system (LUS).
Results and Discussion: When the preoperative and postoperative USG scores were compared, we observed an increase in the LUS score in all areas except for both anterior upper areas (p <.001). This increase was more pronounced especially in the posterior and inferior parts of the lungs (Figure 1). We found the frequency of atelectasis to be 81.1% in patients undergoing laparoscopic bariatric surgery. The pCO2 values were increased (p <.001) while the pO2 values were decreased (p <.001) during the pneumoperitoneum and postoperative period as compared to the post-intubation period. During pneumoperitoneum, Ppeak values were increased while compliance values were decreased.
Conclusion: Lung ultrasound can be used in the diagnosis of atelectasis in obese patients. Atelectasis is seen at a high rate in patients undergoing laparoscopic bariatric surgery.

5892

Nostril Chosen As Using Trachway Assisted for Nasotracheal Intubation: the Left Better Than The Right

Shen Y. C.[1], Chen H. L.[1], Tseng K. Y.[1], Cheng K. I.[2]
[1]Department of Anesthesiology, Kaohsiung Medical University Hospital, Kaohsiung medical university - Kaohsiung (Taiwan), [2]Department of Anesthesiology, Kaohsiung Medical University Hospital, Kaohsiung Medical University - Kaohsiung (Taiwan)

Background and Goal of Study: To minimize nasal bleeding and mucosa injury during nasotracheal tube passing through the selected nares, the bevel of tube always face on the turbinates to avoid intubating related trauma, and the right-side naris should be selected (1). But, using Trachway assisted nasotracheal intubation has been demonstrated a feasible technique (2). The aim of the study is to investigate either nostril is suitable for Trachway assisted nasotracheal intubation.
Materials and Methods: one hundred patients undergoing oro-facial surgery with nasotracheal intubation general anesthesia using Trachway-endotracheal tube assembly intubated were enrolled in this prospective, randomized, single blind, clinical trial study. Each nasotracheal intubation was assisted by Trachway and patients were categorized into group L (n=50, left nostril) and group R (n=50, right nostril) according to the nostril assigned. Intubation time spent, tube rotation during passing through nasal cavity, jaw thrust to increase airway space, intubation related side effects were analyzed.
Results and Discussion: 42 out of 50 patients in group R and 34 out of 50 patients in group L need jaw thrust assistance during assembly passing through the oropharyngeal space into trachea. Total intubation time spent in group R more than the group L and the assembly taken more time in group R as assembly passing through nasal cavity. There is no statistical difference between groups on intubation related nasal bleeding and other side effects.
Conclusion: Due to shortening of intubation time spent without increased nasal bleeding and side effects, the left nostril is more suitable for Trachway-tube assembly passing than the right nostril during the procedures of nasotracheal intubation as patients undergoing oro-facial surgery.
References:
1. Berry JM. Conventional (laryngoscopic) orotracheal and nasotracheal intubation (single lumen tube). In: Hagberg CA. Benumof's airway management. 2nd eds. Mosby Elsevier 2007. P. 379-392.
2. Lee MC, et al. Nasotracheal intubation in patients with limited mouth opening: a comparison between fiberoptic intubation and the Trachway®. Anaesthesia. 2016 Jan;71(1):31-8.

4712

Anesthetic management of a patient with hypertrophic cardiomyopathy for major pancreatic surgery

Duarte D. F.[1], Pinto A. M.[1], Fonte A.[1], Glória A.[1], Figueiredo P.[1]
[1]Centro Hospitalar de Entre Douro e Vouga - Santa Maria da Feira (Portugal)

Background: Hypertrophic cardiomyopathy (HCM) is an autosomal dominant disease with asymmetric left ventricular hypertrophy (LVH) and left ventricular outflow tract (LVOT) obstruction. Clinical presentation ranges from asymptomatic to sudden cardiac death.1-3 Understanding the pathophysiology and anesthetic implications is needed for successful perioperative outcome, especially in major surgery.
Case Report: A 58-year-old male, ASAIV, was scheduled for duodenopancreatectomy. He had HCM, paroxysmal atrial fibrillation, hypertension, diabetes mellitus, hyperuricemia and presented an ECG with sinus rhythm and LVH. The echocardiogram was compatible with HCM. He stopped apixaban according to guidelines and maintained amiodarone and verapamil. After premedication (midazolam), monitorization was initiated with ASA standard, BIS, invasive arterial and central venous pressures. Non-invasive cardiac output monitoring was used (Starling SV). Defibrillating pads and pneumatic compression stockings were placed. A phenylephrine perfusion was initiated. General anesthesia was induced with remifentanil, lidocaine, propofol and rocuronium and maintained with sevoflurane. After reversal of neuromuscular block with sugammadex, the patient was extubated and transferred to the ICU, with no major complications reported.
Discussion: Duodenopancreatectomy has significant morbimortality, especially in patients with comorbidities. In HCM, LVOT obstruction and secondary mitral regurgitation worsen with hypovolemia, vasodilation and tachycardia, with risk of hemodynamic collapse, myocardial ischemia and tachyarrhythmias. Preload must be maintained/increased (maintenance of sinus rhythm is crucial) while avoiding hypovolemia and afterload reduction.1-3 In this setting, hemodynamic monitoring is of vital importance in estimating the response to inotropes, vasopressors and fluid load, thus guiding goal-directed fluid administration.2,3
References:
1. Ann of Card Anest 2010, 13(3):253-256.
2. Anesth Analg 2015,120:554–69.
3. Mulaikal T., Moitra V. (2019). Anesthesia for patients with hypertrophic cardiomyopathy undergoing noncardiac surgery. In N. A. Nussmeier (Ed.), UpToDate. From www.uptodate.com
Learning points: Anesthetic management in patients with HCM requires understanding hemodynamic changes and prevention of LVOT obstruction. It can be achieved by preoperative examination, optimization with intraoperative hemodynamic monitoring and target-directed therapy, especially in major surgery.

4912

Anaesthetic management of a patient with Wilson's disease and severe neurological symptoms scheduled for total thyroidectomy for thyroid cancer-a case report

Efstathiou G.[1], Galarioti V.[1], Madi A.[1], Roungeris L.[1], Matsota P.[1], Gerolouka-Kostopanagiotou G.[1]
[1]Attikon University Hospital - Athens (Greece)

Background: Wilson's disease (WD) is an autosomal disorder with an estimated incidence of 1:40.000, characterised by hepatic, ophthalmic and neurophychiatric symptoms from excess copper accumulation due to ceruloplasmin deficiency.(1) There is limited information in the literature regarding anaesthetic management of WD complicated with severe neurological symptoms.(2) We report the case of a patient with WD and dysarthria who underwent thyroidectomy.
Case Report: A 50-year-old female, ASA II, diagnosed with WD 25 years back, was posted for thyroidectomy due to thyroid cancer. She was on treatment with zinc acetate, also on propranolol and methimazole for hyperthyroidism. Preoperative assessment revealed: normal laboratory findings except for increased alkaline phosphatase (180U/L) and decreased platelets (70.000/μL), liver parenchymal disease-cirrhosis with hypersplenism (abdominal ultrasound), dysarthria (patient could only communicate yes and no), dystonia, spasticity of upper and lower limbs with risus sardonicus. Brain imaging showed basal ganglia involvement. The patient underwent general anaesthesia induced with propofol, fentanyl, cisatracurium and maintained with desflurane under standard monitoring, bispectral index and neuromuscular monitoring (train of four). Postoperative course was uneventful with no deterioration of liver, renal function or neurological status.
Discussion: Our case serves as a reminder of the challenging anaesthetic management in the presence of hepatic and neurological dysfunction. Main concerns were altered drug pharmacokinetics and possible deterioration of pre-existing neurological symptoms. Using drugs with extra-hepatic or minimal metabolism provides the quickest emergence from anaesthesia, thus enabling early assessment of neurological status postoperatively. Meticulous perioperative monitoring is of utmost importance for avoiding complications in patients with WD.
References:
1. Langley A, Dameron C. Copper and Anesthesia: Clinical Relevance and Management of Copper Related Disorders. Anesthesiology Research and Practice.2013;1-10.
2. De Souza Hobaika AB. Anesthesia for a patient with Wilson's disease. Middle East J Anesthesiol.2008; 19(4):905-908.
Learning points: 1) Neurological involvement in WD can complicate anaesthetic handling. 2) Detailed preanaesthetic evaluation, careful intraoperative choice and titration of drugs and meticulous monitoring can lead to a successful outcome in patients with WD.

5454

Acute intermittent porphyria (AIP) and general anesthesia. Case report

Talavan Serna J.[1], Belmonte-Bayo L.[1], Rodríguez-Martínez S.[1], Sánchez-Martín C.[2], Martínez-Castro S.[3], Hurtado-Palma L.[3]
[1]Hospital Obispo Polanco, Teruel - Teruel (Spain), [2]Hospital Universitario Doctor Peset - Valencia (Spain), [3]Hospital Clínico Universitario, Valencia - Valencia (Spain)

Background: Porphyria is a group of diseases related to the –hem metabolism. Clinical findings during porphyrias´ crisis (abdominal pain, vomiting, arrithmias, etc.) are frequently masked by the general anesthesia (1); these could prevented by a correct perioperative management.
Case report: 39 years old female, active smoker with gastrointestinal intolerance to acetylsalicylic acid and scopolamine. Previous diagnosis of AIP since childhood and several renal colics with nephrolithiasis. In a CT scan, a parathyroid adenoma was shown associated to high levels of parathyroid hormone and hipercalcemia. She is proposed for adenoma resection; 24h before surgery, an IV infusion of 10% glucose (1500 ml.) was given. Anesthetic iv induction with midazolam (1,5 mg), atropine 1 mg, fentanyl 0,2mg, propofol 120 mg and cisatracurium 12 mg. Intubation was performed with a 7.0 mm orotracheal tube. Maintenance of the anesthesia: sevofluorane and boluses of fentanyl and cisatracurium IV. The surgery lasted 2 h. Pantoprazol 40 mg, metoclopramide 10 mg, paracetamol 1 g and tramadol 100 mg were infused before the end. Neuromuscular blockade reversed with neostigmine (2 mg) and atropine (1 mg), with successfull extubation. 500 ml of glucose 5% and 500 ml of cristaloids were infused during the surgery. In the post-anesthesia care unit (PACU), morphine (2 mg. IV) was administered to control pain. No incidences reported.
Discussion: An examination in the preoperative evaluation to denote clinical events of crisis is recommended; also to prevent "stressful events" as pain, infections, dehydratation… (1,2). IV fluidotherapy with dextrose or glucose 10% provide the lack of the calories of fasting. Crisis of porphyria have been described with some drugs (barbiturates, sulfonamides, pirazolones…); but propofol, fentanyl, tramadol, sevofluorane, paracetamol, neostigmine, atropine, midazolam and cisatracurium are safe. Metoclopramide is unsafe, but we haven´t observed incidences, neither with pantoprazol.
References:
1. Naithani K, Bhatia Shah S, Bhargava AK, and Batra V. Anesthesia for hemicolectomy in a known porphyric with cecal malignancy.Saudi J Anaesth. 2015; 9(1):82–85.
2. James MFM, Hift RJ.Porphyrias. British J. Anaesth. 2000; 85(1):143–53.
Learning points:
Midazolam, propofol, fentanyl, cisatracurium, sevofluorane, neostigmine, atropine morphine, tramadol, paracetamol and pantoprazol are safe in porphyria diagnosed patients.

5471

Anaesthetic management of a GSD type III patient with hip fracture

Ramos Soto M.[1], Herrera Castro R.[1], Miquel López A.[1], García Pérez N.[1], Pardo Rodríguez Á. E.[1], Polanco Suriel F. A.[1]
[1]Hospital Clinico Universitario de Valencia - Valencia (Spain)

Background: Glycogen storage disease type III (GSD III) is a hereditary disease caused by deficiency of the glycogen debranching enzyme and characterized by severe muscle weakness and liver disease. Clinically, patients may present hypoglycaemia from the first year of life. They may also show hepatomegaly, stunted growth and occasional seizures associated with hypoglycaemia. Symptoms may improve with puberty, except in some cases which evolve to myopathy or cirrhosis with liver failure or hepatocellular carcinoma. About 80% of patients have severe fasting hypoglycaemia.
Case Report: 59-year-old woman who started developing muscle weakness at the age of 50, so that she was diagnosed with GSD III. History of surgery for Scheuermann's disease with general anaesthesia, without incidents. She was admitted to our facility for pertrochanteric fracture repair. Blood test was irrelevant but presented low platelet count (99,000/ml) secondary to liver disease (ALT 56 U/L,AST 51 U/L,Bilirubin 1.25 mg/dl). According to protocol for hypoglycaemia control, once she was nil per os, intravenous 10% dextrose infusion at 110 mL/h was started the night before. Firstly, we got a blood glucose measurement (160 mg/dl). Sedation with 2 mg of midazolam and 25 mcg of IV fentanyl was given. We performed a subarachnoid block with 7 mg 0.5% levobupivacaine and 10 mcg fentanyl. We kept normothermal conditions, hemodynamic constants (MAP 70 mmHg, PR 80 bpm) and strict control of glycaemia. In PACU, according to the protocol, the infusion of dextrose was maintained for up to 4 hours after oral tolerance.
Discussion: Perioperative management of GSD patiens is an unkown challenge for anaesthesiologists. We decided to avoid general anaesthetic because of the unpredictable drugs clearance. Spinal puncture provided anaesthesia with hemodynamic stability and optimal postoperative pain control. The dextrose infusion was decisive for hypoglycaemia prevention.
References:
1. Glycogen storage disease type III: diagnosis, genotype, management, clinical course and outcome. Sentner C. et al. J Inherit Metab Dis (2016).
Learning points: Once npo begins, dextrose infusion should not be stopped until 4 hours after the onset of corn-stach tolerance. Stress situations (hemodynamic instability, pain or cold), which can cause blood glucose changes, should be avoided. Avoid if possible hepatic metabolism drugs and succinylcholine in patients with myopathy. If general anaesthesia is given, we recommend TOF monitoring.

5532

Lamellar Ichthyosis: The importance of anesthetic approach

Eloy A.[1], Tinoco J.[2], Rosinha D.[2], Cordeiro L.[2]
[1]Centro Hospitalar Setúbal - Setubal (Portugal), [2]Hospital de Sao Bernardo - Setubal (Portugal)

Background: Lamellar ichthyosis is a rare, autosomal recessive genodermatosis (incidence 1:300,000) caused by a mutation of the transglutaminase-1 (TGM1) gene, located on chromosome 14 with variable expression. It is part of a group of 5 hereditary types of ichthyosis, characterized by erythroderma, xeroderma and excessive skin peeling. Hyperproliferation and hyperkeratinization of the corneal layer may be present. Typical manifestations of this disease conditions the preparation and adaptation of anaesthetic procedures.
Case Report: 10-year-old male patient (42kg) with lamellar ichthyosis as the only relevant personal antecedent, proposed for draining and excision of the upper eyelid chalazion of the left eye. To mention, extreme peeling from birth without paternal inbreeding or known family history. On observation, peeling was evident on almost total body surface, with particular incidence on the face, limbs and scalp, as well as bilateral ocular ectropion. The mouth opening was limited to about 1.5cm due to the scaling and angular cheilitis with a Mallampatti III. Also the cervical extension was limited by discomfort to the cutaneous stretch. A G22 venous access was established with special care in its fixation using narrow bandages rather than adhesives. Because it's a short-term procedure and the patient had adequate fasting, induction with intravenous alfentanil, lidocaine and propofol was chosen after premedication with midazolam per os. After abundant hydration of the facial skin with petroleum jelly and occlusion of the right eyelid, manual ventilation with face mask was performed. The possibility of tracheal intubation or the use of a supraglottic device would condition the choice of a wide ribbon for its fixation. After venous access loss occurred during the procedure, the postoperative period was uneventful.
Discussion: Timely assessment and planning of the various anaesthetic considerations in the case of a lamellar ichthyosis patient influence the success of the entire procedure. It includes adequate hydration and protection of the scaling areas, eye protection, venous access establishment and fixation, monitoring techniques, maintenance of normothermia, airway approach and nutrition, beyond others.
References:
1. Nelson Textbook of Pediatrics. 20th ed. Elsevier; 2016. p.3171.
2. J Dermatol Sci2006;42: 83–89.
3. Masui 2011;60: 258–261.

5579

Laparoscopic cholecystectomy under total intravenous anaesthesia (TIVA) in a patient with Myotonic Dystrophy type 1 (Steinert's disease) - a case report

Nikouli E.[1], Karras G.[1], Kiamiloglou B.[1]
[1]Sismanoglio General Hospital Komotini - Komotini (Greece)

Background: Patients with Steinert's Disease (SD) are highly sensitive to the common anaesthetics which may induce muscle rigidity. These patients are prone to cardiac and pulmonary complications. Malignant hyperthermia and myotonic episodes are also possible. Hypothermia, shivering and mechanical or electrical stimulation can also trigger myotonic reactions.
Case Report: 44-year-old male diagnosed with SD and cholelithiasis underwent laparoscopic cholecystectomy under general anaesthesia. Preoperatively, the patient had weakness and atrophy of cranial muscles and upper and lower limb fatigue. His physical status was classified as ASA 3 (ECG, chest X-ray, echo, spirometry and lab results were normal). No history of anaesthetic procedures. Ondansetron (8mg) and omeprazole (40mg) were received 30 minutes before surgery. Rapid sequence intubation with midazolam (1mg), propofol (200mg) and rocuronium (50mg). Anaesthesia was maintained with O2 mixed with air at 50%, and continuous infusion of propofol (4mg/kg/h) and remifentanil (0.2μg/kg/h), with continuous monitoring. The operation theatre and the patient were adequately heated. Paracetamol (1000mg) and lornoxicam (8mg) were administered 30 minutes before the end of the procedure. Sugammadex (200mg) reversed muscular relaxation with an uneventful postoperative period.
Discussion: Our strategy (TIVA, short-acting opioid drug and normothermia) was effective and safe for this patient with SD. No postoperative complications were observed due to fast reverse of neuromuscular blockade, careful administration of remifentanil, and NSAIDs, which resulted in adequate recovery from anesthesia and postoperative pain control.
References:
1. Mavridou P, Dimitriou V, Margaritis A, Manataki A. Anesthesia for laparoscopic surgery in a patient with myotonic dystrophy (Steinert's disease): beneficial use of sugammadex, but incorrect use of pethidine: a case report. Acta Anaesthesiol Belg. 2011;62(2):101-4.
2. Bisinotto FM, Fabri DC, Calçado MS, Perfeito PB, Tostes LV, Sousa GD. Anesthesia for videolaparoscopic cholecystectomy in a patient with Steinert disease. Case report and review of the literature. Revista Brasileira de Anestesiologia, 2010;60(2):181-91, 105-10.
Learning points: Avoiding triggering factors for myotonic reactions like hypothermia, use of monitoring, and careful selection of anaesthetic drugs and appropriate doses, resulted in a successful general anaesthesia to a patient diagnosed with SD.

5650

Balancing the safest approach for a patient with Steinert Myotonic Dystrophy undergoing general anaesthesia: a case report

Pratas A.[1], Carmo Pinheiro A.[1], Lima De Morais L.[1], Windels A.[1], Fino C.[1], Fernandes P.[1]
[1]Hospital Espirito Santo Evora EPE - Evora (Portugal)

Background: Steinert myotonic dystrophy (DM1) is a multisystem myotonic syndrome marked particularly by myotonia, muscular dystrophy and cardiac conduction abnormalities. By affecting variable muscle groups, DM1 predisposes patients to perioperative respiratory complications, as a result of pharyngeal muscle and diaphragm weakness and decreased central respiratory drive, as well as delayed gastric emptying, a risk factor for aspiration.1,2 We report the first case of an adult DM1 patient undergoing total intravenous anaesthesia (TIVA) with endotracheal intubation without use of neuromuscular blocking drugs (NMBDs), and complete immediate postoperative respiratory recovery.
Case Report: 47-yearl old male, ASA II, with DM1 presented with palpebral ptosis for elective blepharoplasty. Preanesthetic evaluation revealed dysphagia, dysphonia and sleep apnoea requiring CPAP. Ranitidine and metoclopramide were administered preoperatively and TIVA was the chosen anaesthetic technique. Propofol and remifentanil infusions were used for induction and maintenance of general anaesthesia, avoiding long acting opioids, NMBDs and reversal agents. Endotracheal intubation was uneventful. Deepness of anaesthesia was guided by bispectral index monitoring. Hemodynamic and ventilatory stability was observed throughout. Anaesthetic emergence and extubation underwent without incidents. Postoperative pain management was achieved with an opioid free strategy. Full recovery of ventilatory function was observed and there was no record of respiratory complications.
Discussion: DM1 patients may show enhanced sensitivity to the respiratory depressant effects of anaesthetic medications.3 Anaesthetic and analgesic medications should be carefully titrated to effect. This case was successful in attaining anaesthetic conditions without the need for NMBDs and showed full respiratory recovery, rendering our strategy a safe alternative for DM1 patients undergoing general anaesthesia.
References:
1. Miller, Ronald D. Miller's Anesthesia. 8th ed. Philadelphia, PA: Saunders/Elsevier, 2015.
2. Schieren M, et al. Anaesthetic management of patients with myopathies. Eur J Anaesthesiol 2017; 34:641–649.
3. Mangla C, et al. Myotonic Dystrophy and Anesthetic Challenges: A Case Report and Review. Case Reports in Anesthesiology, vol. 2019, Article ID 4282305.
Learning points: DM1 predisposes patients to respiratory complications. Safe general anaesthesia can be achieved with TIVA without unnecessary use of NMBDs.

5885

Jackknife position and epidural anaesthesia in a patient with a pre-existing lumbosacral radiculopathy: a case of double-crush phenomenon

Ferreira C.[1], Lourenço S.[1], Moreira Z.[1]
[1]Centro Hospitalar Porto - Porto (Portugal)

Background: Double-crush phenomenon is a susceptibility to nerve injury in patients with pre-existing neural compromise when a second insult is practiced1.
Case Report: A 59years-old-female, ASAII, with L5-S1 compressive radiculopathy and dyslipidemia, was submitted to a perirectal cystic hamartoma excision (posterior approach), in jack-knife position(JP), under general anaesthesia. Intraoperatively, it was necessary a wider tissue removal than expected, which implied 3h in JP. Also, we placed an epidural catheter for postoperative analgesia. 24h after the procedure, the patient reported persistent bilateral hypoesthesia of the anterolateral thigh, although without pain at the surgery site. One month after discharge, the patient maintained the same symptoms, so pregabalin was prescribed and neurophysiologic study was made. Five months later, she had no hypoesthesia and study results described the pre-existing lumbosacral radiculopathy (LR). However, she reported a significative worsening of her LR symptoms since the procedure, so neurology collaboration and MRI lumbosacral image for further study were included.
Discussion: In this case, pre-existing LR increased the susceptibility to new neurological deficits and worsening of previous neurological complains. JP induced external compression of the lateral femoral cutaneous nerve, resulting in hyposensitivity of the anterolateral thigh (meralgia paresthesica) potentiated by her established radiculopathy2. Besides, she reported significative worsening of her LR symptoms after the procedure. In fact, pre-existing compressive lumbar disk disease has been proposed as a potential risk factor for neurologic complications following an epidural technique. Several mechanisms of injury have been proposed, including an ischemic or compressive effect after the injection of large volumes of local anaesthetic into a relatively confined space3.
References:
1. Upton A. et al. Lancet. 1973;302(7825):359–62.
2. Edgcombe H, et al. Br J Anaesth. 2008;100(2):165–83.
3. Kopp SL et al. Reg Anesth Pain Med. 2015;40(5):467–78.
Learning points: Pre-existing neurologic deficits should be documented before any anaesthetic approach, since patients with this background are at increased risk of postoperative neurologic complications. The anaesthesiologist should consider possible nerve injuries underlying each positioning, take the appropriate measures to prevent it and consider the risks and benefits of a neuraxial approach in these patients.

6008

Case report: thyroid storm during total thyroidectomy surgery

Berruga Corredor J. J.[1], Pallardó López M. Á.[1], Hernández Laforet J.[1], Aísa Gasca I.[1], Bonilla López I.[1], w[1]
[1]Hospital General De Valencia - Valencia (Spain)

Background: Thyrotoxic crisis are rare, life-threatening, emergency endocrine diseases with various clinical manifestations. Here we report a case of a patient who simultaneously developed thyrotoxic crisis during total thyroidectomy.
Case report: 40-year-old woman who undergoes total thyroidectomy secondary to Graves-Basedow disease. The patient was under medical treatment with Thiamazol 30 mg and Propranolol 10mg daily. During the induction with general anaesthetic and orotracheal intubation without incidents, the patient presents an episode of severe bronchospasm which reverses after intensive treatment. Approximately 1 hour after induction, Sinus tachycardia is recorded at 140 bpm and hyperthermia of 38.5°C. Thyroid hormone levels are requested during the intervention with the following results: TSH<0.01 uUI/mL and T4L 4.10 ng/dL. Esmolol 30mg is administered for the control of sinus tachycardia and Paracetamol 1gr and Metamizol 2gr for the control of hyperthermia. After finishing the surgery without incident, the patient is transferred to ICU for later control.
Discussion: Graves' disease is characterized by the presence of autoantibodies directed against the thyrotropin receptor in patients' serum that cause overproduction and release of thyroid hormones. The diagnosis is based on characteristic clinical features and biochemical abnormalities. The serum TSH is low and T4L and T3 are increased. Thyroid storm is an endocrine emergency which is associated with high mortality (10%) if not promptly recognized and treated. Multidisciplinary treatment in an intensive care setting is usually needed. Thyroid surgery was previously the most common precipitant of storm. Pretreatment with antithyroid drugs in order to promptly achieve the euthyroid state is recommended to avoid the risk of precipitating thyroid storm during surgery. For the majority of patients, euthyroidism is achieved after few weeks of ATD treatment. Beta-blockers, such as propranolol, are often effectively added to control hyperthyroid symptoms.
References:
1. Suzuki K, Miyake T, et al. Thyrotoxic and pheochromocytoma multisystem crisis: a case report. J Med Case Rep. 23 de junio de 2017;11(1):173.
2. Piantanida E. Preoperative management in patients with Graves' disease. Gland Surg. octubre de 2017;6(5):476-81.
Learning points: The thyrotoxic crisis is a very serious adverse event that can occur during surgery in those patients who have not achieved an euthyroid state prior to surgery.

6042

Anesthetic technique in a patient with leiomyosarcoma of the inferior vena cava. A case report

Méndez Martínez E.[1], Rubio Baines Í.[1], Lara Jiménez A.[1], Mendoza Sorrondegui J.[1], Montero López P.[1], López Olaondo L.[1]
[1]Clínica Universidad de Navarra - Pamplona (Spain)

Background: A leiomyosarcoma of the inferior vena cava is a rare tumor with a poor prognosis. Since the first description in 1871, only 400 cases have been reported in the literature. Due to their low prevalence, no real consensus has been reached on the proper treatment of these tumors. The prognosis is bad and directly depends on the extent of the surgical resection.
Case Report: This report presents the case of a 48-year-old woman, diagnosed with inferior vena cava leiomyosarcoma, who is operated on a scheduled basis for resection. Rapid sequence induction is performed with Diazepam, Fentanyl, Propofol and Rocuronium, without incidents. The central venous line is cannulated in the left internal jugular vein and the 7F volume vein access. In addition, invasive monitoring is placed with SwanGanz catheter. The anesthetic maintenance is performed with Sevoflorano, Remifentanil and Rocuronium. Tumor resection is performed, with a donor graft of infrahepatic cava and an autologous graft with a falciform ligament in the left renal vein. Duodenal resection is also performed with mechanical latero-lateral duodenal-jejunal anastomosis. The patient presents hemodynamic lability throughout the surgery, with a tendency to hypertension and tachycardia, requiring administration of beta blockers and nitroglycerin during the intraoperative period to get hemodynamic stability. Abundant bleeding of difficult quantification (approximately three liters are estimated), requiring politransfusion. Guided transfusion is monitored at all times with ROTEM. Good tolerance to clamps and resection of the inferior vena cava.
Discussion: Lower vena cava leiomyosarcoma has a low incidence, hence the importance of reporting all those cases that occur on a daily basis, due to the limited literature on this tumor and its management. From the anesthetic point of view, it can be a challenge due to all the pathophysiology that is associated with this type of lesion, both during induction, as well as intraoperatively and postoperative management.
References:
1. Inferior Vena Cava Resection and Reconstruction for Primary Leiomyosarcoma: A Case Series of Three Patients. Neill JC Jr et al. The American Surgeon. 2019.
Learning points: Lower cava leiomyosarcoma is a very rare tumor with poor prognosis. The anesthetic management for resection of this tumor can be very complex, due to all the pathophysiological changes that both the tumor and its resection imply.

6097

About a rare disease: congenital erythropoietic porphyria

Dias R.[1], Esteves S.[1]
[1]Centro Hospitalar do Porto - Porto (Portugal)

Background: Congenital Erythropoietic Porphyria (CEP) is a rare autosomal recessive disorder, with 200 cases reported, caused by altered activity of uroporphyrinogen III synthase within the heme biosynthetic pathway1. The reduced activity of the enzyme leads to accumulation of porphyrins in red blood cells, plasma, teeth and bones causing haemolytic anemia and severe cutaneous photosensitivity which represents anaesthetic concerns in the management of these patients2.
Case Report: A 67-year-old man, Jehovah's Witness, with CEP diagnosed at the age of 33, was admitted for an elective hepatic resection due to a hepatocellular carcinoma. Physical examination revealed generalized skin tightening, facial deformities, nose and ears ulcerations, missing eyelids, blindness and mutilation of digits by phototoxic damage. The airway evaluation showed limited cervical extension, limited mouth opening, protruding brown coloured teeth and Mallampati class 3. Medical records described a non-demyelinating axonal polyneuropathy and multiple corneal transplants.The anaesthetic plan was a combined general anesthesia (TIVA with OT intubation under videolaringoscopy and spinal morphine) evicting drugs documented as unsafe in patients with porphyria, avoiding operating/recovery room lights and covering the exposed areas. The procedure was uneventful and the patient was admitted to the intermediate care unit.
Discussion: Porphyrinogenic drugs have been implicated as causes of acute porphyric crisis so we checked the data of safe drugs to use in the porphyria patient´s group2. Although morphine has been documented as a safe drug, this is the first report in literature describing spinal administration of morphine on CEP patients. The range of safe pharmacological agents available is wide so the choice of agent may be based more on the patient´s anaesthetic and surgical requirements rather than governed by specific requirements imposed by porphyria.
References:
1. Katugampola RP, Badminton MN, Finlay AY, et al. Congenital erythropoietic porphyria: a single-observer clinical study of 29 cases. Br J Dermatol 2012; 167:901.
2. James MFM, Hift RJ. Porphyrias. Br J Anaesth. 2000;85:143-53.
Learning points: The key to successful management of patients with this disease lies on preventing aggravation of phototoxic injury and triggering porphyric crises. The administration of spinal morphine seems to be safe in this group of patients but further documentation is needed.

6125

Cholinesterase deficiency: a forgotten complication

Gutiérrez A.[1], Gil Sánchez J. M.[2], Abejaro Mut B.[2], Montoliu Torruella R.[2], Díaz Jover R.[2], Moral García M. V.[2]
[1]Hospital Santa Creu i Sant Pau - Barcelona (Spain), [2]Hospital de la Santa Creu i Sant Pau - Barcelona (Spain)

Background: Succinylcholine associated pronlonged paralysis appears in 1 of 2800 cases. Among 5 to 19% surgical patients show decreased cholinesterase activity preoperatively.
Case Report: Gastroscopy to remove a foreign object was schudeled on a 30 years-old male without known diseases. Induction with propofol, fentany and succinylcholine. Non incidence endotracheal intubation. The procedure was finished after 30 minutes but no spontaneous breathing was achieved. Biespectral index showed values around 80 and there was no improvement to opid reversion with naloxone. There was no availability of devices monitoring muscular relaxation to confirm our suspicion on delayed succinylcholine metabolism. The patient was transferred under remifentanyl sedation and mechanical ventilation to Intensive Care Unit. Two hours later showed complete spontaneous neuromuscular reversal and was extubated succesfully. Blood samples were analyzed, observing low levels of plasmatic cholinesterase (2852U/L, reference levels 5990-12220). That deficiency may be related to genetic causes as well as diseases or drugs. Nevertheless, literature tell us that apneas longer than 60 minutes after succinyloline treatment are probably related to atypical genetic traits. Dibucaine testing is currently undergoing in order to acurate diagnosis.
Discussion: The rise of rocuronium as the election drug for rapid sequence induction due to the appearence of sugammadex, has led to a drastic decrease on the use of succinylcholine. Adverse effects and contraindication are spare but well-known. Prolonged paralysis by succininylchoilne is a potentially severe entity that every anesthesiologist should identify and treat, as well as conducting proper differential diagnosis.
References:
1. Robles A, Michael M, Mc Callum R. Pseudocholinesterase Deficiency: What the Proceduralist Needs to Know. Vol 357, American Journal of the Medical Sciences. Elsevier B.V.; 2019.
2. Delacour H, Dedome E, Courcelle S, Hary B, Ceppa F. Déficit génétique en butyrylcholinestérase. Ann Biol Clin (Paris). 2016 May.
Learning points: Previously consider physiological and pathological causes, along with drugs associateed to cholinesterase deficiency. Keep heavy suspicion on dubious curarization after succinylcholine. Neuromuscular monitoring is key to minimize complications and avoid anesthesia awareness. Need of diagnostic test to advise the patient on his condition, its implications and the probability of having affected relatives.

6185

Anesthetic approach of a patient with Amyotrophic Lateral Sclerosis

Dias C.[1], Rodrigues M.[1], Orvalho C.[1]
[1]Centro Hospitalar Lisboa Norte - Lisbon (Portugal)

Background: Amyotrophic Lateral Sclerosis (ALS) is a progressive neurodegenerative disease that affects the upper motor neuron, causing muscle atrophy of the respiratory and bulbar muscles. Although data concerning the anesthetic approach is scarce, these patients appear to be more susceptible to anesthesia-related complications than the general population (1).
Case Report: A 61 years old man diagnosed with ALS in 2015, with bulbar and respiratory dysfunction, currently under riluzole treatment, was submitted to a radical prostatectomy due to a prostate adenocarcinoma, under intravenous general anesthesia with remifentanil and propofol delivered by target-controlled infusion (TCI), myorelaxation with 30 mg of rocuronium with train of four monitoring. We followed a multimodal analgesia strategy with conventional analgesia using paracetamol, parecoxib and tramadol and regional analgesia performing a bilateral transversus abdominis plane (TAP) block with 20 ml of ropivacaine 0,2%. The intraoperative period was uneventful. Neuromuscular block reversal was done with sugammadex. Right after the surgery, the patient was successfully extubated and transferred to postoperative anesthesia care unit. No complications occurred in the postoperative period.
Discussion: Postoperative respiratory failure seems to be the main problem, particularly in patients who already have bulbar involvement. In a study of 18 patients who underwent general anesthesia, 4 remained intubated and had to be transferred to the Intensive Care Unit. Many authors favor the use of intravenous anesthesia with remifentanil and propofol over balanced anesthesia because of the higher rates of respiratory depression. Regional techniques should be privileged because they are opioid sparing, lowering the respiratory depression. However, neuroaxial blockades are not recommended because they may exacerbate the disease. This underlying mechanism is unknown. Some authors believe that the demyelination of the spinal cord makes it more susceptible to toxicity by local anesthetics (2).
References:
1. Amit Prabhakar et al. “Anesthetic management of the patient with amyotrophic lateral sclerosis.” J Anesth (2012).
2. Alan M. Hoeper., et al. “Amyotrophic lateral sclerosis and anesthesia: a case series and review of the literature.” Journal of Anesthesia (2019).
Learning points: Use reversible, short acting agents. Sugammadex is effective in reversing the neuromuscular blockade.

6264

Spastic paraparesis and electroconvulsive therapy - a case report

Branquinho P.[1], Conde R.[2], Paulino A.[1]
[1]Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal),
[2]Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Hereditary Spastic Paraparesis (HSP) is a heterogeneous group of genetic neurodegenerative diseases that affects the corticospinal tract and is characterized by progressive spasticity of the lower limbs. Electroconvulsive therapy (ECT) is performed under general anesthesia (GA) and muscle relaxation. There is no scientific evidence of the superiority of an induction agent over the others and succinylcholine (SCh) is the preferred neuromuscular blocking agent (NMBA). On HSP monitoring the depth of anesthesia is recommended and SCh is contraindicated due to the upregulation of nicotinic receptors and the risk of hyperkalemia.
Case Report: 19 years old male, ASA II, 60kg, with inaugural psychotic depression with catatonia proposed to ECT. Presumptive diagnosis of HSP based on MRI findings, without symptoms, waiting for genetic tests. Submitted to 8 ECT sessions under intravenous GA using different induction agents. On the 5th ECT, in addition to ASA standard monitoring, BIS was used to titrate the induction agent and rocuronium 0.3mg/kg was used and monitored with TOF. The shock was applied when TOF of 2. Sugammadex was administered when TOF of 2, initially 2mg/kg with partial response and final dose of 4mg/kg.
Discussion: Induction agents with anticonvulsive action interfere negatively with the convulsive threshold (CT) e duration (CD). Anesthesia depth monitoring allows finding the minimal effective dose, with amnesia between the beginning of action of NMBA and the seizure, reducing its impact on CT and CD. This association is not proven and there is no BIS value recommended for ECT. In this case a BIS of 60 was used without awareness. Rocuronium was the NMBA used due to the possibility of reversal with sugammadex. There is no dose of rocuronium or TOF value recommended for ECT. With rocuronium 0.3mg/kg and TOF of 2 no complications were observed.
Learning points: No complications during ECT in patients with HSP using propofol/etomidate, rocuronium and sugammadex. BIS allowed the use of a lower dose of the induction agent and a target of 60 was enough to prevent awareness. Rocuronium 0.3mg/kg and TOF of 2 were enough to avoid mechanical complications.

6270

Anesthetic considerations of patient with severe aortic stenosis for non-cardiac surgery and cardiac surgery. A case report

Bilaj-Miraka M.[1], Huti G.[1], Abdyli A.[1], Domi R.[1], Peci J.[1], Papa A.[1]
[1]Dept of Anesthesiology & Intensive Care Medicine, American Hospital - Tirana (Albania)

Background: Aortic stenosis(AS) is one of the most common valvular abnormalities. Severe aortic stenosis(SAS) is associated with morbidity and mortality after non-cardiac surgery(NCS).Perioperative complications in NCS patients with AS include the following: Myocardial infarction(MI),heart failure, arrhythmias, stroke, hypotension, death. We present anesthetic management of SAS patient coming for urgency NCS.
Case Report: A66 y/o female with a history of PCI in LAD 6 years ago, HBP and SAS, presented for acute cholecystitis. and underwent urgent laparoscopic cholecystectomy(LCh) . Considering the urgency and her medical condition, the decision is made to proceed with the LCh procedure and defer surgery of aortic valve replacement(SAVR). TTE showed the patients SAS, calcified aortic valve with peak and mean gradient of 103mmHg and 51 mmHg ,moderate AR and mild TR. Severe concentric hypertrophy of LV with normal EF. Mallampati score III, BMI=39.4.We chose GA and we took care to avoid arrhythmias and hypotension with fluids and the administration of vasoconstrictor. Standard ASA monitoring, and TEE was performed during the procedure to provide continuous monitoring. Preinduction arterial line was cannulated for BP monitoring. Central venous catheter(RIJ) was inserted to provide administration of fluids and drugs. Anesthesia was induced with fentanyl +lidocain + propofol +norcuron. Maintenance of anesthesia with TIVA .The intubation was performed successfully under video laringoscope. MAP was maintained above 65mmHg. The perioperative course was uneventful.The patient was extubated in OR and transferred in PACU in a good hemodynamic condition. The patient was transferred to the step-down unit for follow up . The patient discharged in the POD2. The postoperative course was uneventful. The patient admitted at the hospital one month later to proceeded with elective SAVR .The perioperative and postoperative course was uneventful. The patient was discharged in POD9 in a good hemodynamic condition.
Discussion: Patients with AS are at risk for increased complications after NCS. Proper triaging of AS patients for NCS depends on identifying the urgency and risk of surgery and degree of stenosis . With close intraoperative monitoring and careful anesthetic planning ,urgent NCS can be performed safely and with an acceptable risk profile .Close collaboration between the anesthesia and surgical team is essential.

6286

Myasthenia gravis - Rare but be aware!

Moreira S.[1], Nunes L.[1], Aquino E.[1]
[1]Centro Hospitalar Lisboa Ocidental - Lisboa (Portugal)

Background: Myasthenia gravis is an autoimmune disorder, mediated by antibodies directed to acetylcholine receptors in the neuromuscular junction, resulting in weakness of the skeletal muscle. Due to the characteristics of the disease, its specific therapy and probable involvement of the bulbar and respiratory muscles, there are critical features in the anaesthetic management of these patients.
Case Report: 32 years old patient with past medical history of myasthenia gravis, under corticosteroid therapy and pyridostigmine 60mg prn, recently aggravated with bulbar symptoms (diplopia, dysphagia and phonation disorders). She entered emergency department with complains of abdominal pain, being later diagnosed with ectopic pregnancy and referred for urgent laparotomy and unilateral salpingectomy. Intraoperatively, a combined epidural-spinal block at L3-L4 level was performed, opioid free, only with bupivacaine (10mg), uneventfully. Surgery proceeded without any complications, neither pain nor dyspnea. Postoperative analgesia was achieved with epidural infusion of ropivacaine 0.1%, plus intermittent paracetamol intravenoulsy. The patient remained 5 hours under vigilance in the post-anaesthetic care unit and 4 days in the gynecological ward. Before discharge a re-evaluation was performed by the neurologist.
Discussion: Myasthenia gravis has an important impact on the anaesthetic

approach. In the preoperative evaluation it is essential to assess bulbar or respiratory symptoms and, with the neurologist, consider intensive care in the postoperative period. Regarding the anaesthetic technique, regional anaesthesia is the preferable and safest approach and, whenever possible, it should be chosen. In this case, we opted for neuro-axial anaesthesia, with good results. When general anaesthesia is required, preference should be given to short-acting drugs and avoidance of neuromuscular junction blockers. Postoperative analgesia is another fundamental concern, as surgical aggression and postoperative pain are important factors that can lead to disease decompensation and evolution to myasthenic crisis.

References:
1. Riki kveraga, John Pawlowski. Anesthesia for the patient with myasthenia gravis. UpToDate, Feb 2019.
2. Mark Abel, James Eisenkraft. Anesthetic Implications of Myasthenia Gravis. The Mountsinai Journal of Medicina. Vol. 69 Nos. 1 & 2.

6300

Anaesthetic approach in a patient with Madelung´s Disease – A Case Report

Eunice M.[1], Pires Asseiro M.[1], Bernardino A.[1]
[1]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Madelung´s Disease, also known as Multiple Symmetric Lipomatosis (MSL) or the Launois-Bensaude syndrome, is characterized by nonencapsulated subcutaneous lipid deposits. Tumors are usually located in the neck and upper body. MSL usually affects Mediterranean males with history of chronic alcohol abuse. It can range from an asymptomatic disease, to severe cosmetic deformity and neck immobility, and in the worst cases, to dysphagia or dyspnea. The most effective treatment is surgical resection. Due to the fact that MSL is an uncommon disorder and could be very challenging for the anesthesiologist, associated with the lack of studies in this field, we decided to report this case.
Case Report: 49-year-old male, ASA III, alcoholic habits with MSL who was scheduled to anterior cervical dermolipectomy. Our main concern was the airway management due to the multiples predictors of difficult airway (DA): macroglossia, Mallampati IV, reduced mobility of the neck due to the lipid deposits (approximately with 10 cm diameter) and it was impossible to evaluate tiromentonian distance. We performed an awake nasal fiberoptic intubation. We kept the equipment for difficult airway ready in the OR. Endotracheal intubation was successful performed at first attempt. The surgery and emergence were uneventful, and he was discharge after 3 days.
Discussion: Dermolipectomy in MSL represents a challenge for anesthesiologists because it requires optimal capabilities in the management of airway. The gold standard is awake fiberoptic intubation. 1 These patients also have more risk of bleeding in the post-operative period, and the emergence is also challenging. It is becoming more important for an anaesthesiologist to develop different skills to manage a difficult airway. Pre-anaesthetic evaluation, knowledge of the patient and of his predictors of DA were essential in the coordination and management of the case.

References:
1. Stopar T Et al. Four different airway-management strategies in patient with Launois-Bensaude syndrome or Madelung's disease undergoing surgical excision of neck lipomatosis with a complicated postoperative course. Journal of Clinical Anesthesia (2005) 17, 300 – 303.

Learning points: Treatment of patients with MSL is challenging for anesthesiologists, difficult airway management and possible postoperative complications are major problems. A proper advanced plan to insure safe induction and emergence, to avoid any airway complication is of paramount.

6371

Management of bilateral vocal cord palsy after total thyroidectomy – Case report

Grenho B.[1], Pereira V.[1], Miranda M.[1], Bettencourt A. R.[1]
[1]Hospital Garcia de Orta - Almada (Portugal)

Background: Recurrent laryngeal nerve damage (RLND) after thyroid surgery is a rare complication, ranging from hoarseness to life-threatening respiratory distress. Although the incidence of bilateral RLND (BRLND) following total thyroidectomy (TT) is as low as 0,5%, it is still the most common cause of bilateral vocal cord palsy (BVCP).
Case Report: A 59-year-old male with Graves disease was proposed for a TT. Prior to surgery the patient was euthyroid, had no obstructive symptoms or difficult airway stigmas. On laryngoscopy the vocal cords had normal movement. The CT scan showed a large goiter with reduction of the tracheal lumen. General anesthesia with intubation via direct laryngoscopy was performed in a single attempt. TT was completed with an uneventful intra-operative period. At the end of the procedure, neuromuscular block was reversed. Immediately after smooth extubation, the patient developed stridor and respiratory distress. Positive pressure ventilation was applied. As the symptoms did not improve, a fiber optic laryngoscopy was performed, revealing BVCP in the paramedian position. The patient was immediately reintubated. Later that day a tracheostomy was performed under GA.
Discussion: RLND is a rare and troublesome complication of TT that must be promptly treated. The injury can occur by ischemia, contusion or actual transection. This patient had two risks factors: a large goiter and TT. The ENT examinations are important to determine pre-operative vocal cord status. Although RLND is the most obvious cause of stridor after TT, other causes to be considered are residual NM blockade, stroke, anaphylaxis and even hypocalcemia. In the presence of stridor and respiratory distress, urgent reintubation is required and if vocal cord palsy is confirmed, tracheostomy must be performed.

References:
1. Joliat,G-R, et al (2017). Recurrent laryngeal nerve injury after thyroid and parathyroid surgery. Medicine. 96:17(e6674).
2. Shin,K, et al (2016). Bilateral Vocal Cord Palsy after Thyroidectomy Detected by McGrath Videolaryngoscope. Korean J Endocr Surg. 16:85-8.
3. Misron,K, et al (2014). Bilateral vocal cord palsy post thyroidectomy: lessons learnt. BMJ Case Rep 2014:1-3.

Learning Points: Careful postoperative vigilance is mandatory, allowing for a timely response. The gold standard for prevention of RLND is still surgical visual confirmation. Other causes of post-thyroidectomy stridor should be considered. In face of BRLND, urgent reintubation must be performed.

6073

Lewis-Sumner Syndrome – Challenges on the anaesthetic management of an orphan disease

Sales F. I.[1], Cruz A. R.[1], Maldonado A. F.[1], Cunha M.[1]
[1]Unidade Local de Saúde de Matosinhos - Hospital Pedro Hispano - Matosinhos (Portugal)

Background: Lewis-Sumner Syndrome (LSS) or Multifocal Acquired Demyelinating Sensory Motor neuropathy is a rare immune neuromuscular disorder without any published reports in anaesthesiology. We describe the anaesthetic management of a patient suffering from the disease, using total intravenous anaesthesia (TIVA), rocuronium and sugammadex.
Case Report: A 63-year-old, ASA III, diabetic woman presented for lumbar discectomy. She had a previous diagnosis of LSS with neurogenic bladder and sensory-motor polyneuropathy as well as severe degenerative lumbosacral polyradiculopathy. A pre-anaesthetic evaluation with emphasis on neurological deficits was performed. Surgery was performed under general anaesthesia with standard monitoring, including invasive blood pressure, neuromuscular monitoring and bispectral index. General anaesthesia was induced with fentanyl, propofol and rocuronium (0,4mg/Kg) and maintenance was assured with TIVA. No further muscle relaxant was given. Surgery lasted 110 minutes. Before emergence the train-of-four (TOF) ratio was 49, so neuromuscular block was reversed with 2mg/kg of sugammadex. Blood gas analysis performed in the recovery room showed no respiratory insufficiency and the patient remained stable without worsening of sensory-motor deficits. She was discharged home 3 days later. On her neurology follow-up, she reported pain relief and better mobility of the lower limbs.
Discussion: There are no reported cases on the anaesthetic management of LSS. There is some doubt regarding LSS classification and some authors point out similarities with Chronic Inflammatory Demyelinating Polyradiculoneuropathy (CIDP). Theoretical concerns with the use of neuromuscular drugs in patients with demyelinating neuropathies have been raised.1 There is a report of prolonged effect of vecuronium in a patient with CIDP.2 In our case, rocuronium effect was also prolonged and low dosage was sufficient to provide intubation conditions (TOF count 0). Sugammadex allowed total reversion of neuromuscular block and no respiratory complications occurred. The combination of rocuronium and sugammadex proved to be a good choice for patients with LSS.

References:
1. Acta Neurol Belg. 2017 Dec;117(4):895-901.
2. Anesth Analg. 2000 Jan;90(1):224-6.

Learning points: LSS is an orphan disease with no reported cases of anaesthetic management. Lower dose of rocuronium and sugammadex were safely used in a patient with LSS.

4489

The Carbon Footprint of Anaesthetic Agents: An LCA Case Study in the UK

Hu X.[1], Morrissey K.[2]
[1]*University of Exeter Medical School - Exeter (United Kingdom),*
[2]*University of Exeter - Truro (United Kingdom)*

Background and Goal of Study: Anaesthetic gases emit a significant amount of carbon dioxide equivalent (CO2E) at every stage of their life-cycle. The implementation of a technology that recycles wasted anaesthetic gases requires an early understanding of its environmental impact. The greenhouse gas (GHG) captured by such technology may significantly exceed the emissions generated in the other stages of the life-cycle combined.
Materials and Methods: This study employs a life cycle assessment (LCA) model and discusses the environmental implications of using a recycle and reuse technology. LCA applies a cradle-to-grave approach to assess the environmental impacts associated with all stages of a product's life cycle, including manufacturing, transporting, utilisation, and residues.
Results and Discussion: The LCA results indicate that the emissions generated during manufacturing are the highest for Sevoflurane while Desflurane produces the highest total emission once the wasted vented gases are considered. The CO2E generated can be reduced by almost 80% if one uses Desflurane with the sustainable technology instead of using Sevoflurane without recycling the wasted gases. In the case of low-flow rate, Sevoflurane produces the highest total emission followed by Desflurane in our model. Moreover, data collected in all acute NHS Trusts in the UK under the Freedom of Information Act 2000 shows that while the number of surgery cases keeps growing the use of anaesthetic gases is not slowing down. Recycling wasted anaesthetic gases is crucial to reduce the carbon footprint of health services.
Conclusion: If the reuse and recycle technology is successfully implemented at a large scale, our results indicate a large decrease in volatile anaesthetic agents going into the environment. This shifts the current policy from encouraging the use of Sevoflurane instead of Desflurane to the opposite spectrum.

4652

The efficacy and safety of ciprofol for the induction of general anaesthesia in selective surgery: a phase III, multi-centre, randomized, propofol-controlled, double-blind Trial

Wang X.[1], Wang X.[2], Zhu Q.[2], Zuo Y.[2]
[1]*West China Hospital, Sichuan University - Chengdu (China),*
[2]*West China Hospital, Sichuan University - Chengdu (China)*

Background and Goal of Study: Ciprofol (HSK3486 emulsion injection), a new anaesthetic 2,6-disubstituted phenolic derivative, binds toward GABAA receptor which is same as propofol[1]. Based on the results of previous studies (Clinical Trial Registration: identifier: NCT03773835, NCT03773042, NCT03709056), ciprofol provided effectively sedative effects with a quick onset.This multi-centre , randomized, double-blind study was designed to compare the efficacy and safety of ciprofol 0.4 mg/kg and propofol 2 mg/kg for the induction of general anaesthesia in patients scheduled for elective surgery.
Materials and Methods: Patients aged 18-64 years with a body mass index between 18 and 30 kg/ m2, American Society of Anesthesiologists physical status of I or II, were studied.The primary efficacy end point was anesthesia induction success rate , which was defined as Modified Observer's Assessment of Alertness/ Sedation score ≤ 1 (MOAA/S ≤ 1) after study drugs administration (up to giving 2 supplemental dose) without requiring alternative sedative of propofol. Other end points included the time to successful anesthesia induction, the time to the loss of the eyelash reflex , safety and pharmacokinetics.
Results and Discussion: Eighteen centers selected 216 patients and 178 patients underwent randomization. The anesthesia induction success rate of ciprofol 0.4mg/kg and propofol 2mg/kg were both 100.0% in Full Analysis Set or Per-Protocol Set. The lower limit of the one-sided 97.5% CI (-4.18%) for the difference in the anesthesia induction success rate was no more than -8%. This indicated ciprofol 0.4 mg/kg was comparable to propofol 2 mg/kg for induction. There were no significant differences in adverse events between the ciprofol group and the propofol group(88.6% & 92.0%,P>0.05). No patients experienced serious adverse events in ciprofol group while one patient underwent bronchospasm in propofol group. Pharmacokinetics showed that the trend of serum concentration of ciprofol and propofol was similar.
Conclusion: The anesthesia induction success rate of ciprofol 0.4 mg/kg was comparable to propofol 2 mg/kg. Ciprofol is of efficacy and safety for the induction of general anaesthesia in selective surgery.

References:
1. Qin L , Ren L , Wan S , et al. Design, Synthesis, and Evaluation of Novel 2, 6-Disubstituted Phenol Derivatives as General Anesthetics[J]. Journal of Medicinal Chemistry, 2017:acs.jmedchem.7b00254.

5090

A phase II clinical trial to study the efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment

Chen S.[1], Yuan T.[1], Zhang J.[1], Huang Y.[1], Tian M.[2]
[1]*Peking Union Medical College Hospital - Beijing (China),*
[2]*Beijing Friendship Hospital, Capital Medical University - Beijing (China)*

Background and Goal of Study: To evaluate the efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment.
Materials and Methods: A phase II multi-center, randomized, single-blinded, dose-exploration and active comparator-controlled trial was conducted. A total of 156 patients (18-60 years old) with grade I or II ASA score and 18-30kg/m2 BMI who underwent conventional gastroscopic diagnosis and treatment were selected. Using centralized randomization procedure, they were randomized into 5 groups, including the 5mg, 7mg, 8mg remimazolam tosylate and 5mg remimazolam tosylate +flumazenil treatment groups and the 1.5mg/kg propofol control group. Observation indexes included sedation success rate, sedation recovery time and incidence rates of hypotension, hypoxemia, respiratory depression, injection pain, adverse event and adverse reaction during sedation.
Results and Discussion: There was no statistically difference in the sedation success rate between the treatment groups and the control group (P>0.05). However, the sedation recovery time was significantly shorter in the treatment groups than in the propofol control group (P<0.05). In addition, there were no statistically differences in the incidence rates of hypotension and respiratory depression during sedation between the treatment groups and the control group (P>0.05). The incidence rates of hypoxemia, injection pain, adverse event and adverse reaction during sedation were significantly lower in the treatment groups than in the control group (P<0.05). Serious adverse event was not observed in any group.
Conclusion: Remimazolam tosylate had equivalent success rate of sedation but lower incidence rates of adverse event and adverse reaction than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

5098

A phase III multi-center, randomized, single-blinded, active comparator-controlled clinical trial to study the sedation efficacy and safety of remimazolam tosylate injection in gastroscopic diagnosis and treatment

Chen S.[1], Yuan T.[1], Zhang J.[1], Huang Y.[1], Tian M.[1]
[1]*Peking Union Medical College Hospital - Beijing (China)*

Background and Goal of Study: To evaluate the efficacy and safety of intravenous remimazolam tosylate injection in gastroscopic diagnosis and treatment.
Materials and Methods: A phase III multi-center, randomized, single-blinded and active comparator-controlled trial was conducted. A total of 378 patients (18-65 years old) with grade I or II ASA score and 18-30kg/m2 BMI who underwent conventional gastroscopic diagnosis and treatment were selected. They were randomized into the 5mg remimazolam tosylate group or 1.5mg/kg propofol group. The primary efficacy endpoint was sedation success rate, and secondary efficacy endpoints included sedation induction time, sedation recovery time, and incidence rates of hypotension and respiratory depression during sedation.
Results and Discussion: The sedation success rate of remimazolam tosylate was not inferior to that of propofol in patients during colonoscopic diagnosis and treatment. The sedation induction time of the remimazolam tosylate group was significantly longer than that of the propofol group (P<0.05). The recovery time was significantly shorter in the remimazolam tosylate group than in the propofol group (P<0.05). The incidence rates of sedation-induced hypotension and respiratory depression during sedation were significantly lower in the remimazolam tosylate group than in the propofol group (P<0.05). Furthermore, the incidence rates of adverse event (AE) and adverse reaction (ADR) were also significantly lower in the remimazolam tosylate group than in the propofol group (P<0.05). No serious adverse event (SAE) was observed in any group.

Conclusion: The sedation success rate of remimazolam tosylate is not inferior to that of propofol. Remimazolam tosylate has lower incidence rates of sedation-induced hypotension and respiratory depression than propofol. Remimazolam tosylate did not cause serious adverse reactions and was safe for patients.

5144

Comparison of the degree of sympathetic nervous system suppression during general anesthesia using Sevoflurane/O2 vs Sevoflurane/N2O with the same MAC

Omer M.[1], Carette R.[2], Alliet W.[1], Hendrickx J. F. A.[3], De Wolf A. A. M.[4]
[1]OLV Hospital Aalst - Aalst (Belgium), [2]Staff anesthesiologist OLV Hospital Aalst - Aalst (Belgium), [3]Consulting Assistant Professor, Stanford University School of Medicine, Stanford, USA. Staff anesthesiologist OLV Hospital Aalst - Aalst (Belgium), [4]Professor, Department of Anesthesiology, Feinberg School of Medicine, Northwestern University. - Chicago (United States)

Background and Goal of Study: N2O may stimulate the sympathetic nervous system at end-tidal concentrations FA> 40%1.We examined whether an anesthetic consisting of sevoflurane/N2O versus sevoflurane only at equipotent MAC would offer a similar degree of sympathetic suppression in patients undergoing robot assisted radical prostatectomy(RARP).
Materials and Methods: 19 ASA I-III patients undergoing RARP were randomized to receive sevoflurane(Sevo/O2 group,n=10)or(Sevo/N2O group,n=9).Patients taking drugs altering sympathetic tone were excluded. Anesthesia was induced with propofol(1-2mg/kg),remifentanil continuous infusion(4ng/ml),rocuronium(0.5mg/kg) or cisatracurium(0.1-0.15mg/kg),the tracheas intubated and mechanical ventilation started.The Zeus anesthesia machine(Dräger, Lübeck,Germany)was used in target control mode.The FAO2 target was 40% in(Sevo/O2)group and 50% in(Sevo/N2O),with initial 5 min high fresh gas flow denitrogenation to ensure maintaining FAN2O at 45-47%.MAC target was set at 0.8 in both groups at all times. The degree of sympathetic suppression was measured by parameters known to be affected by the sympathetic/parasympathetic balance(figure1):ANI(Loos, France),qNOX(Quantium Medical, Mataro, Spain),SSI,SE,RE, MAP and HR2.The study started with first intra-abdominal electrocautery incision.Data were collected every 8 seconds for an arbitrary 20 min period(RUGLoop, Demed, Temse, Belgium).The study was stopped if a vasopressor or atropine was used.T-test at 1 min intervals was used to compare groups,with P< 0.05 indicating statistical significance.
Results: (Figure1)The difference between all compared parameters was highly significant. Mainly,with less sympathetic suppression in(Sevo/N2O)group.No vasoactive drugs were needed.
Conclusion: When anesthesia in patients undergoing RARP is maintained at 0.8 MAC, substituting part of the sevoflurane by 50% N2O decreases sympathetic suppression.Whether this is caused by the lower sevoflurane partial pressure or higher N2O partial pressure or both, cannot be determined by this study.
References:
1. Clinical Anesthesia,6th Edition,G. Barash, Lippincott Williams & Wilkins, 2009, page 429.
2. Br J Anaesth.2010;104:587-95.

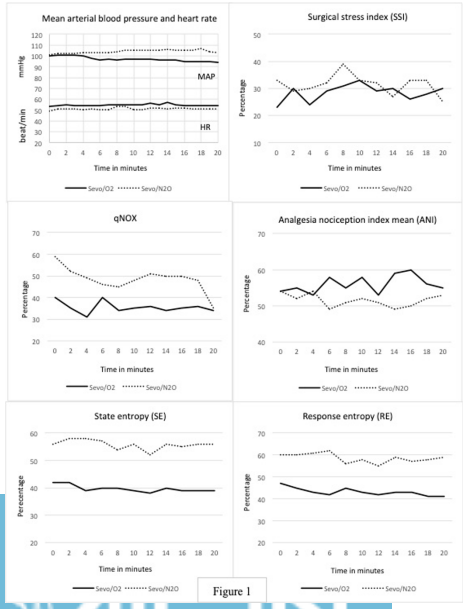


Figure 1

5147

Use of magnesium sulfate in general anesthesia as a coadjuvant, a review

Martínez-Galán Fernández L.[1], Villanueva Carpintero M. D. G.[1], Lopez Olid A.[1], Valbuena Maldonado M.[1], Baladrón González V.[1], Villazala González R.[1]
[1]Hospital General Universitario de Ciudad Real - Ciudad Real (Spain)

Background and Goal of Study: We performed an analysis of magnesium sulfate used in continuous infusion in the perioperative situation, taking great importance today thanks to the OFA.
Materials and Methods: We have carried out a bibliographic research in the main biomedical databases (PUBMED, WOS, Cochrane) to analyze the main studies and their results in the use of magnesium sulfate as an adjuvant in general anesthesia.
Results and Discussion: We have carried out a bibliographic research, we found more than 50 articles where we have been able to see how magnesium sulfate has demonstrated how its use in continuous perfusion allow us to reduce anesthetic doses during the surgical intervention, as well as greater control over postoperative pain. An important article is a meta-analysis made by Albretcht et al, which is the first systematic review on this topic demonstrating a clinically significant decrease in morphine consumption, as well as the study of the adverse effects when we use magnesium sulfate, without giving statistically significant results. Another article to highlight is one written by Rodríguez Rubio et al, which has demonstrated a decrease in the requirements of propofol, muscle relaxants and opioids in induction and maintenance of anesthesia. Currently, the recommended doses are: 30-50 mg per kg bolus followed by continuous infusion of 7 to 15 mg per kg per hour of maintenance, starting 10-15 minutes before induction or just after induction.
Conclusion: We are facing a revolution as far as anesthesia is concerned, since the appearance of opioid derivatives in the 60s, which produced great hemodynamic stability intraoperatively, new adjuvant drugs are currently appearing that can contribute to this without the adverse effects of opioids. Magnesium sulfate has demonstrated an analgesic and anesthetic effect more than evident, reducing pain and with it the consumption of opioids and decreasing the doses of anesthetics used and adrenergic response during the orotracheal intubation.
References:
1. Albrecht et al. | Peri-operative intravenous magnesium and postoperative pain. Laura Rodríguez-Rubio et al. Influence of the perioperative administration of magnesium sulfate on the total dose of anesthetics during general anesthesia.

5776

Efficacy and safety of remimazolam tosilate for general anesthesia in elective surgery: A clinical trial

Chen S.[1], Ruan X.[1], Gao H.[1], Li X.[1], Che L.[1], Yu J.[1], Liying Ren, Ming Tian, Weifu Lei, Meiying Xu, Min Su, Weifeng Tu, Yuguang Huang
[1]Peking Union Medical College Hospital - Beijing (China)

Background and Goal of Study: This study aimed to assess the efficacy and safety of intravenous remimazolam tosilate in Chinese patients undergoing elective surgery under general anesthesia, comparatively to propofol.
Materials and Methods: The patients were randomized into 4 groups to receive remimazolam tosilate (6, 12 and 18 mg/kg/h) or propofol in this Phase II multicenter, randomized, double-blind, dose-finding, positive drug parallel controlled trial. The primary efficacy endpoint was the success rate of achieving anesthesia/sedation depth. The secondary efficacy endpoints included changes in bispectral index score (BIS), anesthesia recovery time, anesthesia induction time, and safety profile.
Results and Discussion: The results showed that the rates of successful anesthesia were not significantly different among the four groups (P>0.05). During anesthesia, BIS values in the remimazolam (6, 12, and 18 mg/kg/h) and propofol groups fluctuated between 40 and 60. The anesthesia induction time was gradually decreased with increasing dose of remimazolam tosilate. Recovery time was longer with remimazolam administration at 6 and 18 mg/kg/h groups compared with the propofol group (all P<0.05). The incidence rates of deep sedation, inadequate sedation, hypotension, and hypoxemia were not significantly different among the four groups (all P>0.05). There was no serious adverse event.
Conclusion: Remimazolam tosilate was not inferior to propofol in terms of anesthesia success and adverse event occurrence. This study was registered with ClinicalTrials.gov (NCT02406872), CFDA clinical trial register number CTR20150191, and CFDA clinical trial document numbers 2013L00702, 2013L00703, 2013L00704, and 2015L01799.

5797

A lipid-free etomidate formulation based on designed self-assembling peptide

Liu J.[1], Qiu F.[2], Wu W.[2], Zhang W.[2]
[1]West China Hospital of Sichuan Universit - Chengdu (China), [2]West China Hospital of Sichuan University - Chengdu (China)

Background and Goal of Study: Etomidate and propofol lipid emulsions are widely used in induction and maintenance of anesthesia, but the use of lipid as carrier also causes some drawbacks including pain on injection, bacteria contamination and hypertriglyceridemia. Thus, a lipid-free formulation based on self-assembling peptides would be promising to prevent these side-effects.
Materials and Methods: Self-assembling peptide GQY was dissolved in 0.9% normal saline and 5mM GQY solution was obtained. After that, etomidate was added into the GQY solution at the concentration of 2 mg/mL equal to the clinical lipid emulsion. Nanoparticles formed in the etomidate-GQY formulation were observed by TEM. Healthy adult male SD rats divided 2 groups (GQY group and lipid group) were used in further pharmacodynamic experiments. Rats were placed supine in the cage after single injection of etomidate through the lateral caudal vein. Loss of righting reflex (LORR) occurred when rats failed to right themselves. Up-and-down method was applied to find the hypnotic median effective dose (ED50). ED50 was taken average of three tests. 2ED50 of two formulations was administered (n=24 each group). And the time to act, LORR duration, sedation duration and adverse events was observed and recorded.
Results and Discussion: Etomidate-GQY solution was white turbid liquid with nanoparticle size of less than 50 nm. The ED50 (95%CI) of etomidate-GQY solution and lipid emulsion was 0.80 (0.75-0.86) mg/kg and 0.68 (0.64-0.72) mg/kg, respectively, which indicated that the potency of etomidate in two different formulations was similar. And the onset time ([0.12 (0.12, 0.13)] min vs. [0.12 (0.12, 0.13)] min, P=0.91), duration for LORR ([5.74±1.34] min vs. [6.22±1.37] min, P=0.23), and sedation duration ([12.58±2.18] min vs. [11.71±2.47] min, P=0.20) of etomidate-GQY solution and lipid emulsion had no difference. The incidence of myoclonus was 10/24 in GQY group and 6/24 in lipid group (P=0.36). No respiratory depression or other adverse reaction was observed.
Conclusion: Hydrophobic etomidate could be successfully encapsulated by self-assembling peptide GQY and form stable nanoparticles. And the GQY formulation of etomidate had the similar efficacy in anesthesia induction to lipid emulsion. We are going to study further about this lipid-free formulation, as well as to develop lipid-free propofol formulation based the peptide.

5300

Propofol wastage and disposal: doing the right thing

Kanani S.[1], Ratenberry W.[1], Barley M.[1]
[1]Nottingham University Hospitals NHS Trust - Nottingham (United Kingdom)

Background and Goal of Study: Propofol is believed to have a greenhouse gas impact 4 orders of magnitude lower than desflurane or nitrous oxide [1]. However, a comprehensive life cycle analysis of its environmental impact was not mandatory at the time of its discovery and was not performed. Nevertheless, it is known that propofol does not biodegrade, accumulates in fat and can be toxic to aquatic organisms [2]. Unused propofol, including empty ampoules and glassware, must therefore be disposed of by incineration to prevent it from entering the watercourse. In 2012, a study in New York demonstrated that 45% of all propofol dispensed was wasted [2]. Avoidance of unnecessary waste and disposal of propofol are of paramount importance.
Materials and Methods: We sought to establish a baseline for propofol waste at Queens Medical Centre Nottingham, UK. We recorded the volume of propofol dispensed and the volume administered in 50 cases. We used a questionnaire to ascertain knowledge about propofol disposal and its environmental impact amongst anaesthetists and operating department practitioners (ODPs).
Results and Discussion: Overall, we found that 23% of dispensed propofol was wasted.10 ODPs and 41 Anaesthetists completed the questionnaire. Of these, 75% of anaesthetists and 70% of ODPs did not know how to correctly dispose of propofol within our Trust. 51% of participants were not aware of the major environmental hazard of wasted propofol.
Conclusion: The state of the environment is a major public health crisis which we cannot ignore.This audit has shown that increased awareness is required amongst our peers to help overcome the environmental impact propofol has. Waste propofol must be disposed of by incineration and all anaesthetists and ODPs have a responsibility to ensure this happens. We believe this and other environmental issues should be integrated within the anaesthetic curriculum.
References:
1. Sherman J, Le C, Lamers V et al. Life cycle greenhouse gas emissions of anesthetic drugs. Anesth Analg. 2012 May;114(5):1086-90. doi: 10.1213/ANE.0b013e31824f6940. Epub 2012 Apr 4.
2. Mankes, Russell F., PhD; Retired. Propofol wastage in the operating room. Anesthesia & Analgesia: May 2012 - Volume 114 - Issue 5 - p 1091–1092.

5263

Efficacy and safety evaluation of injected Remimazolam Tosylate in the sedation for colonoscopy diagnosis and treatment

Chen S.[1], Yuan T.[1], Zhang J.[1], Huang Y.[1], Tian M.[1]
[1]Peking Union Medical College Hospital - Beijing (China)

Background and Goal of Study: This study aimed to evaluate the efficacy and safety of injected Remimazolam Tosylate in the sedation for colonoscopy diagnosis and therapy with propofol as a control.
Materials and Methods: We conducted a multicenter, randomized, single-blind, and positive drug parallel controlled trial. A total of 388 patients, aged 18~65 years old, with an BMI of 18~30kg/m2 and an ASA grade of I or II, were selected for colonoscopy diagnosis and treatment. They were randomly divided into two groups and given either Remimazolam Tosylate(5 mg/kg) or propofol (1.5 mg/kg), respectively. The primary endpoint was sedation success rates, and the secondary endpoints included sedation induction time, sedative recovery time, incidences of hypotension and respiratory depression.
Results and Discussion: We observed that the sedation success rate with Remimazolam Tosylate was not inferior to that with propofol in colonoscopy diagnosis and treatment. Furthermore, the sedative induction time of Remimazolam Tosylate group was dramatically prolonged compared with that of propofol group (P<0.05), whilst there was no significant difference in sedative recovery time (P>0.05). The incidences of injection pain, respiratory depression, hypoxemia and hypotension were all significantly lower in Remimazolam Tosylate group as compared to those of propofol group (P<0.05). No serious adverse events (SAE) or adverse reactions (ADR)were observed in the current clinical trail.
Conclusion: Overall, the sedation success rate of Remimazolam Tosylate was not inferior to that of propofol for colonoscopy diagnosis and therapy. Hence, our data indicated that Remimazolam Tosylate was an efficient and safe drug in the sedation of colonoscopy diagnosis and treatment.

5698

The efficacy and safety of ciprofol versus propofol for deep sedation during colonoscopy: A phase III, multi-center, randomized, double-blind, non-inferiority trial

Junxiang L.[1], Xiao W.[1], Jin L.[1], Xia W.[1], Yunxia Z.[1]
[1]West China Hospital, Sichuan University - Chengdu (China)

Background and Goal of Study: Ciprofol (HSK3486) is a close analog of propofol,which acts on GABA receptors to induce sedation and general anaesthesia. We aimed to compare the efficacy and safety of ciprofol and propofol for deep sedation during colonoscopy.
Materials and Methods: A phase III, multi-center, randomized, double-blind, non-inferiority trial was performed at 17 sites in China.Participants were randomly assigned to receive ciprofol (0.4 mg/kg) or propofol (1.5 mg/kg). The primary outcome was the success rates of colonoscopy, and analysed by intention to treat and a margin of 8%. The secondary outcome included induction time (time to reach the MOAA/S ≤1 after administration of first dose of study medication); fully alert time (first 3 consecutive MOAA/S scores of 5 after end of the procedure); discharge time (time to readiness for discharge after the end of the procedure) and safety.The trial was registered at ClinicalTrials.gov with registration number NCT03674008.
Results and Discussion: A total of 289 eligible participants were underwent randomization. The success rates of colonoscopy in ciprofol group and propofol group was 100% and 99.2%, a difference of 0.8% (95%CI:-2.2~4.2) that did not exceed the predefined 8% margin.There was no significantly difference observed in induction time between the two groups(1.09±0.418 vs.1.13±0.416 min, p>0.05). Fully alert time was longer in ciprofol group (3.21±3.168 min) than that of in propofol group (1.83±2.019 min,p<0.001).Time to readiness for discharge was significantly longer in ciprofol group (7.23±3.198 vs.5.83±2.028 min, p<0.001). Although the fully alert time and time to readiness for discharge was statistically significant, the time to ready for discharge from end of the procedure in ciprofol group is still within 10 minutes, and this delay has been estimated as the minimal clinically important difference in patients undergoing colonoscopy. The overall rates of adverse events

(AEs) in ciprofol group and propofol group were similar (26.4% vs.23.8%, P> 0.05),and there were no severe AEs observed in both groups.The injection pain was less common in the ciprofol group as compared with propofol (5.4%vs. 50.8%, p<0.001), which may due to its stronger hydrophobicity and lower concentration of fat milk.
Conclusion: Ciprofol was non inferior to propofol in success rates of colonoscopy. There were no severe AEs in both groups,but more injection pain in propofol group.

5752

Quantitative assessment of Cytochrome C oxidase patterns in muscle tissue by the use of near-infrared spectroscopy (NIRS) in healthy volunteers

Verhaeghe C.[1], Lapage K.[2], Moerman A.[1], De Hert S.[1], Wouters P.[1]
[1]Ghent University Hospital - Ghent (Belgium), [2]General Hospital - Aalst (Belgium)

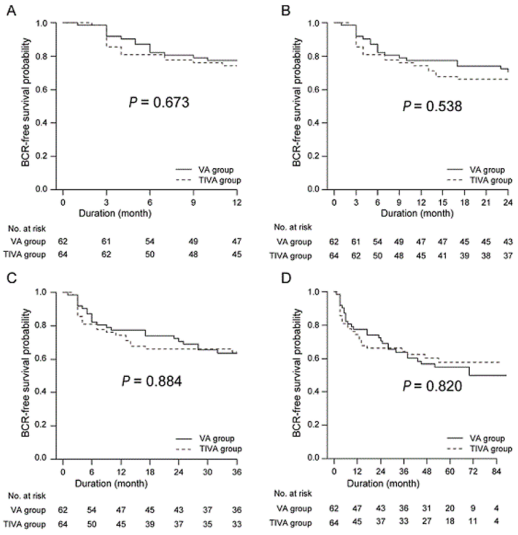
Background: Cytochrome C oxidase (CCO) acts as final electron acceptor in the respiratory chain and may provide information concerning intracellular oxygen consumption. CCO is a chromophore with an absorption peak in the near-infrared spectrum (NIRS) in its reduced, deoxygenated state. However, this absorption peak overlaps with deoxygenated haemoglobin (HHb) which is present in much higher concentrations(1). NIRO300 (Hamamatsu Photonics, Tokyo, Japan) measures the CCO signal but did not receive FDA approval for this use due to lack of independency of the measured CCO changes. In this study, we hypothesized that the NIRO 300 provides a HHb independent measurement of CCO concentration changes in the near-infrared spectrum.
Methods: In this single center randomized controlled trial in healthy volunteers, subjects were randomized to receive arterial occlusion to the left arm (n=5) and venous stasis on the right arm (n=5) or vice versa during 5 minutes. After a resting period of 30 minutes, the opposite to the former condition was applied to each arm. We placed the NIRO 300 optodes bilateral at the level of the brachioradial muscle. We designed the intervention as collecting NIRS data continuously during 1 minute of rest (baseline), directly followed by a 5 minute interval of arterial occlusion or venous stasis with a final interval for reactive hyperaemia and return to baseline. All NIRS data were time aligned to cuff release for data comparison. CCO was analysed using a generalized additive mixed model with HHb, Time and their interaction as independent variables, Subject and Side as nested random effects. A P value < 0.05 was considered statistically significant.
Results: The characteristics of the volunteers were comparable between both groups. We found a significant non-linear effect of HHb (p < 0.0001) and a temporal influence of the effect of HHb (p < 0.0001) on CCO measurements during arterial occlusion. For venous stasis, we found a significant non-linear effect of HHb (p < 0.0001) on CCO measurements. Elapsed time did significantly mediate the effect of HHb on CCO (p<0.0001).
Conclusion: We demonstrated that the measured CCO concentration changes are affected by the HHb concentration changes in the brachioradial muscle during two different blood flow alterations. Our results indicate that the NIRO300 may not be a reliable tool to monitor cellular hypoxia in a clinical setting
Reference:
1. Bale G, et al. J Biomed Opt. 2016; 21(9):091307.

5720

Volatile anesthetics versus propofol based total intravenous anesthesia on biochemical recurrence in patients undergoing robot assisted radical prostatectomy

Yoo Y. C.[1], Bai S. J.[1]
[1]Yonsei University College Of Medicine - Seoul (South Korea)

Background and Goal of Study: Recurrence after cancer surgery is a major concern in cancer patients. Growing evidence from preclinical studies has revealed that various anesthetics can influence the immune system in different ways. The current study compared the long-term recurrence of prostate cancer after robot-assisted radical prostatectomy (RARP) in terms of selection of anesthetic agents between propofol-based total intravenous anesthesia (TIVA) compared to balanced anesthesia with volatile anesthetics and remifentanil (VA).
Materials and Methods: We followed-up oncologic outcomes of patients who underwent RARP and had participated in two previous prospective randomized controlled trials, and compared outcomes of those who received TIVA (n = 64) to those who received VA (n = 64). The follow-up period was between November 2010 and March 2019.
Results and Discussion: TIVA and VA groups showed identical biochemical recurrence-free survival at all-time points after RARP (Figure 1). The predictive factors of prostate cancer recurrence were determined by cox regression as follows: colloid input (1.002, 1.000-1.003; P = 0.011), initial PSA level (1.025, 1.007-1.044; P = 0.006), and pathological tumor stage 3b (4.217, 1.207-14.735; P = 0.024), but not anesthetic agent (1.227, 0.660-2.283; P = 0.518). Propofol has been reported to have helpful immunomodulatory effects, and better survival has been reported after cancer surgery with TIVA than VA. However, other recent studies have shown different results regarding the influence of anesthetic agents on the recurrence of cancer, and different oncologic outcomes have been demonstrated depending on the type of cancer. This is the first study to compare oncologic outcomes after RARP in prostate cancer patients administered propofol-based TIVA or VA during surgery. In addition, a strength of this study is that we analyzed its 7-9 years' outcomes in patients who were randomly assigned to either propofol-based TIVA or VA groups.
Conclusion: Our findings demonstrate that the effects of propofol-based TIVA are comparable with those of VA with regards to postoperative recurrence in patients with prostate cancer.



5795

The effect of propofol on rat lung mesenchymal stem cell

Catalca S.[1], Ergil J.[1], Pınarlı F.[1], Saban M.[1]
[1]University Of Health Sciences Diskapi Yildirim Beyazit Training And Research Hospital - Ankara (Turkey)

Background and Goal of Study: Pulmonary diseases are an important cause of morbidity and mortality. Allogeneic lung transplantation is the only treatment for advanced chronic lung diseases. Because of insufficient number and tissue rejection, stem cell therapy will be the hope in lung diseases. Propofol is a frequently used agent in anesthesia practice. Propofol may be administered to patients with end-stage lung disease who are candidates for stem cell therapy due to the need for anesthesia or sedation. Therefore, the aim of our study was to investigate the cytotoxic / proliferative effect of propofol on lung mesenchymal stem cell (MSC).
Materials and Methods: With the permission of G.U.ET-18.003 from the local ethics committee of animal experiments; MSCs were isolated from the lungs of two Wistar Albino rats. In the second stage, these cells were transformed into adipocytes, chondrocytes and osteocytes, identified according to surface antigens in flow cytometry and they proved to be MSCs. Cells were placed in 32-well e-plates on the Xcelligence Reel Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well. The doses of propofol 25(n=6), 50 (n=9) and 100 µM (n=9) was applied. Normalized cell index (NCI) of propofol and control groups (n=3) were compared for cytotoxic proliferative effect at 6th, 24th, 48th and 72th hours. Statistical analysis was performed using SPSS 20.0 (Chicago, USA), p<0.05 was considered significant.
Results and Discussion: In our study, it was shown that propofol reduced the growth of cells compared to low doses (25 µM) when used at high doses (50 and 100 µM) and when used at 100 µM dose, it was cytotoxic to the cells at 24 hours but this effect was not seen at following times (Table 1).
Conclusion: Propofol can be used in anesthesia practice as a safe agent that does not affect the proliferation of MSCs in the lung. However, we recommend that propofol should be used in low doses because it has better cell proliferation values when used in low doses compared to high doses.

Table 1: Comparison of normalise cell index (NCI) of groups

	Group Control		Group P15		Group P50		Group P100		P
	NCI	SD	NCI	SD	NCI	SD	NCI	SD	
6th hour	0.978	0.010	0.990*	0.485	0.897	0.765	0.885*	0.656	0.031
24th hour	1.513'	0.735	1.687**^	0.108	1.347^	0.140	1.315**'	0.645	0.000
48th hour	1.778	0.129	2.489***^^	0.212	1.680***	0.150	1.645^^	0.148	0.010
72th hour	1.539	0.097	2.307****^^	0.274	1.499****	0.134	1.456^^	0.157	0.014

*p=0.008, ' 0.001, **0.000, ^0.001, ***0.005, ^^0.005, ****0.005, ^^^^0.005

5857

The effect of dexmedetomidine on rat lung mesenchymal stem cell

Ergil J.[1], Catalca S.[1], Pınarlı F.[1], Saban M.[1], Polat R.[1]
[1]University of health sciences diskapi yildirim beyazit training and research hospital - Ankara (Turkey)

Background and Goal of Study: Allogeneic lung transplantation is the only treatment today in chronic lung diseases. However, inadequate number of donors and tissue rejection are the major problems of this treatment. Stem cell therapy, which has started to be used in clinical practice in recent years, can be a hope for lung diseases. However, the effect of anesthetic agents on lung mesenchymal stem cells is not known. Dexmedetomidin, one of popular anesthetic agents, can be used in these population because of sedation, analgesia, anesthesia. The aim of our study is to investigate the effect of dexmedetomidine on lung mesenchymal stem cells which has never been investigated before.
Materials and Methods: With the permission of G.U.ET-18.003 from the local ethics committee of animal experiments; mesenchymal stem cells were obtained from the lungs of 2 newborn Wistar Albino rats, were producted in stem cell culture medium. Lung mesenchymal stem cells were differentiated to adipocyte, osteocyte and chondrocytes; surface markers were identified in flow cytometry, proving that these cells were mesenchymal stem cells according to International Society Cell& Gene Therapy (ISCT). Cells were placed in 16-well e-plates on the Xcelligence Reel Time Cell Analyzer (RTCA) (Roche, Germany) with 5000 cells per well and three wells per group (n:3). Dexmedetomidine was applied at doses of 0.1, 1 and 10 µM. Normalized cell index (NCI) at 6th, 24th, 48th and 72th hours were compared for cytotoxic/proliferative effect. Statistical analysis was performed using SPSS 20.0, p<0.05 was considered significant.
Results and Discussion: Dexmedetomidine did not affect proliferation of lung mesenchymal stem cells at all doses and durations used (Table 1).
Conclusion: Dexmedetomidine can be used safely in patients with chronic lung disease who will be candidates for mesenchymal stem cell therapy when have procedures need for sedation, analgesia and anesthesia.

	Grup Control		Grup D0.1		Grup D1		Grup D10		p
	NHİ	SD	NHİ	SD	NHİ	SD	NHİ	SD	
6th hour	0.978	0.011	0.835	0.059	0.849	0.064	0.831	0.099	0.075
24th hour	1.513	0.074	1.363	0.079	1.362	0.059	1.342	0.175	0.259
48th hour	1.778	0.129	1.801	0.110	1.853	0.043	1.888	0.242	0.804
72th hour	1.539	0.098	1.695	0.139	1.703	0.101	1.769	0.210	0.322

5847

Sevoflurane's primary metabolite hexafluoroisopropanol attenuates the inflammatory response in human effector and target cells, mediated by inhibition of NF-κB p65 translocation

Müller M.[1], Heinzelmann M.[2], Roth Z'Graggen B.[2], Schläpfer M.[1], Beck-Schimmer B.[1]
[1]University Hospital Zurich - Zurich (Switzerland), [2]University of Zurich - Zurich (Switzerland)

Background: Hexafluoroisopropanol (HFIP), the primary sevoflurane metabolite, is detected in blood samples of patients after sevoflurane anesthesia.1 Sevoflurane-mediated protection has been described decades ago, recently an immunomodulatory effect of HFIP has been demonstrated in septic rodents, attenuating inflammation and improving survival.2,3 Immunomodulation was not yet confirmed in humans and the mode of action has to be investigated. This study aimed to determine the impact of HFIP on inflammation in human blood samples, representing the effector cell compartment and to evaluate the interference with the inflammatory NF-κB pathway in human pulmonary microvascular endothelial cells (HPMEC) as target cells.
Methods: Blood samples from healthy volunteers were stimulated with LPS and treated with HFIP (4 and 8mM). Interleukine-6 (IL-6) as an important biomarker in the cascade of severe inflammation was determined. For NF-κB pathway analyses, HPMEC were stimulated with LPS and treated with 8mM HFIP. IL-6 was measured in cell supernatant. Cytoplasmic and nuclear proteins were harvested, and Western blots allowed quantifying phosphorylation of IKK-complex, degradation of IκBα, as well as nuclear transmigration of NF-κB. Results are expressed as relative values of the LPS treated samples. Means and standard deviation were calculated and one-way ANOVA and Dunnet post-hoc test were used to compare groups. Statistical significance was set at p<0.05.
Results: HFIP dose-dependently attenuated the LPS-induced inflammatory response in human blood samples (LPS vs. LPS+HFIP 4mM: 100±0 vs. 63±16%, p<0.001; LPS vs. LPS+HFIP 8mM: 100±0 vs. 17±9%, p<0.001). Likewise, the LPS-induced IL-6 expression was attenuated in HPMEC representing the vascular compartment (LPS vs. LPS+HFIP 8mM: 100±0 vs. 54±12%, p<0.001). HFIP accentuated the LPS-mediated phosphorylation of the IKK complex and degradation of IκBα, but impaired nuclear transmigration of the p65 subunit (LPS vs. LPS+HFIP 8mM: 100±0 vs. 44±17%, p<0.001).
Conclusion: This study shows a dose-dependent attenuation of a LPS-induced inflammatory reaction in human effector and target cells using HFIP. Moreover, our data reveal, that inhibition of NF-κB p65 transmigration might be the molecular mechanism responsible for HFIP-mediated protection.
References:
1. Kharasch ED, Anesthesiology, 1995.
2. Herrmann IK, PLoS One, 2013.
3. Urner M, Clin Exp Immunol, 2015.

5890

The alteration of mICAT in small intestinal myocytes by ketamine after X-ray coronary artery stenting

Dziuba D.[1], Melnyk M.[2], Dryn D.[2], Loskutov O.[3], Zholos A.[4]
[1]National Medical Academy of Postgraduate - Kyiv (Ukraine), [2]A.A. Bogomoletz Institute of Physiology - Kyiv (Ukraine), [3]Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine), [4]Taras Shevchenko National University of Kyiv - Kyiv (Ukraine)

Background and Goal of Study: Some of the unwanted frequent complications of surgical procedures are nausea and vomiting. Ketamine is an antagonist of glutamate NMDA receptors. However, ketamine has other multiple targets, among which there are TRPC4 channels coupled with muscarinic receptors (M2/M3 types) via G-proteins, activation of which initiates cholinergic excitation-contraction coupling in the small intestine. In our work, we demonstrate for the first time that clinically relevant concentrations of ketamine strongly inhibit both carbachol- and GTPγS-induced muscarinic cation current (mICAT) in mouse ileal myocytes with IC50 ~ 3 µM. We show that this action of ketamine is associated with altered mICAT deactivation kinetics and voltage-dependence, thus suggesting that ketamine inhibits G-protein signalling rather than muscarinic cation channels. Also, to determine the incidence of nausea and vomiting among patients, we have performed retrospective analysis of 60 cases of analgosedation in X-ray theater during coronary artery stenting with different anesthetic agents, including ketamine.
Materials and methods: To investigate the mechanisms of the inhibitory effects of ketamine on mICAT we have performed electrophysiological studies and calcium imaging using the calcium-sensitive dye, fura-2-AM in isolated mouse ileal myocytes.

The retrospective analysis of 60 cases of analgosedation in X-ray operation room during stenting of coronary arteries was done for 3 groups (20 patients in each group). Group #1 – Fentanyl 2 mkg/kg + Diazepam 3 mg/kg, Group #2 – Fentanyl 1,5 mkg/kg + Propofol 3-4 mg/kg, Group #3 – Fentanyl 1 mkg/kg + Propofol 2-3 mg/kg + Ketamine 0,3 mg/kg.
Results and Discussion: In ileal myocytes ketamine (100 μM) strongly inhibited both carbachol- and GTPγS-induced mICAT. The inhibition (IC50 of about 3 μM) was slow and practically irreversible. It was associated with altered voltage dependence and kinetics of mICAT. Ketamine abolished carbachol-induced calcium oscillations in fura-2AM loaded myocytes. The retrospective analysis showed that there were no incidences of vomiting in all groups, but there were cases of intra/postoperative nausea: group #1 – 5/5%, group #2 – 0/5%, group #3 – 15/10%.
Conclusion: Thus, intra and postoperative nausea in group #3 could be explained, at least in part, by the action of ketamine on small intestinal smooth muscles.

6058

The influence of low s(+) ketamine doses on electroencephalogram during total intravenous anesthesia

Araujo Lopes Junior L.[1], Rodrigues Nunes R.[1], Ferreira Cavalcante S. L.[1], Paixão Rodrigues L.[1], Labanca Delgado Perdigão R.[1], Da Silva Costa A.[1]
[1]Hospital Geral de Fortaleza - Fortaleza (Brazil)

Background and Goal of Study: S-Ketamine (SK) plays an important role in pain modulation in surgical patients. However, its intraoperative use may not validate electroencephalogram (EEG) anesthetic adequacy indices. This study aims to evaluate the EEG derived parameters: bispectral index (BIS) and electromyographic activity (EMG) in relation to varying doses of SK.
Materials and Methods: Forty patients, male and female, aged between 20 and 45 years, who underwent controlled effector site (eS) total intravenous anesthesia (TIVA), with BIS maintained between 45 and 55, before SK, were randomly assigned to 5 equal groups. In the control group k 0, the patients did not receive SK; k 1, k 2, k 3 and k 4 received SK in a 200 μg.kg-1 bolus iv, followed by continuous infusion of 100 μg.kg-1.h-1; 200 μg.kg-1.h-1; 300 μg.kg-1.h-1 and 400 μg.kg-1.h-1, respectively. In all patients in groups k1, k2, k3 and k4, 200 μg.kg-1 bolus SK was used. Eleven moments were evaluated in each group: M0 - before anesthetic induction; M1 - 10 minutes after anesthesia stabilization with BIS between 45 and 55 (with a target of 50); M2 - 3 minutes after SK; M3 -6 minutes after SK; M4 - 9 min after SK; M5 - 12 minutes after SK; M6 - 15 minutes after SK; M7 - 18 minutes after SK; M8 - 21 minutes after SK; M9 - 24 minutes after SK and M10 - 27 minutes after D. At all times the values of: BIS and EMG were noted. The electroencephalographic data obtained were analyzed using ANOVA for repeated measures and adjusted p-value for multiple comparisons by Tukey test, considering as significant, p <0.05. Results and Discussion: Comparing the mean values of BIS and EMG between all groups, in each moment, no significant changes were observed (p< 0.05). No studies evaluating low SK doses during TIVA eS controlled and its influence on BIS and EMG were found in the literature.

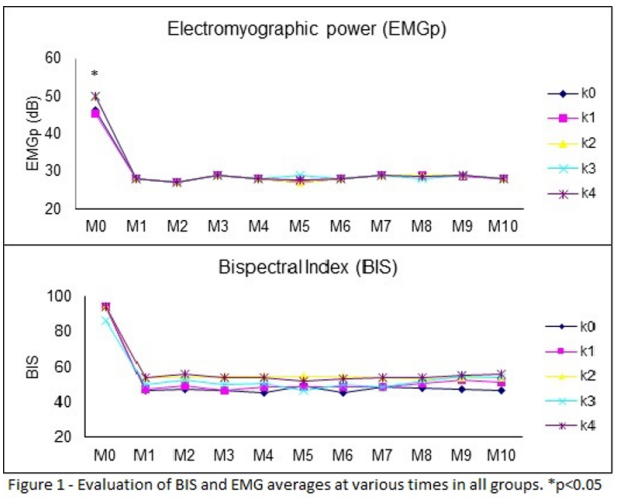


Figure 1 - Evaluation of BIS and EMG averages at various times in all groups. *p<0.05 between M0 and all other times. No statistical difference in intragroup analysis at each moment

Conclusion: Electroencephalographic parameters (BIS and EMG) can be used to assess anesthetic adequacy when this model of SK infusion and TIVA is observed.

4431

Postoperative pain and steroid pulse therapy affect oral intake after tonsillectomy for IgA nephropathy

Goto S.[1], Yamagata K.[1], Ashikari E.[1], Kouda H.[1], Ozaki M.[2]
[1]Ohkubo hospital - Shinjuku-ku, Tokyo (Japan), [2]Tokyo Women's Medical University - Shinjuku-ku, Tokyo (Japan)

Background and Goal of Study: Early oral intake after surgery is associated with a decrease in postoperative complications and shortened hospital stay. The aim of this study was to retrospectively examine the predictors of adequate oral intake after tonsillectomy for IgA nephropathy.
Materials and Methods: This study was a retrospective observational study conducted at a single institution, which was reviewed and approved by the Ethics Committee of Ohkubo Hospital, Public Health Corporation. We reviewed patients with IgA nephropathy who underwent tonsillectomy between January 1, 2014, and March 31, 2019. The patients were divided into two groups: the possible group (amount of oral intake after surgery was 60% or more) and the impossible group (less than 60%). The primary outcome was odds ratio (OR) with a 95% confidence interval (CI) between various patient factors and oral intake, assessed using logistic regression analysis ($p<0.05$ as the level of significance, calculated with the Benjamini-Hochberg method). Pain was evaluated with and without analgesics before initial intake after tonsillectomy.
Results and Discussion: A total of 293 patients (212 patients in the possible group and 81 in the impossible group) were reviewed. The insufficient initial intake after tonsillectomy was associated with the need for analgesic administration before initial intake [OR=2.28, 95% CI(1.24, 4.19), p=0.02] and steroid pulse therapy before surgery [OR=0.33, 95% CI(0.15, 0.74), p=0.02]. There was no correlation between initial oral intake and the incidence of postoperative nausea and vomiting (PONV) [OR=1.53, 95% CI(0.78, 3.01), p=0.22]. Pain was the most common reason for lack of intake (n=41, 50.6%), followed by unknown reasons (n=21, 25.9%), PONV (n=11, 13.6%), and unsatisfactory meal served (n=8, 9.9%).
Conclusion: After tonsillectomy for IgA nephropathy, weak postoperative pain and steroid pulse therapy before surgery had a positive effect on the initial oral intake. No significant difference between groups was observed in terms of the incidence of PONV, whereas some patients complained that PONV was the cause of poor dietary intake. Taken together, appropriate postoperative analgesic management and the prevention of PONV are necessary for early oral intake after tonsillectomy.

4677

An investigation of the association between perioperative blood transfusion and recurrence of pancreatic cancer after surgical resection

Lin K. J.[1], Chang K. Y.[1], Tsou M. Y.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan)

Background and Goal of Study: The controversial effects of perioperative blood transfusion on pancreatic cancer recurrence following surgery stem from shortfalls in analytic approaches of previous studies that failed to separate blood transfusion effects from other potential confounders. We utilized a retrospective cohort to investigate the effect of perioperative blood transfusion on cancer prognosis following pancreatic cancer resection.
Materials and Methods: We identified patients with stage I through III pancreatic cancer undergoing tumor resection at a tertiary medical center in Taiwan between January 2010 and December 2018 and then divided into transfusion and non-transfusion groups based on whether they received perioperative packed red blood cell (pRBC) transfusion or not. and evaluated through October 2019. Recurrence and patient death were collected from 286 patients with the median follow-up time of 14.5 months and 160 (55.9%) of them received red cell transfusion within 7 days of surgery. Postoperative disease-free survival and overall survival were measured using proportional hazards regression models with inverse probability of treatment weighting (IPTW) to balance observed covariates between the transfusion and non-transfusion groups. Restricted cubic spline functions were used to characterize dose-response effects of the amount of transfusion on cancer recurrence and mortality.
Results and Discussion: Perioperative pRBC transfusions were associated with increased risk of cancer recurrence (IPTW adjusted HR: 1.62, 95% CI: 1.18 – 2.23, p = 0.003) and all-cause mortality (IPTW adjusted HR: 1.63, 95% CI: 1.19 – 2.24, p = 0.002) after pancreatic cancer resections. Restricted cubic spline regression analysis disclosed a linear dose-response association between the amount of pRBC transfused and cancer recurrence but no specific dose-dependent relationship was identified between transfusions and death after cancer resection.
Conclusion: Perioperative blood transfusion was associated with worse prognosis after curative pancreatic cancer resection. Strategies aim to minimize transfusion requirements should be further developed.

5119

The Cancer and Anaesthesia study (CAN), an RCT of survival after propofol- or sevoflurane-based anaesthesia for cancer surgery. First results for breast cancer

Enlund M.[1], Cancer and Anaesthesia (CAN) study group
[1]Västmanlands Sjukhus Västerås - Västerås (Sweden)

Background and Goal of Study: Animal studies and a few retrospective human studies indicate that the choice of anesthetic may affect long-term-survival (1,2). This is however questioned for breast cancer (3). The aim is to investigate any difference in 1- and 5-year-survival between propofol and sevoflurane.
Materials and Methods: In the CAN study, adult patients scheduled for curative surgery of breast- or colorectal cancers are included. After informed consent, patients are randomised to either propofol- or sevoflurane-group in a 1:1-ratio. For pragmatic reasons, there are no protocol-specific restrictions regards concomitant therapy, thus, anaesthesia are maintained according to randomisation and otherwise according to standard institutional procedures at each site. Demographic data, oncological-, surgical- and anaesthesia related details are recorded in an electronic CRF. With 1,650 patients, a survival difference of 5 %-units may be detected with 80 % power and a P-value of <0.05. Another 115 more patients will give a reasonable safety margin for loss of patients or technical errors. Overall survival and time to progress are presented as Kaplan-Meier curves together with median survival time. The impact of factors related to anesthesia, the surgical procedure, oncological characteristics of the tumor, and adjuvant treatment are evaluated in regression analyses.
Results and Discussion: Of 1,765 patients included between December 2013 and September 2017, 1,757 remained for analysis, 887 in the propofol group and 870 in the sevoflurane group. Randomisation equalised all surgical- and oncological related variables, perioperative characteristics, demographics, and anesthesia related variables. Only the hypnotic used for anesthesia maintenance separated the groups. One-year-survival will be presented in the abstract.
Conclusion: This is the first results from the first RCT comparing the impact of propofol and sevoflurane on survival after cancer surgery.
References:
1. Enlund M, et al. Upsala J Med Sci 2014;119:251-61.
2. Wigmore TJ, et al. Anesthesiology 2015;124:69-79.
3. Yoo S, et al. Anesthesiology 2019;130:31-40.
Acknowledgements: The Swedish Research Council, The Regional Research Council in the Uppsala-Örebro Region, and The County Council/Region of Västmanland.

4377

A Case Report of Seizures During General Anaesthesia for Cervical Spine Surgery: Undetected Cerebrospinal Fluid Leak Leading to Intracranial Haemorrhage and Status Epilepticus

Lam S.[1], Yeo V.[1]
[1]Singapore - Singapore (Singapore)

Background: Cerebrospinal fluid (CSF) leak is a known complication of spine surgery, with an incidence of 0.3-1.3% in cervical spine surgery[1]. Symptoms range from mild (headache, vertigo) to potentially life-threatening (meningitis, intracranial haemorrhage[ICH]). Most publications[2]report intracranial events after emergence of general anesthesia(GA), hours-days post-procedure.We report a case of seizure during GA with status epilepticus secondary to ICH due to CSF leak,contributed by active drain suction.
Case Report: 78-year-old underwent C1-T2 posterior decompression for cervical myelopathy.After resuming supine position,he developed tonic-clonic seizures. Blood gas sampling ruled out metabolic causes. Surgical drain was found to be on active suction, with 400ml haemoserous fluid drained. Urgent CT brain showed acute bilateral ICH with decreased ventricles size. He developed status epilepticus requiring urgent co-management by Intensive Care,Neurosurgery and Neurology.
Discussion: Most reports describe intracranial events due to CSF leak hours-days post-procedure; we report a case of seizures during GA. Inadvertent creation of active drain suction likely contributed to CSF leak & intracranial hypotension, resulting in significant ICH and status epilepticus.Seizure activity may have been suppressed by higher doses of anaesthetics prior to turning supine. Observation of patient was obscured by drapes and body straps which restricted movement. High index of suspicion is required for intracranial events during spine surgery which can cause life threatening complications.
References:
1. Baird E.National trends in surgical treatment of degenerative C-spine disease. Global Spine J.2014;4:143-150.
2. Lee HY.Seizure&delayed emergence resulting from remote cerebellar hemorrhage after spine surgery.Korean J Anes.2012;63:270–3.
3. Sporns PB.Undetected Dural Leaks Complicated by Accidental Drainage CSF Lead to Severe Neurological Deficits.Rofo 2016;188(5):451-8.
Learning points: Initial signs of seizure were subtle and attributed to common causes: shivering,movement from decreased anaesthetic depth. Suspicions were only raised when seizures became more apparent. Careful monitoring of brain function waveforms may aid in more prompt diagnosis. Early diagnosis and management of intra-operative seizures is needed to prevent life-threatening neurological injury. Increased use of negative pressure drainage devices makes knowledge of potential harms crucial perioperatively[3].

4783

Involuntary muscle contraction after C-spine surgery

Wong Y. C.[1], Kuo P. H.[1], w[1]
[1]Hualien Tzu Chi General Hospital - Hualien (Taiwan)

Background: Myoclonus is a common medical sign of various diseases. To differentiate the cause of myoclonus at the spot is difficult. Here, we present a case of propriospinal myoclonus after cervical laminoplasty in the post-anesthesia care unit (PACU).
Case Report: A 70-year-old man with a diagnosis of ossification of posterior longitudinal ligament with myelopathy received cervical laminoplasty. He did not have a history of seizure but he experienced involuntary upper limb muscle contraction when he bent his head down. He took antihypertensive medication and pain killers before the surgery. All of his preoperative tests were within normal limits. General anesthesia was induced with propofol 200mg, fentanyl 100mcg, cisatracurium 10mg, and was maintained with sevoflurane. His hemodynamics was stable throughout the surgery. Neck collar was placed before emergence. He was extubated uneventfully and was transferred to PACU. In PACU, he developed jerky movement with alert consciousness. The jerky movements arise from upper limb initially and spread over the trunk and lower limb. It is a rhythmic flexion motion. Midazolam was given intravenously and jerky movements subsided as he was sedated. The jerky movements relapsed when he was alert or stimulated by pain or touch. Following brain CT showed neither intracranial hemorrhage nor other intracranial abnormalities. The clinical features of his jerky movements were likely to propriospinal myoclonus, which was originated from the spinal cord. Clonazepam was prescribed and no known of myoclonus relapsed before he was discharged. We proposed that the cause of propriospinal myoclonus might be induced by the mechanical rub of the ossified posterior longitudinal ligament on the cervical spinal cord.
Discussion: Generalized involuntary muscle contraction after the emergence of anesthesia is often treated as a seizure. Here, we emphasize the importance of past medical history and characteristics of muscle contraction for differential diagnosis before EEG and polymyography take place.
References:
1. M Kojovic,C Cordivari et al, Lee, J., et al.
Learning points: The characteristics of myoclonus varies with different causes. The leading cause of myoclonus in this case is myelopathy, but we should keep in mind that drug such as propofol, sevoflurane and high dose fentanyl has been reported to induce myoclonus. Benzodiazepine can resolve myoclonus. Clonazepam is the drug of choice for propriospinal myoclonus.

4850

Predictors of severity of Perioperative hypersensitive drug reaction (HDR): Retrospective Cohort study

Pradhan U.[1], Oofuvong M.[1], Karnjanawanichkul O.[1], Pakpirom J.[1], Ujal Pradhan, MD, Maliwan Oofuvong, MD, PhD, Orarat Karnjanawanichkul, MD, Jatuporn Pakpirom, MD, Department of Anesthesiology, Faculty of Medicine, Prince of Songkla University, Thailand.
[1]Faculty of Medicine, Prince of Songkla University - Hatyai, Songkhla (Thailand)

Background: Hypersensitive drug reactions (HDR) can lead to life threatening events, depending on their severity. However, predictors based study of the severity of HDR were rare. Hence, we examined the predictors of the severity of HDR for patients receiving anesthesia.
Methods and materials: Retrospective cohort study was conducted in patients of all age, who underwent anesthesia at a Tertiary care hospital, in Southern Thailand, between February 2015 to December 2018. Data were collected from the Hospital Information System. HDR were graded from 1 to 4. The suspected agents of HDR were evaluated by anesthesiologists and allergists. Patient, surgery and anesthetic factors were included as a potential predictor. Univariate and multivariate multinomial logistic regression was performed and presented as relative risk ratio (RRR) with a 95 % confidence interval (CI).
Results: The incidence of HDR was 3.4 per 1,000 (325 of 74,031 patients). The severity of HDR were grade 1 (72.9%), grade 2 (24%), grade 3 (3.1%) and grade 4 (0%). The most common symptoms were cutaneous symptoms (30.5%), hypotension (7.8%) and flushing (4.8%). According to the allergist, morphine, ceftriaxone and cefazolin were the most commonly suspected agents for grade 1, while cisatracurium, propofol and cefazolin were the most commonly suspected agents for grade 2 and 3. For the multivariate analysis, when compared to grade 1, the predictor of grade 3 were having rhinitis (RRR 12.37, 95%CI 8.94, 17.11), longer duration of anesthesia (RRR 1.0002, 95% CI 0.999, 1.004) and ASA 3 vs 1 (RRR 3.29, 95% CI 1.77, 6.11). The predictor for grade 2 HDR were older age (RRR 1.02, 95% CI 1.00, 1.04), history of a drug allergy (RRR 2.08, 95% CI 1.05, 4.11) and higher blood loss (RRR 1.0002, 95% CI 1.00, 1.0003) intraoperatively. The common predictor of grade 2 and 3 HDR were cardio-vascular-thoracic/ neurosurgery/ eye/ ear-nose-throat surgery, when compared with orthopedic and abdominal surgery (p=0.01). The combination of general and regional anesthesia reduced the risk of grade 3 HDR, compared to sole use of general anesthesia (RRR 0.69, 95% CI 0.62, 0.77).
Conclusion: Most patient risks (older age, history of allergic rhinitis, drug allergy) and anesthetic risk (higher ASA classification and longer anesthetic time) for severe HDR may be unpreventable. Avoiding cisatracurium, propofol and cefazolin are required in these high risk patients, so as to minimize the severity of HDR perioperatively.

4945

Perioperative anaphylaxis to patent blue dye: a case report

Pereira A.[1], Fernandes D.[1], Amorim A.[1], Fernandes L.[1], Mendonça M.[1], Zenha S.[1]
[1]Funchal central Hospital, Madeira, Portugal - Funchal (Portugal)

Background: Anaphylaxis is defined as a potentially fatal severe systemic reaction. Patent blue dye is often used perioperatively for sentinel ganglion biopsy in breast cancer and malignant melanoma. Hypersensitivity to the agent is rarely documented in adults and children1 and the diagnosis can be a challenge. We report an atypical case of anaphylaxis to patent blue dye with a late onset and a bifasic reaction in a patient undergoing breast tumorectomy and sentinel ganglion biopsy.
Case Report: 50 year old female patient, American Society of Anesthesiologists class 1, without previous allergic reactions. After 40 minutes since the retroareolar administration of 2.5 ml of patent blue dye 2.5%, the patient developed suddenly hypotension (74 / 39mmHg), tachycardia (111 beats per minute) and hypoxia (peripheral oxygen saturation of 87%). Additionally we noticed a blue coloration, that was more intense on the upper limbs and face, despite the absence of the typical blue plaques previously described in cases of patent blue allergy2. Only 3 hours after the exposure the patient developed cutaneous signs, highlighting the need for patient monitoring after an anaphylactic reaction, since biphasic reactions can occur.
Discussion: The diagnosis of patent blue anaphylaxis can be challenging due to the uncertainty of the mechanism, possible absence of blue urticaria, variability in clinical presentation and rare documentation. The hypothesis should be considered in the differential diagnosis of a perioperative allergic reaction whenever it is used, even in the absence of blue skin plaques. The medical and nursing team should be on alert and familiarized with this entity due to its variable clinical presentation.

References:
1. Mertes PM, Malinovsky JM, Mouton-Faivre C, et al. Anaphylaxis to dyes during the perioperative period: reports of 14 clinical cases. J Allergy Clin Immunol. 2008;122(2):348-352.
2. Maranhao MV, da Nobrega DK, Anunciacao CE, et al. Allergic reaction to patent blue dye in breast surgery - case report. Braz J Anesthesiol. 2016;66(4):433-436.
Learning points: Patent blue dye anaphylaxis is a rare condition and the diagnosis is a challenge to anaesthesiologists. The variable clinical presentation and late onset of sintoms/signs are factors that can difficult the diagnosis. Patent blue dye anaphilaxis should be considered in the differential diagnosis of perioperative allergic reactions whenever it is used.

5149

When things don't go your way, always remember to go back to A. - How a case of status asthmaticus can turn out to be a tube obstruction

Risberg E.[1], Pellegrini M.[1], Hannerz-Schmidtke E.[1], Kollmann Camaiora A.[1]
[1]Akademiska Sjukhuset - Uppsala (Sweden)

Background: Epiglottitis involves swelling of the epiglottis and supraglottic larynx. Depending on severity, different support strategies accompanies antibiotic treatment: from clinical observation to tracheal intubation or tracheostomy1,2,3.
Case report: A 34 y.o. man with a medical history of asthma was diagnosed with epiglottitis. The ENT examination showed edematous uvula, gum bows and epiglottis. The patient was considered to have a threatened airway and transferred to the ICU for awake nasal intubation by an ENT-specialist (uneventful with an Ivory PVC tube (smiths medical). After tube positioning was confirmed by bronchoscopy, the patient presented severe signs of airway obstruction with a tendency to desaturation and an obstructive auscultatory pattern together with high intrinsic-PEEP, high resistance and high peak pressures. The initial treatment included repeated inhalations of anticholinergic and beta2-agonists, inhaled adrenaline was also tested. Ventilator settings were optimized with increased expiratory time and optimal PEEP. A multimodal approach with theophylline, ketamine, steroids and terbutaline was applied. However, due to the high pressures and intrinsic PEEP the patient developed a tension pneumothorax which needed acute decompression. Heliox-based ventilation was started and the ECMO team consulted. During the positioning of the nasogastric tube with the aid of a laryngoscope, massive airway swelling compressing the tracheal tube was noted. The jaw lift maneuver helped reduce the tube obstruction and considerably decreased the ventilator pressures. A tracheostomy was performed and in the end the patient made a full recovery.
Discussion: Anaesthesiologists consider tracheal intubation to be a secure airway, however, in this case, all the signs were interpreted as status asthmaticus instead of tube obstruction. This lead to a delay in decision-to-tracheostomy in a moment of critical instability. There is still a debate on tracheal intubation vs tracheostomy in epiglottitis, with tracheostomy being cheaper but at the expense of more complications and longer sick leaves3.
References:
1. Oh´s intensive care manual, seventh edition.
2. Laryngoscope 1998;108:64–69.
3. Eur Arch Otorhinolaryngol 2019;276:3173-77.
Learning points: "When things don't go your way, always remember to go back to A", even if you think you have a secure airway. Do not get locked into one diagnosis early, even if the patients' medical history points a certain way.

5221

Unexpected coma in a patient with Parkinson's Disease following general anaesthesia

Barbosa T.[1], Jantarada C.[1], Guimarães L.[1]
[1]Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Parkinson's disease (PD) is a disorder of the central nervous system and these patients represent a particular anaesthetic challenge (1,2).
Case Report: A 65 years old male with PD under carbidopa/levodopa (25mg/100mg) five times daily was scheduled for an inguinal hernia repair surgery. He had light bradykinesia of the limbs, slow walking, dystonia of the toes and unpredictable off periods. The patient received his usual medication orally in the morning of the surgery. The surgery took 3 hours and when anaesthesia was discontinued the patient quickly started spontaneous ventilation, opened his eyes but failed to demonstrate any facial movements or any response to direct commands and presented a severe hypotonia of the limbs. He had no response to pain or any verbal or motor response. Possible diagnoses were a delayed emergence of anaesthesia, a stroke leading to a locked-in syndrome or an off-syndrome. CT scan was negative for acute cerebrovascular events and 300 mg of levodopa was given through a nasogastric tube. Over the next minutes, he showed progressive improvement in responsiveness to questions and in muscular tone. Levodopa administration was continued every 3hours and at the end of the day he was already able to speak by gestures and move with a light bradykinesia.
Discussion: Levodopa is an effective drug to treat motor symptoms of PD and to prevent an acute exacerbation it should be used until the day of surgery (1-3). This patient received his usual medication in the morning of the surgery, but an unforeseen delay lead to a prolonged time without administration of additional doses. The patient emerged from the anaesthesia with a GCS of 3 which was reversed with the administration of Levodopa via nasogastric tube. There are no prior reports of a comatose state with hypotonic muscle tone, expressionless facies and unresponsiveness to verbal command in these patients.
References:
1. Considerations for general anaesthesia in Parkinson's disease; J Clin Neurosci; 2018.
2. Perioperative management of patients with Parkinson's disease; Am J Med; 2014.
3. Parkinson's disease and anaesthesia BJA Educ; 2002.
Learning points: Off-syndrome in patients with PD is expectable if the timing of levodopa dose is not adjusted properly and symptoms usually improve with administration of Parkinson's medication. Minimize drug interruptions and place a nasogastric tube for additional doses may be helpful to prevent exacerbation of PD symptoms.

5331

A strange cause of intraoperative desaturation

Gonzalez Carranza J. E.[1], Calvo A.[1], Solchaga I.[1], Varela Garcia O.[1], Fernandez Riveira C.[1], Cruz P.[1]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Platypnea-Orthodeoxia Syndrome (POS) is a rare clinical entity characterized by dyspnea and arterial desaturation from supine to an upright position. The pathophysiology of POS remains unclear1. We present a case of POS during the intraoperative period.
Case Report: A 54-year-old man with previous history of hypertension, obesity and alcoholic liver disease was diagnosed of esophageal carcinoma with a pericardial fistula, resulting in pericardial and bilateral pleural effusion. A pericardial window and a palliative esophageal prothesis placement were performed urgently. The surgery proceeded without any incident but before emergence, when incorporating the patient to the upright position, he experienced sudden desaturation up to 80%, which reverted spontaneously when the patient was placed back to the supine. Technical and obstructive causes of hypoxemia were ruled out by inspection, examination, X-ray and bronchoscopy. However, episodes of desaturation persisted in the upright position every time the maneuver was repeated. Due to the absence of pathological findings and the hemodynamic stability, the patient was extubated without incidents.
Discussion: All causes of hypoxemia improve with an increase in oxygen inspired fraction except low cardiac output and shunt. The most frequent cause of POS is the presence right-to-left shunt (RTLS) through a permeable oval foramen (POF) followed by hepatopulmonary syndrome1. POS requires the presence of an anatomical component that allows the passage of deoxygenated blood to the systemic circulation, and a functional component, responsible for RTLS through the anatomical defect. The functional component may be due to intracardiac, extracardiac or miscellaneous etiologies. It has been suggested that upright position would increase the RTLS by favoring the emptying of left cavities, decreasing the compliance of the right ventricle and redistributing the flow from the inferior vena cava through the anatomical defect. The certainty diagnosis is based on the echocardiogram with bubble study and the treatment depends on the underlying cause.
References:
1. The multiple dimensions of Platypnea-Orthodeoxia syndrome: A review. Abhinav Agrawal, MD, Atul Palkar, MD, Arunabh Talwar, MD FCCP. Respiratory Medicine 2017; 129:1-38.
Learning points: In the presence of dyspnea or desaturation in upright position not justified by other causes, POS should be considered. It may be a priority to rule out a POF.

5355

The different strategies of fluid infusion therapy affect the development of postoperative pulmonary complications regardless of the surgery risk

Klygunenko O.[1], Kravets O.[1], Volkov O.[1]
[1]State Establishment 'Dnipropetrovsk Medical Academy of Health Ministry of Ukraine' - Dnipro (Ukraine)

Background and Goal of Study: Postoperative pulmonary complications (PPC) occur in 5-70% of cases in surgical patients and are accompanied by significant short-term and long-term mortality. The aim of our study is to reveal relationship between the frequency of PPC, the surgical risk extent in different infusion therapy patterns in patients with acute abdominal pathology.
Materials and Methods: Having agreed with the local Ethics Committee and obtained the informed consents, 200 patients with acute abdominal pathology, prescribed for urgent open surgery, were examined. Patients were randomized into groups regarding to surgical risk (P-POSSUM scale) and volume modes: MR-R (n=50) – medium risk, restrictive volume resuscitation; MR-L (n=50) – medium risk, liberal volume; HR-R (n=50) – high risk, restrictive volume; HR-G (n=50) – high risk, goal-directed volume. All groups were similar in relation to gender, age, weight, physical status (ASA II-III). Changes of the body's water spaces were performed by noninvasive integral impedance method. The fluid accumulation in the extravascular pulmonary space (EPS) was assessed by ultrasound (US). Postoperative pulmonary complications (PPC) were verified by clinical, laboratory and radiological data. Data are presented as mean±SD or % patients with parameters. Mann-Whitney U test was used for statistical analysis, $p<0.05$ was considered as statistically significant for comparison between groups.
Results and Discussion: PPC were found in 10.5% of all cases generally. Pneumonia with a frequency of 80.9% was the main cause of complications. Postoperatively, the liberal volume regimen was accompanied by an increasing in the interstitial volume by 159% ($p=0.02$), with moderate fluid accumulation in the EPS (0.86, $p=0.04$), and it correlated with 16% of PPC (0.79, $p=0.002$). In the groups with restrictive volume regimen were found the absence of interstitial edema and normal US lung picture. The frequency of PPC was up to 6% (medium surgical risk) and 10% (high surgical risk). Goal-directed volume therapy led to interstitial volume increasing during the first 24hrs, moderate fluid accumulation in the EPS up to 3 days, and had association with 10% of the PPC after surgery.
Conclusion: In patients with acute abdominal pathology, the perioperative volume load should be restrictive regardless of the surgery risk. Goal-directed infusion requires further study in this group of patients.

5356

A rare case of thyrotoxicosis in patient with ovarian struma 34 years after total thyroidectomy

Videc Penavic L.[1], Vuletic Brletic A.[1], Klican-Jaic K.[1], Pesic M.[1], Horvat A.[1], Krolo Videka H.[1]
[1]Clinical hospital Sestre Milosrdnice - Zagreb (Croatia)

Background: Ovarian struma is extremely rare (1% of all ovarian tumors), with incidence of thyrotoxicosis about 8%1. Presentation of thyrotoxicosis varies, being especially complex in cases of preexisting comorbidity which can be aggravated, or even caused, by unrecognized thyroid hormone excess. Perioperative approach to the thyrotoxic patient is very challenging for anesthesiologist, especially in case of previous cardiac dysfunction2.
Case Report: A 68 year old female patient with hypertensive diastolic heart dysfunction and atrial fibrillation was admitted to hospital with acute heart failure. She was already scheduled for surgery for recently diagnosed ovarian tumor with very high levels of fT3 and fT4, but postponed by anesthesiologist because of severe thyrotoxicosis, assumed both iatrogenic and endogenic. Substitutional levothyroxin therapy was started after total thyroidectomy 34 years ago, with no endocrinologic controls. After successful treatment with thiamazol and propranolol, laparoscopic procedure was performed. Pleural effusions were drained preoperatively, arterial and central venous lines were inserted. General anesthesia was induced with propofol, sufentanil and rocuronium, maintained with sevoflurane. Anesthesia, surgery and postoperative period were uneventful.
Discussion: Thyrotoxicosis is state of thyroid hormone excess with variety of causes, manifestations and therapies. Ovarian struma is extremely rare cause of thyrotoxicosis or thyroid storm, which is a life threatening clinical syndrome with 30% mortality. Administration of thyrostatics, beta blockers and corticosteroids is crucial for control of symptoms and intraoperative hemodynamic stability. There are no studies about optimal type of anesthesia. Anesthesiologist's plan is much more than choice of anesthesia, it must include algorithm for possible intraoperative complications and postoperative management.
References:
1. Roth LM at al. The enigma of struma ovarii.Pathology.2007;39:139.
2. Furman WR at al. Anesthesia for patients with thyroid disease and for patients who undergo thyroid or parathyroid surgery.UpToDate (Feb2019).
Learning points: In case of thyrotoxic patient with numerous comorbidities, careful preoperative multidisciplinary approach with optimisation of hormonal status, cardiovascular and sympathetic symptoms is equally important as intraoperative anesthesia management. Surgery should be delayed until euthyreosis is achieved and patient condition optimised.

5198

Does low-flow anesthesia reduce emergence agitation in adult women? A prospective, randomized, clinical study

Demir G.[1], Tas Tuna A.[2], Kocayigit H.[3], Erdem A. F.[2]
[1]Sakarya University Training and Research Hospital Department of Anaesthesiology - Sakarya (Turkey), [2]Sakarya University Faculty of Medicine Department of Anaesthesiology - Sakarya (Turkey), [3]Sakarya University Training and Research Hospital Department of Anaesthesiology - Sakarya (Turkey)

Background and Goal of Study: It's known that low-flow anesthesia (LFA) technique has many advantages. In this prospective study, we aimed to determine whether LFA has an effect on emergence agitation (EA) in the post-anesthesia care unit (PACU) in women underwent laparotomic gynecologic surgeries.
Materials and Methods: After receiving approval, 64 female patients who scheduled for elective laparotomic gynaecologic surgery requiring general anesthesia were enrolled in this prospective, randomised study. Patients were randomly divided into two groups as Group 2 (n = 32) and Group 0.5 (n = 32). General anesthesia was administered using a standardised protocol for all patients in both groups. At the beginning of anesthesia fresh gas flow (FGF) rate was set at 4 L/min in both groups When all patients reached 1 MAC of sevoflurane (AbbVie Inc.), then FGF was reduced to 2 L/min in Group 2 and 0.5 L/min in Group 0.5. Sevofluran concentration adjusted to 1-1.1 MAC during througout surgery. Vapor was closed in Group 0.5, 15 min before and in Group 2 end of the operation. At the end of the surgery FGF was increased to 4 L/min. All patients were extubated when the TOF ratio was > 90%. Emergence agitation was assessed by using Riker Sedation-Agitation Scale (SAS) at the PACU at 5th, 10th, 20th and 30th minutes (4: calm and cooperative, >4: presence of agitation, <4: presence of sedation).
Results and Discussion: Emergence agitation was observed in 5 patients in the PACU. There was no significant difference between two groups. At the all evaluation times, the number of patients with SAS=4 was significantly higher in group 0.5 than group 2 and the number of patients with SAS<4 was significantly higher in Group 2 than Group 0.5 (p>0.05). In the literature, there is no study that is demonstrating the effects of low flow anesthesia on emergence agitation in adult patients. It is known that awakening agitation in pediatric patients is associated with rapid redistribution of inhalation anesthetics from the brain(1).
Conclusion: In our study, we didn't find any statistically significant difference between the groups about emergence agitation. However the presence of higher number of patients who are calm and cooperative in the PACU in LFA may be related with slower redistribution of volatile anesthetics from brain.
References:
1. Paediatr Anaesth 2000;10:419-24.

5368

Comparative effects of Propofol, Sevoflurane, or Desflurane on Postoperative Pulmonary Complications for Lung Resection Surgery: a randomised clinical trial

Li X.[1], Yu H.[1]
[1]West China Hospital of Sichuan University - Chengdu (China)

Background and Goal of Study: It is controversial about pulmonary-protective and immunomodulatory property of volatile anesthetics in patients undergoing lung surgery, especially during the one-lung ventilation. The effect on pulmonary outcome is yet undetermined. We hypothesized that volatile anesthesia is superior to intravenous anesthesia regarding postoperative complications in patients undergoing lung surgery.
Materials and Methods: Patients scheduled for lung surgery with one-lung ventilation were randomly assigned to one of three parallel arms to receive propofol, sevoflurane, or desflurane as general anesthetic. The outcomes include postoperative pulmonary complications (PPCs, defined following the ARISCAT study) and major postoperative complications classification (according to the Clavien-Dindo score).
Results and Discussion: The three groups had similar demographics, disease and intraoperative characteristics. Of 837 screened patients, 504 were randomized and 495 were analyzed, with 163 in the propofol group, 165 in the sevoflurane group, and 167 in the desflurane group. There was no difference in PPCs incidence between patients in the propofol groups and the volatile group (34.3% in propofol, 33.9% in sevoflurane, and 33.5% in deflurane, p=0.99). The Clavien-Dindo score did not differ significantly across groups.
Conclusion: No difference between the three anesthetic regimens was evident. Compared with the propofol, volatile anesthetics had no benefit in the pulmonary protection for the patients undergoing lung surgery.

5379

Kounis syndrome after sugammadex administration

Pérez Hernández A. I.[1], Liberal Sarnago P.[1], Martín Vizcaíno M. P.[1], Monteagudo Moreno L.[1], Ortiz Martín I.[1], Salvador Bravo M. J.[1]
[1]Complejo Hospitalario de Navarra - Pamplona (Spain)

Background: We present a case of Kounis syndrome (KS, "allergic angina syndrome") after sugammadex administration. Informed consent of the patient for the publication of this case was obtained.
Case Report: A 70-year-old woman with no remarkable medical history or preoperative examinations findings was admitted for surgical intervention (acute apendicitis). General anaesthesia was induced and intraoperative course was uneventful. When the surgical procedure finished sugammadex was given and the patient was extubated. Few minutes later we found a sudden ST depression in lead V5, low blood pressure, signs of hypoperfusion and tachycardia. Patient was reintubated and perfusion of norepinephrine was initiated. We performed a transthoracic echocardiogram in which good cardiac contractility was observed; by this time the ECG had return to normal. Skin redness was observed when normal hemodynamic returned. The patient was moved to PACU with norepinephrine perfusion at 0,4 ug/kg/min. About one hour later she was normally extubated. Intradermal allergy tests obtained a positive result to sugammadex.
Discussion: KS has been related with a wide range of drugs. Sugammadex is commonly used in general anaesthesia with an estimated incidence of allergic reactions of 0.04%. Diagnosis of KS can be challenging in the surgical context because there are many drugs administered in short time, patients are unable to refer their symptoms and clinical signs may be hidden. Actually there are no clinical guidelines to treat KS. It is necessary to treat the acute myocardial infarction and also the anaphylactic reaction. After the acute clinical presentation all patients must be evaluated by an allergist doctor.

References:
1. Kounis NG. Kounis syndrome: an update on epidemiology, pathogenesis, diagnosis and therapeutic management. Clin Chem Lab Med 2016;54(10):1545-1559.
2. Sidi A. Anesthetic drugs and Kounis syndrome. J Clin Anesth 2008;20:563-564.
3. Kerai S, Sehrawat L, Saxena KN, Taneja B. Occurrence of Kounis syndrome under anesthesia. J Anaesthesiol Clin Pharmacol 2017;33(2):276-277.
Learning points:
Sugammadex can cause acute coronary symptoms by allergic mechanisms. It is important to keep patients monitored and evaluate development of reactions when neuromuscular blockade have been reversed. A high suspicion index for KS can lead to a faster treatment.

5439

Iatrogenic scrotal pneumatocele with severe bradycardia and hypotension as a complication of TAPP hernioplasty: a case report

Carrillo-Alfonso N.[1], Santos T.[2], Gouveia A.[2], Lares A.[2]
[1]Centro Hospitalar e Universitário do Algarve, EPE - Hospital de Faro - Faro (Portugal), [2]Centro Hospitalar e Universitário do Algarve, EPE - Hospital de Faro - Faro (Portugal)

Background: Transabdominal preperitoneal (TAPP) hernioplasty is one of the possible approaches to laparoscopic hernia surgical repair. This case reports a unique iatrogenic surgical complication of this technique: scrotal pneumatocele (air in the scrotum) with severe hemodynamic effects.
Case Report: A 42-year-old male, ASA II, previous smoker otherwise healthy, with no known allergies, underwent a programmed hernioplasty with transabdominal preperitoneal approach under balanced general anesthesia. During surgery, sudden severe bradycardia and hypotension occurred, being successfully treated with 0,5 + 0,5 mg of Atropine. While searching for possible causes, the anesthesia team found beneath the surgical drapes that an exuberant scrotal pneumatocele had been formed. Other causes for the bradycardia were excluded, such as sudden hypovolemic shock, hypoxemia, and electrolyte abnromality. After the patient was hemodynamically stabilized, the surgery continued without other difficulties. In the end, and with disinflation of pneumoperitoneum, scrotal pneumatocele disappeared without any scrotal complaints during the postoperative period.
Discussion: This case shows scrotal pneumatocele as an iatrogenic complication of TAPP Hernioplasty not described before in the scientific literature. Excluding other possible causes, bradycardia and hypotension were attributed to hypervagotonia due to a secondary parasympathetic reflex caused by air in the scrotum. Although not having any postoperative consequences, the iatrogenic scrotal pneumatocele caused severe intraoperative hemodynamic adverse effects that could have put the patient's life at risk.
References:
1. Doyle, D.J. & Mark, P.W.S. Can J Anaesth (1990) 37: 219. https://doi.org/10.1007/BF03005473.
2. Çakmak E, Koyuncu A, Yilmaz A, Yönem Ö, Ataseven H, Sarkiş C. Iatrogenic pneumoscrotum after colonoscopy. Turkish J Gastroenterol. 2011;22(4):443-444. doi:10.4318/tjg.2011.0296.
3. Cochetti G, Barillaro F, Cottini E, et al. Pneumoscrotum: Report of two different cases and review of the literature. Ther Clin Risk Manag. 2015;11:581-587. doi:10.2147/TCRM.S77326.
Learning points:
The anesthesiology team should be always aware of possible complications under the surgical drapes. Scrotal pneumatocele can be an iatrogenic complication of hernioplasty by TAPP technique, which can have severe intraoperative adverse effects.

5513

Challenges in the intraoperative diagnosis of Malignant Hyperthermia versus other hypermetabolic states: Case report

Tabatabaian Kheirkhah N.[1], Soriano Cosculluela E.[1], Choza De Juan C.[1], Bueno Rey L.[1], Santé Serna L.[1]
[1]Clinico San Carlos - Madrid (Spain)

Background: Malignant hyperthermia syndrome is a rare family myopathy, which appears as a skeletal muscle hypercatabolic syndrome linked to anesthesia and may prove fatal if effective treatment is delayed. However there are other medical conditions such as acute sepsis that may mimic this hypermetabolic state and hinder a prompt diagnosis.
Case Report: We report a case of a 51-year-old male without history of previous general anesthesia or relevant medical history that underwent an arthroscopic knee washout due to septic arthritis. Insertion of a laryngeal mask airway after induction with propofol and fentanyl resulted in adequate ventilation. Anesthesia was maintained by sevofluorane and oxygen. After 45 minutes of induction when articular debridement was mostly finished and before tourniquet cuff was released a drastic elevation in end-tidal carbon dioxide was noted (first arterial gasometry showed PaCO2 > 115 mmHg), and several possible causes for this elevation were subsequently ruled out. A presumptive diagnosis of malignant hyperthermia was made when the patient exhibited tachycardia and temperature increase (38,8 Cº). Immediately malignant hyperthermia protocol was initiated, sevofluorane was suspended and early administration of dantrolene helped in hemodynamically stabilizing the patient. The patient later recovered in the intensive care unite, where he was treated for the bacteria that grew in joint fluid.
Discussion: Malignant Hyperthermia is an uncommon condition without specific clinical features. Sepsis shares clinical symptoms that resemble malignant hyperthermia. However, in an acute situation, with the knowledge that untreated malignant hyperthermia is life threatening, patients with clinical suspicion of malignant hyperthermia, even with signs of sepsis or uncertain diagnosis, should be treated as such. Early administration of dantrolene is the cornerstone in malignant hyperthermia treatment, which can also be useful in other non-specific hyper metabolic medical condition.
References:
1. Glahn, K. P. E., Ellis, F. R., Halsall, P. J., Müller, C. R., Snoeck, M. M. J., Urwyler, A., & Wappler, F. (2010). Recognizing and managing a malignant hyperthermia crisis: guidelines from the European Malignant Hyperthermia Group. British journal of anaesthesia, 105(4), 417-420.
Learning points: Highlight the need of an early intervention considering the difficulty to clinically differentiate MH and sepsis during surgery.

5537

Complication of laparoscopic surgery: a case of carbon dioxide embolism

Viana P.[1], Dias R.[2], Moreira Z.[2]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal), [2]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Laparoscopic surgery has many known benefits, however it also has associated risks due to physiologic changes in response to pneumoperitoneum, extreme positioning, systemic carbon dioxide (CO2) absorption and gas embolism.1 Case report: A 70-year-old woman, ASA physical status class 2, was admitted for elective laparoscopic right hepatic lobectomy due to colorectal cancer metastasis. She was submitted to radiotherapy and chemotherapy with significant tumor regression. Pre-operative physical examination and analytical study showed no pathological findings. An intravenous general anesthesia under ASA standard, invasive blood pressure, BISTM, StarlingSV and neuromuscular blockade monitoring was conducted. Consecutive arterial blood gases were performed without significant changes. Two hours after pneumoperitoneum insufflation, we observed a sudden increase in end-tidal CO2 from 32 to 56mmHg and a drop of medium blood pressure from 112 to 48 mmHg. Fraction of inspired oxygen (FiO2) was increased to 100% and the findings rapidly reverted. Arterial blood gas analysis with a FiO2 68% revealed a pH 7,296; paO2 237 mmHg; paCO2 45.4 mmHg and HCO3- 26.2 mmol/L. The procedure and pos operative period were uneventful.
Discussion: The clinical findings were read as CO2 embolism. This complication is rare (incidence 0.0014-0.6%) but potentially fatal1. CO2 is highly soluble on blood and rapidly eliminated in the pulmonary vasculature. Clinical manifestation of CO2 embolism depends on the amount and celerity of gas entering the venous system. Air embolism causes increased dead space, ventilation/perfusion mismatch, hypoxemia and hypercapnia. As it increases pulmonary artery pressure and right ventricular afterload, it leads to decreased venous return, left ventricular preload and cardiac output, which may culminate in to cardiovascular collapse. Treatment includes immediate release of the pneumoperitoneum, FiO2 100%, fluid therapy,

inotropic support and insertion of a central venous catheter for gas aspiration. Furthermore, trendelenburg and left lateral decubitus should be adopted.
Learning Points: The key to successful management of patients with CO2 embolism lies on early recognition, knowledge of therapeutic options and their prompt execution.
References:
1. Naveen A,et al.Near Fatal Carbon Dioxide Embolism during Laparoscopy and its Successful Aspiration Using Ultrasound Guided Catheter.J Anest & Inten Care Med.2016;1(3):555564.

5702

Anaphylactic reaction in a patient undergoing laparoscopic oophorectomy

Gregório M.[1], Fonseca J.[1], Macedo I.[1]
[1]Centro Hospitalar de Leiria - Leiria (Portugal)

Background: The incidence of anaphylaxis in the perioperative period is 1:4000 to 1:250001. Various mechanisms cause activation of mast cells and basophils which in turn release inflammatory mediators leading to the onset of clinical features potentially life-threatening. This case ilustrates the anesthethic management of a anaphylatic reaction during anaesthetic induction.
Case Report: A 22 year old female of ASA physical satus class 1 was schedule for laparoscopic oophorectomy. Before anaesthesia induction 2 g of cefazolin and 500 mg of metronidazole were administrated. Anaesthesia was induced with midazolam, droperidol and fentanyl at which time the patient complaint about mild nausea. Induction continued with propofol and rocuronium. At this time, the patient developed labial and periorbital swelling with cardiovascular collapse (BP 35/17 mmHg and HR 150 beats min-1). Endotracheal intubation was performed and she was treated with i.v. voluven, ephedrine and amiodarone. This restored cardiovascular stability within 20 min. Surgery was performed and at the end the patient was successfully extubated, although some labial and periorbital edema were still present, for which clemastine was administrated. Blood was withdrawn for histamine and tryptase measurements and an immunoallergology appointment scheduled. She had no complaints after anaesthesia emergency and after three days went home.
Discussion: Perioperative anaphylaxis tends to be severe and has a higher mortality rate than anaphylaxis occurring in other settings, partly because to factors that impair early recognition. Diagnosis is presumptive based on clinical signs and the timing of the reaction in relation to the drugs administered. Antibiotics and neuromuscular blocking agents are the most common triggers2. Although different from the case described the cornerstones of treatment are adrenaline and i.v. fluids. Histamine and tryptase levels should be measure and referral to an allergy specialist for definitive diagnosis2.
References:
1. doi: 10.4103/0259-1162.108286.
2. doi: 10.1016/j.bjae.2019.06.002.
Learning points: Anaphylactic reactions are important causes for perioperative morbidity and mortality; Prompt diagnosis and treatment are crucial for the successful management of anaphylaxis; All patients should measure histamine and tryptase levels and be follow up, so the culprit drug and safe alternatives are identified, thus ensuring patient safety during future anaesthetics.

5886

Myoclonic Jerks Post General Anaesthesia — A Case Report

Chee M.[1], Ong S.[1]
[1]Singapore General Hospital - Singapore (Singapore)

Case Report: A 29-year-old Male with no medical history and a previous uneventful general anaesthetic (GA), presented for a knee meniscus repair. GA was induced with intravenous (IV) propofol 200mg and fentanyl 50mcg. IV cefazolin 2g was given for antibiotic prophylaxis. A laryngeal mask airway was inserted, and GA was maintained with sevoflurane and oxygen/air mixture. Surgery proceeded uneventfully. IV morphine 6mg and paracetamol 1g was given for analgesia. Anti-emetics included IV ondansetron 4mg and dexamethasone 8mg. Upon awakening, he had involuntary jerking movements of his head, torso and upper limbs, occurring 2 to 3 times every few minutes. Each episode lasted a few seconds. These movements were not distractible, choreiform, nor dystonic in nature. There was accompanying myalgia, but no slurred speech, aura, photophobia, neck stiffness or diplopia. He was conscious and aware of the jerks. Neurological examination was otherwise normal. He was afebrile and haemodynamically stable. Blood investigations revealed normal calcium, magnesium and serum electrolyte levels. He was transferred to the high dependency and prescribed IV Midazolam and oral Clonazepam by the neurologist. An EEG performed to exclude seizures was reported to be normal. The jerks reduced in frequency following the administration of benzodiazepines, and he was discharged after complete resolution of his symptoms on the 2nd post-operative day.
Discussion: Myoclonic jerks post anaesthesia are a rare occurrence, the mechanisms of which are relatively unknown. Drugs reported to be associated include propofol, fentanyl, ramosetron and ondansetron. This phenomenon is idiosyncratic and impossible to predict. It is important to rule out differential diagnoses such as adverse drug reactions, local anaesthetic reactions, emergence delirium, hysterical response and shivering. Investigations such as electrolyte levels, EEG, CT/MRI Brain should be performed. Treatment may involve aborting myoclonic jerks with benzodiazepines, barbituates or anti-epileptics. All cases of unexplained seizure-like activity after anaesthesia should be reported. The symptoms are usually self-limiting without any long-term sequelae. It is important to reassure the patient as these symptoms may be distressing, and they should be reviewed regularly till resolution of symptoms. It may be prudent to provide a memo to avoid administering similar drugs for future anaesthesia to prevent reoccurrence of such symptoms.

6001

Unexpected intra-operative hypertension in patient with Von Hippel Lindau disease: what else? A case report

Salvador S.[1], Tomás A. S.[2], Madeira I.[2]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal), [2]Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Von Hippel Lindau (VHL) syndrome is a rare autosomal dominant disease characterized by the presence of hemangioblastomas, renal cell carcinoma and neuroendocrine tumors.
Case Report: We report a case of a 52-year-old woman suffering from VHL disease proposed for an open partial nephrectomy due to a renal cell carcinoma. She had history of retinal, intracranial and intramedullary hemangioblastomas and adrenal pheocromocytoma surgically removed. Although no complications throughout pre-operative period and anesthesia induction were reported, during the procedure there were several moments of unexpected systolic and diastolic hypertension. The first on the surgical incision and moreover as the peri-renal tissue was dissected. The possibility of an undiagnosed pheochromocytoma was suggested to the surgical team, thus the procedure continued avoiding adrenal gland manipulation and no anti-hypertensive medication was needed. The presence of a mass reported during surgery and on post-operative image supported the diagnose.
Discussion: Pheochromocytoma is a tumor of chromaffin cells characterized by the production of catecholamines. Up to one third are inherited in syndromes. Those associated with VHL disease have some singularities. Unlike others these are bilateral in half of cases and rarely metastize. They produce almost exclusively noradrenaline, which explains why they are asymptomatic, causing sustained systolic and diastolic hypertension and are less associated with tachycardia. In a series of incidental intraoperative catecholamine-producing tumors most hemodynamic instability was related to mass manipulation and during induction. The peri-operative mortality associated with these tumors was 8%, however a under reporting bias of poor prognosis cases was pondered.1 Other comorbidities comprise cardiac failure, pulmonary edema, arrythmias and myocardial ischemia. It should be emphasized that some drugs can indirectly spur a catecholaminergic crisis in the presence of pheochromocytoma.
References:
1. Hariskov S, Schumann R. Intraoperative management of patients with incidental catecholamine producing tumors: A literature review. J Anaesthesiol Clin Pharmacol. 2013 Jan.
Learning points: Patients with undiagnosed neuroendocrine tumors may be a challenge to the intraoperative care. Pheocromocytoma must be considered in patients with abnormal BP behavior, particularly in VHL disease. Early invasive monitoring should be pondered.

6068

Intra-operative anaphylaxis after ketorolac administration unveils sensitization to multiple neuromuscular blocking agents and midazolam

Almeida C.[1], Moço R.[1], Reis A. T.[1]
[1]*Centro Hospitalar de Lisboa Ocidental - Lisboa (Portugal)*

Background: Anaphylaxis during anaesthesia is a serious complication with considerable morbidity and mortality (3-6%)1. Therefore, it demands adequate recognition, management and investigation. During the episode, removal of suspected drugs is mandatory, but their identification is often difficult such that 40% of the time wrong drugs are discarded.1
Case Report: A 48-year-old, female, ASA II patient with smoking habits, controlled asthma and allergy to egg yolk was scheduled for abdominal liposuction. After midazolam, remifentanil, thiopental and rocuronium, she was intubated and volatile anesthesia commenced without any incident. Ketorolac was administered 43 minutes after the anesthetic induction. Immediately, a severe bronchospasm started, followed by arterial hypotension (minimum: 55/29 mmHg) and a widespread rash. Anaphylaxis due to ketorolac was suspected and treated with fluidtherapy, a sympathomimetic, hydrocortisone, clemastine, aminofilin and inhaled salbutamol. The clinical evolution was good and the patient was extubated and transferred to the PACU without incidents. Skin tests were performed 13 weeks later and were positive for midazolam as well as for tested neuromuscular blocking agents (NMBA): rocuronium, atracurium and cisatracurium. The only reliable test to confirm sensitization to ketorolac is a provocation test, which was not performed due to high risk of anaphylaxis.1 Therefore, the anaphylaxis was believed to be caused by ketorolac, rocuronium and/or midazolam.
Discussion: Type I hypersensitivity reactions during anaesthesia typically occur within the first minutes after IV exposure, however delayed onset may occur.1 In this case, the investigation was crucial because it detected sensitization to unsuspected agents that putatively contributed to the anaphylaxis (even though their action did not occur immediately). It identified a sensitization to midazolam, for which a small number of cases of anaphylaxis have been reported.2. Furthermore, it identified a cross-sensitivity between NMBA, which implies that all NMBA must be avoided hereafter1. However, if future NMBA use is imperative, a NMBA with a negative skin test should be chosen, even though it does not guarantee its safety.1,2.
References:
1. Contin Educ Anaesth Crit Care Pain 14, 57–62 (2014).
2. Anaesthesia 64, 199–211 (2009).
Learning points: The temporal relationship between drug administration and anaphylaxis symptoms may not be a reliable predictor of the causative agent.

4910

Does regional scalp block reduce pain after craniotomy?

Avni N.[1], Margalit N.[1], Gonen L.[1], Nahtomi-Shick O.[1]
[1]*Shaare Zedek Medical Center - Jerusalem (Israel)*

Background and Goal of Study: There is no consensus regarding the best anesthetic regimen for use in neurosurgery. Performing a regional scalp block as an adjunct to various anesthesia techniques has the potential for reducing analgesic and vasoactive requirements during craniotomy surgeries and in the post-operative period. We evaluated our 2.5 year experience in a new Neurosurgical department.
Materials and Methods:A retrospective qualitative analysis of electronic charts from Shaare Zedek Medical Center for patients undergoing craniotomy surgery for tumor removal during the period of December 2016 through July 2019. A total of 195 patient files were examined, of which 67 received a scalp block (intervention group) and 128 received conventional IV treatment.Highest postoperative pain was recorded during the first 8 hours (VAS1), 8-16 hours (VAS2) and 16-24 hours (VAS3) after surgery. Total amount and time of analgesic and antihypertensive drugs during surgery and in the first day post-op were evaluated.
Results and Discussion: The 2 groups were equivalent for age, gender, weight, operation time and hospital stay. Statistically significant differences were found between the conventional and intervention groups respectively in VAS1 (3.37±3.01 & 2.34±3.12, p=0.014) and in VAS3 (3.18±2.97 & 2.00±2.86, p=0.005) (Wilkokson-2 sided).The intervention group contained a higher percentage of hypertensive patients (37.1% compared to 25.78%). The intraoperative requirements of Labetalol were similar in both groups (41.41% vs 40.3%). However, the intraoperative requirements of Hydralazine were lower in the intervention group (30.47% vs 19.4%, p=0.033).The intraoperative requirements of Fentanyl were lower in the intervention group as compared to the control group (4.24±2.42 mcg/kg and 5.63±2.44 mcg/kg respectively, p<0.001).After surgery pain control was superior in the intervention group, and use of antihypertensive drugs was lower in this group despite containing more hypertensive patients. Although the study was retrospective with no uniform protocol for pain management less narcotics were given. Better post-op pain scores were probably attributed to lower sympathetic surge and patient anxiety.
Conclusion: It seems that performing a regional scalp block for craniotomy surgeries carries the high benefit of lower opiate and anti-hypertensive treatment intraoperatively and lower pain scores postoperatively.

5511

Intravenous lidocaine perfusion for postoperative analgesia in CRS + HIPEC: a retrospective analysis

Pujol E.[1], Bassas E.[1], Bernat M. J.[1], Fernanz J.[1], Gil L.[1], Masdeu J.[1]
[1]*CSI Hospital Moises Broggi - Sant Joan Despí (Spain)*

Background and Goal of Study: Surgical approach of peritoneal carcinomatosis following Sugarbaker's technique (medial laparotomy and coliseum technique), is performed in our hospital under combined anaesthesia: thoracic peridural catheter (TPC) + balanced anaesthesia. The use of the TPC during 5 days after the surgery provides the patient good quality analgesia. Our challenge is to find the best strategy for the postoperative pain management in patients who are not candidates for TPC.
Materials and Methods: Based on the successful use of intravenous lidocaine, not only in multimodal pain management, but also in reducing postoperative ileus, reducing PONV and reducing length of hospital stay, reported in the last years, we applied this approach to the patients who were not candidates for TPC for postoperative pain management. These patients received a lidocaine bolus of 1'5 mg/kg at anaesthetic induction (balanced anaesthesia, with sevoforane, rocuronium in continuous perfusion and fentanyl on demand), followed by a continuous intravenous lidocaine perfusion at 1'5 mg/kg/h, started before surgical incision, and maintained during 48 hours. Between September 2016 and November 2019, 20 patients received intravenous lidocaine perfusion combined with paracetamol and NSAIDs during 48 hours for postoperative analgesia. When lidocaine perfusion was finished they received NSAIDs and opioids in case of pain (VAS >3).
Results and Discussion: 19 of the patients had a good analgesia quality, with VAS (0-10 cm) between 0 and 3 during the 5 days following the surgery. No one of them presented adverse effects due to the lidocaine administration. Only one patient needed opioid administration during this period (intravenous morphine perfusion at 1 mg/h during 24 hours, between the second and the third postoperative day).
Conclusion: Although it is a small sample, these results suggest that lidocaine intravenous perfusion provide a good postoperative analgesia, and we think that a study comparing lidocaine intravenous perfusion to TPC should be considered. Other possible benefits of lidocaine administration (reduction of postoperative ileus, reduction of length of hospital stay, less postoperative nausea and vomiting) should also be compared.

5682

Multimodal analgesia and rectus abdominis sheath block in exploratory laparotomy

Vigorito M.[1], Garcia I.[1], Sousa C.[1], Miranda M.[1]
[1]*Hospital Federal da Lagoa - Rio de Janeiro (Brazil)*

Background: Multimodal anesthesia has been stimulated by the excessive use of opioids and their unwanted postoperative (PO) effects. The gold analgesic blueprint for major abdominal surgeries is neuraxial block, however, it is not a risk-free technique and has contraindications. In this context, regional block in association with multimodal anesthesia becomes a good alternative.
Case Report: A 60 years old, no comorbidities, in the fifth postoperative day of videolaparoscopic cancer rectosigmoidectomy, with abdominal distension and sepsis is admitted for performing exploratory laparotomy. General anesthesia was inducted in rapid sequence with esmolol 60mg, midazolam 1mg, fentanyl 70mcg, propofol 50mg, rocuronium 80mg. An attack dose of 0,5ml/kg of a multimodal solution (MS), including dexmedetomidine 2mcg/ml, ketamine 0,5mg/ml and lidocaine 4mg/ml, was made. Anesthesia was maintained with sevoflurane and continuous infusion of SM in 0,25ml/kg. Patient remained hemodynamically stable. A blockade of the rectus abdominis sheath with bilateral ropivacaine 0,3% 40ml was performed at the end of the surgery. Infusion of the 0,125ml/kg MS was maintained for 48h postoperatively. Patient referred pain score below 3, needing no complimentary analgesia.
Discussion: Multimodal analgesia may reduce the excessive use of opioids that have high rates of effects produced in the PO. In addition, proper control of intra and PO nociception is crucial to reduce stress response, respiratory complications, deep vein thrombosis and chronic pain. Rectal sheath analgesia (RSA) provides analgesia in the anterior abdominal wall region. This case reports a patient with

contraindications to epidural block. RSA was chosen at the end of surgery for analgesia associated with multimodal anesthesia that contributes visceral as well as somatic analgesia intra and PO, reducing opioid use and its unwanted effects.
References:
1. Yassin HM. The analgesic efficiency of ultrasound-guided rectal sheath analgesia compared with low thoracic epidural analgesia following elective abdominal surgery with midline incision. 2017.
2. Brown PT. Multimodal General Anesthesia: Theory and Practice 2018.
3. Nordquist D. Perioperative multimodal anesthesia using regional techniques in the aged surgical patient. 2014.
Learning points: A multimodal analgesia that incorporates regional anesthesia is an alternative that can reduce high dose opioid requirements and possible associated adverse effects.

6243

Effectiveness of continuous wound infusion of 0.375% ropivacaine by On-Q pain relief system for postoperative pain management in major abdominal procedures

Grigoriadou I.[1], Vavoura A.[1], Maniatis C.[1], Devadze G.[1], Dimakopoulou A.[1]
[1]General hospital of Athens G.Gennimatas - Athens (Greece)

Background and Goal of Study: Optimal pain management after major abdominal surgery presents unique challenges.The goal of this study is to compare the effectiveness of the On-Q surgical incision site pain-relief system to intravenous patient controlled analgesia.
Materials and Methods: Thirty six patients, ASA I-III, who underwent major surgery (peripheral pancreatectomy, Whipple's, cancer colon surgery) were randomized to either the On-Q catheter /pump or the i.v. PCA group. Exclusion criteria were:history of chronic pain,allergic reactions to local anesthetics,inability to use a PCA device. Intraoperatively, all patients received fentanyl, paracetamol 1mg, lornoxicam 8mg and morphine 8-10mg i.v. Post-op instructions for 3mg paracetamol and 8mg lornoxicam /day were given. On-Q group: 24 patients, aged 38-87 (mean 69,4y) received a continuous infusion of ropivacaine 0.375%, at a rate of 2ml/h through each of 2 On-Q catheters, for 48 hours. An extra 10ml ropivacaine 0.375% was injected through each catheter before skin suturing. PCA i.v.(100 ml morphine 0.3mg/ml, bolus 0.6mg, lockout 15/min) was used as a "rescue" regimen. PCA i.v.: 12 patients, aged 28-78 (mean 60,7y) received the same PCA i.v regimen postoperatively.Pain was assessed in both groups,using VAS (0-10),at 3 time points:at PACU (POD0),24h (POD1) 48h (POD2).Total morphine consumption was also recorded in both groups.
Results and Discussion: Pain scores were: a) POD0: On-Q group 0-8, (mean value 2,92), 8/24 patients had 0 pain, PCA group 0-6 (mean value 3,33) (only1 patient with 0 pain) b) POD1: On-Q group 0-9 (mean value 3,29), and PCA group 2-4 (mean value 2,92. c) POD2: On-Q group 0 -7 (11/24 patients had 0 pain) (mean value 2) ,PCA group 1-4 (mean value 2,67).In the On-Q group,10/24 patients (41.7%) used the PCA,receiving 0,9-30 mg morphine (mean 3,2mg) during 48h. In the PCA group, 11/12 patients (91,7%) received 2-45mg morphine (mean 10,2mg). Although patients in the On-Q group showed a rise in pain scores on POD1, the overall pain scores were significantly lower and the"drop" in pain scores is higher in the On-Q group at all time-points. Total morphine consumption was also significantly lower in the On-Q group.
Conclusion: Continuous wound perfusion with a ropivacaine solution using the On-Q system seems to provide effective postoperative analgesia with less opioid consumption in major abdominal surgery.

4704

Anesthetic factors affecting outcome after DIEPflap surgery, a retrospective regression analysis of the impact of opioid free anesthesia

Vanhoorebeeck F.[1], Benmeridja L.[1], Mulier H.[2], De Frene B.[1], Mulier J. P.[1]
[1]AZ Sint-Jan Brugge - Brugge (Belgium), [2]Katholieke Universiteit Leuven - Leuven (Belgium)

Background and Objectives: Deep Inferior Epigastric Perforator flap (DIEPflap) is an autologous free flap reconstructive technique after mastectomy. Opioid free anaesthesia (OFA) might improve outcome. Primary objective evaluated OFA versus opioid anaesthesia (OA) regarding flap revisions and complications. Secondary objectives measured the effect on PONV, pain, postoperative opioids, flap perfusion and length of stay (LOS).
Methods: A retrospective single-centre cohort study approved by the hospital Ethical Committee. All 204 patients who underwent DIEPflap surgery from January 2014 to April 2019 were included. All patients provided consent to allow anonymized data analysis. Anaesthesia was classified as OFA when no peri-operative opioids were given until wound closure. Balanced anaesthesia was obtained by a combination of 0.5 Mac sevoflurane and 3 mg/kg/h propofol. Based on working schedule, patients were assigned to an OFA or OA. OFA protocol consists of a loading and infusion of dexmedetomidine, lidocaine and ketamine, continued postoperative at a below-sedative level. OFA patients got a goal directed fluid therapy, whereas OA (sufentanil and remifentanil) got a liberal fluid strategy, both with extra vasoconstrictors to maintain perfusion pressure. Paracetamol and NSAIDs with opioids were provided. Mann-Whitney, X2 and linear regression are used.
Results and Discussion: 55 Patients got OFA, 149 got OA. No difference in flap revisions (1.8% vs 6.1%, p=0.205) was observed, number of minor complications was lower in the OFA group (17.9% vs 51.4%, p<0.001). OFA required less postoperative opioids (40.0% vs 87,3%, p<0.001) and had a shorter LOS (6.8 vs 7.5 days p=0.003). OFA compared to AO was associated with less PONV (12.7% vs 43.6%, p<0.001), lower VAS score (1.9 vs 4.9, p<0.001) and a lower skin to flap temperature difference (1.04°C vs 1.41°C, p=0.048). Linear regression confirmed OFA being an independent factor for primary and secondary outcome. Kroll reported 0.74 mg/kg morphine equivalents1. Our OA group required only 0.15 mg/kg, even further reduced to 0.03 mg/kg in OFA. According to Manahan, up to 76% of patients experience PONV after DIEP flap reconstruction2. We found a lower rate with even 50% more reduction in the OFA group, making this method clinical useful.
Conclusion: OFA is associated with improved outcome after DIEPflap surgery.
References:
1. Kroll et al. Plast Reconstr. Surg. 2001;107:338.
2. Manahan et al. Microsurgery. 2014;34:112-21.

6263

Perioperative outcomes in pancreatoduodenectomy surgery: epidural versus patient controlled analgesia

Vieira A.[1], Pires Asseiro M.[1], Mendes E.[2], Infante C.[2], Santos S.[2], Bernardino A.[2]
[1]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal), [2]Centro Hospitalar e Universitario de Coimbra - Coimbra (Portugal)

Background and Goal of Study: Pancreatoduodenectomy (PDC) remains one of the most anaesthetic and surgical demanding open abdominal surgery. Although epidural analgesia (EA) remains the Gold-Standard for most open abdominal surgical procedures, the optimal analgesic technique remains under debate. The choice of the analgesic technique usually takes under consideration the analgesic efficacy, but the implications in the progression of the disease and in morbi-mortality are also primordial aspects. Should we take under consideration other parameters beside the analgesic outcome? This study aimed to compare the epidural analgesia (EA) and intravenous patient controlled analgesia (PCA) based on postoperative clinical outcomes.
Materials and Methods: Retrospective observational study with adult inpatients (>18yr) submitted to PDC between 1ST january 2018 and 30th september 2019 in tertiary medical center. According to analgesic technique the patients were divided into two groups (EA vs morphine PCA). Demographic parameters were analyzed. Outcomes studied were: 30 days mortality, acute pain unit stay (days), surgical intermediate care unit (SICU) stay (days), hospital stay (days), urgency readmission. For the statistically analysis we used SPSS version 23.
Results and Discussion: The study included 42 patients. Mean of age was 66 ±10 years, with 54,8% male, 59,5% ASA II and 40,5% ASA III. Group distribution was: EA 26,2% and PCA 73,8%. Data distribution for normality was tested. No statistically significant differences were found in terms of 30 days mortality (p=0,210) between the two groups. Neither in relation to other outcomes: acute pain unit stay (mean of

days: 3,8, p=0,785), nor SICU stay (p=0,571), nor hospital stay (median of 14 days, p=0,585), nor urgency readmission in 30 days period (p= 0,442). However there was no death in the EA group, but were 4 deaths in the PCA group.
Conclusion: Adequate postoperative pain control is of paramount importance. However, according to the anaesthetic technique chosen, the implications in post-operative stay and complications are also important factors to take under consideration. Although our results do not have statistically significant differences between both techniques, we emphasize that a future study with a larger number of patients may lead to different results.

4670

Case Report: Effect of steroids on a case of allodynia following Spinal anesthesia in Cesarean section

Mahrous R.[1], Hasanin A.[1]
[1]Faculty of Medicine Cairo University - Cairo (Egypt)

Background: Most neurological complications with spinal anesthesia are associated with paresthesia on introduction of the spinal needle. There is a debate about the benefit of the use of steroids in cases of nerve injury in shortening the duration of the effects caused by nerve injury.
Case Report: Intrathecal anesthesia was provided for a 27 years old female schedueled for C.S. in sitting position with a 25G beveled cutting needle at the L4-5 intervertebral space level, the patient experienced paresthesia during introduction of the needle where the needle introduction was stopped and the paresthesia had completely disappeared before the injection of fentanyl and hyperbaric bupivacaine. Two hours after the uneventful operation the patient complained of severe pain on the medial aspect of the foot with marked tactile allodynia. The patient was given a single dose of 100mg hydrocortisone intravenous. 45 minutes later the pain dramatically improved with disappearance of allodynia and after 2 hours the patient was able to walk with minimal pain and within 6 hours the pain completely disappeared and did not appear again within the next 48 hours.
Discussion: The most accepted explanation for paresthesia is the contact of the spinal needle with a nerve root that may have caused an inflammatory response. (1) There is a debate about the benefit of the use of steroids in cases of nerve injury as they are believed to decrease the levels of autoantibodies that are suspected to be deleterious to the nerve regeneration.(2) ,However there was an animal study on mice that showed that Corticosteroid treatment slowed nerve recovery after crush injury to the facial nerve in adult mice.(3) A case report of a patient who had foot drop after spinal anesthesia stated that the use of corticosteroids showed no observed side effects with complete recovery to the patient within few day.(4)
References:
1. Gmelch BS, Bernards CM. Does a Paresthesia During Spinal Needle Insertion Indicate Intrathecal Needle Placement ? 2009;34(1):29–32.
2. Lee SK, Wolfe SW. Peripheral Nerve Injury and Repair. 2000;8(4):243–52.
3. Lieberman DM, et al. Most SP. Effects of Corticosteroids on Functional Recovery and Neuron Survival After Facial Nerve Injury in Mice. 2011;13:117–24.
4. Razavi M. foot drop after spinal anesthesia for cesarean section : a case report. 2018;45–7.
Learning points: In case of neurological symptoms following parasthesia with spinal an. steroids should be considered.

4325

Evaluating the risk of radial nerve injury during radial cutaneous venous puncture in volunteer participants

Kodaka M.[1], Watanebe R.[1], Ueda K.[1], Ando K.[1], Komori M.[1]
[1]Tokyo Women's Medical University East - Tokyo (Japan)

Background and Goal of Study: When placing an intravenous continuous fluid line, studies reported that radial venous punctures within 12-cm proximal to the radial styloid process should be avoided because of the risk of radial nerve damage, which sometimes progresses to complex regional pain syndrome 1). However, the related anatomical research was performed using cadavers2), which sometimes sustained damage to the superficial nerves during dissection, resulting in incorrect anatomical information. In this study, we investigated the intersection points between the superficial branches of the radial nerve and the cephalic vein using portable ultrasound and a cutaneous nerve stimulator, in volunteer participants.
Materials and Methods: After obtaining Institutional Review Board approval (#4679; January 3, 2018) and participants' informed consent, we used a linear ultrasound probe (LOGIQ e; GE Healthcare, Madison, WI, USA) and a pen-type nerve stimulator (Stimuplex®; B Braun, Melsungen, Germany). First, we identified the superficial branches of the radial nerve by minimum amplitude to notice stimulation (approx. 1.2–1.4 mA) using Stimuplex® at participants' wrists. Next, we moved the ultrasound probe proximally to find the intersections between the nerve branches and the cephalic vein. We measured the number of proximate distances to the intersections from the radial styloid process, for each participant.
Results and Discussion: Thirty-two volunteers participated. The intersection points were 9.3 ± 3.5 cm proximately on the left arm and 9.1 ± 3.9 cm on the right arm (mean ± standard deviation). Furthermore, the rate of crossing points beyond the 12-cm range1) was 25% on the left arms and 19% on the right arms (Figure).
Conclusion: Using living volunteers, our results showed that there was no safe venipuncture point in the forearm on the radial side to prevent damage to the superficial radial nerve, using ultrasound and a nerve stimulator.
References :
1. Clin Anat. 2012 Jul;25(5):659-62.
2. Anesthesia & Analgesia 2001; 93:1058-61.

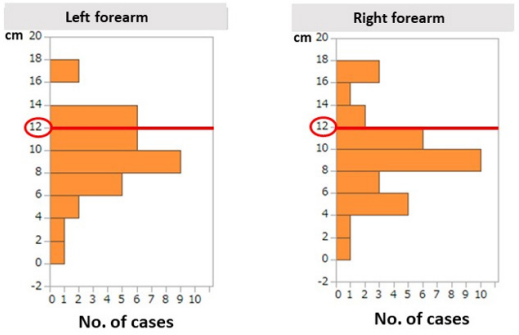


Figure: Distribution of the intersection points between radial nerve superficial branch and the cephalic vein from the radial styloid process.

5435

Novel supraclavicular ultrasonographic real-time guidance during insertion of peripherally inserted central catheter lines

Kirkegaard E.[1], Lind P. C.[1], Dolmer H.[1], Juhl-Olesen P.[1]
[1]Aarhus University Hospital - Aarhus (Denmark)

Background and Goal of Study: Mispositioning is common during insertion of PICC lines. Available techniques to evaluate tip position include fluoroscopy and chest x-ray. Fluoroscopy is resource demanding and exposes both patients and personnel to radiation. Chest x-ray is performed after compromise of field sterility and catheter repositioning entails a completely new procedure. None of the techniques provide precise information on catheter position throughout insertion. A novel supraclavicular ultrasonographic technique facilitates visualisation of the right subclavian, internal jugular (IJV) and brachiocephalic vein and provides guidance of catheter insertion in real-time. The aim of this study was to assess the feasibility of ultrasonographic real-time guidance of PICC line insertion using the supraclavicular view.
Materials and Methods: This was a observational study including 20 patients. The junction of the right IJV and subclavian vein (IJV-subclavian junction), forming the right brachiocephalic vein, was visualised using a microconvex probe in the right supraclavicular fossa. The wire guide tip was identified at the IJV-subclavian junction allowing for estimation of optimal catheter length. During catheter insertion the stiffening wire was identified in real-time, and in case of mispositioning, the catheter was redirected into the right brachiocephalic vein. Final catheter tip placement was validated with fluoroscopy or chest x-ray.
Results and Discussion: In all patients the IJV-subclavian junction and the right brachiocephalic vein were identified. Insufficient upper arm vein patency precluded successful insertion in one patient. Thrombi were identified in two patients in the right brachiocephalic vein and left-sided approaches were performed, also with ultrasonographic guidance. In 16 out of 17 right-sided insertions, both wire guide and catheter stiffening wire were identified at the IJV-subclavian junction and 15 out of 16 visual catheters could successfully be followed into the right brachiocephalic vein. Real-time mispositioning during insertion was detected in 8 cases and redirection was successful in 7 of these. All Ultrasonographic guided catheter length estimations were correct.
Conclusion: Supraclavicular ultrasonography for PICC line insertion was feasible and enabled real-time catheter visualisation during insertion. Mispositioned catheters were redirected without delay and ultrasonographic estimates of catheter lengths were correct.

5576

Neuromuscular block management in Kugelberg-Welander Syndrome

Frias P.[1], Bento C.[1], Resendes H.[1], Marinho S.[1], Borges J.[1], Silva R.[1]
[1]Hospital Divino Espirito Santo Ponta Delgada - Ponta Delgada (Portugal)

Background: Kugelberg Welander syndrome is a milder type of Spinal muscular atrophy (SMA type III) with symptoms typically presenting after 12 months and survival into adulthood. We report our neuromuscular block (NMB) management in a patient with SMA type III.
Case Report: A 46-year-old wheelchair woman (157cm, 100kg), ASA III, underwent laparoscopic cholecystectomy under general anesthesia with standard ASA, BIS and train-of-four monitoring. Anesthesia was induced with intravenous propofol (180 mg), fentanyl (0.15 mg) and rocuronium (60 mg); laryngoscopy and tracheal intubation proceeded uneventfully and anesthesia was maintained by pressure-controlled ventilation with sevoflurane in O2 titrated to BIS 40-60. At the time of pharmacologic reversal, the last and only rocuronium bolus (10 mg) had 27 minutes. Sugammadex (400mg) was administered (PTC 6/10) and after 50s the patient presented a TOFratio>0.90. She was extubated uneventfully. At discharge time to the ward, she was hemodynamically stable without signs of residual NMB or recurarization.
Discussion: The management of anesthesia in patients with SMA is often challenging due to muscle weakness, anesthesia-related respiratory complications, hypersensitivity to nondepolarizing muscle relaxants, and succinylcholine-induced hyperkalemia. 1 Only few cases reported the use of muscle relaxants in these patients, and the majority used neostigmine as NMB reversal agent. Anticholinesterase agents often do not guarantee an adequate recovery of neuromuscular function. As far as we know, there are only 3 cases reporting the use of Sugammadex in SMA type III. 1, 2, 3 All of them presented an efficient NMB reversal with no adverse effects. Sugammadex has been demonstrated to be safe and effective in patients with cardiovascular disease and other neuromuscular disorders.1 Apparently our patient didn't reveal an increased sensitivity to rocuronium, and the sugammadex reversal was very efficient with no adverse effects.
References:
1. Hugo Vilela, Reversal of neuromuscular blockade with sugammadex in a patient with spinal muscular atrophy type III.
2. Tz-Ping Gau, Multimodal anesthesia management of a morbidly obese spinal muscular atrophy patient with obstructive sleep apnea.
3. Inamori M, General anesthetic management of a patient with spinal muscular atrophy type III.
Learning points: Our case reinforces that the combination of rocuronium and sugammadex should be considered in the NMB management of patients with SMA.

5944

Fingers Hook Technique to Improve Trachway Assisted Nasotracheal Intubation

Cheng K. I.[1], Shen Y. C.[1]
[1]Department of Anesthesiology, Kaohsiung Medical University Hospital, Kaohsiung Medical University - Kaohsiung (Taiwan)

Background and Goal of Study: To load a nasotracheal tube on Trachway (a video stylet) has been demonstrated an effective technique in patients undergoing oromaxillofacial surgery.(1,2) The goal is to investigate an alternate technique to instead of the conventional technique of jaw thrust to improve the nasotracheal intubation.
Materials and Methods: Eighty patients undergoing oromaxillofacial surgery with Trachway assisted nasotracheal intubation were included in this prospective, randomized, single blind, clinical trial study. The induction agents of fentanyl 2 mcg/kg, thiamylal 5mg/kg, rocuronium 0.1mg/kg, propofol 1mg/kg were administered and intubation initiated 2 minutes later. In group C (conventional jaw thrust), an assistant raised up patient's bilateral mandible angle to increase oropharyngeal space exposure during Trachway assembly advanced. In group F (fingers hook), the intubator put the left index and middle fingers on submandibular space and deeply compressed it as the Trachway assembly advanced. The intubating attempts, intubation time spent, the scores counted by modified nasal intubation difficulty scale (MNIDS), intubation related bleeding and side effects were recorded and analyzed.
Results and Discussion: The airway characteristics between groups are comparable. There are 6 out of 40 patients in group C and 9 out of 40 patients in group F need no assisted technique to advance the Trachway assembly into trachea. Therefore, 34 patients in group C and 31 patients in group F were analyzed in final. The intubation attempts and intubation time spent were comparable between groups. However, the average score of MNIDS was 3.7±0.5 in group C and 2.8±0.5 in group F (P<0.001). Patients categorized into score of MNIDS 2, 3 and 4 were 1, 7, 26 in group C and 8, 22, 1 in group F, respectively; there is a statistical significance between groups (P<0.001).
Conclusion: As compared with the conventional jaw thrust technique, the fingers hook provides an effective and easy technique for patients undergoing oromaxillofacial surgery.
References:
1. Lee MC, et al. Nasotracheal intubation in patients with limited mouth opening: a comparison between fibreoptic intubation and the Trachway. Anaesthesia 2016 Jan;71(1):31-8.
2. Hsu HT, et al. Trachway in assistance of nasotracheal intubation with a preformed nasotracheal tube in patients undergoing oral maxillofacial surgery. Br J Anaesth. 2014 Oct;113(4):720-1.

6274

Difficult central venous access due to venous valves - a case report

Siddique Z.[1], Aglan A.[1]
[1]Mater Misericordiae University Hospital - Dublin (Ireland)

Background: Central venous cannulation (CVC) is a common procedure in anaesthesia and intensive care. Although most of the times it is accomplished without any complications, difficulties do arise. Internal jugular vein (IJV) valve is a rare cause of failed IJV cannulation. We report a case of bilateral IJV valves that lead to failure of jugular central venous access.
Case Report: A 58 years old female patient was admitted to the cardiothoracic high dependency care unit with Type B aortic dissection. CVC insertion request was made by the cardiothoracic team for vasopressor administration. She was reviewed by anaesthesia registrar and plan was made to put the CVC in post operative care unit with full monitoring and emergency equipment availability. During the ultrasound guided insertion, it was noted that the guide wire did not advance beyond a certain length. Further detailed scanning of the IJV in the lower part of the neck revealed presence of a flap like structure in the vein. Same issue was encountered in contralateral side.
Learning points:
Careful ultrasound scanning of intended access site should be done before central venous cannulation procedure is undertaken to avoid difficulties.

5199

Sedation during drug induced sleep endoscopy: comparison of continuous infusion of propofol vs continuous infusion of midazolam

Crescenzi O.[1], Serra C.[1], Resta R.[1], Bicchi E.[1], Peduto V. A.[1], De Robertis E.[1]
[1]Ospedale Santa Maria della Misericordia, Section of Anesthesia, Analgesia and Intensive Care - Perugia (Italy)

Background and Goal of Study: Drug induced sleep endoscopy (DISE) is a diagnostic procedure for planning surgery in obstructive sleep apnoea (OSA) patients. The impact of the sedative agents on achieving the desired sedation as well as the influence on the airways and on the cardiovascular system are critical. This observational study compares two different sedative drug regimens for DISE.
Materials and Methods: After ERB approval and informed consent, 34 OSA patients were enrolled. Midazolam 0.05-0.07 mg/kg e.v., atropine 0.01 mg/kg e.v. and lidocaine 2% aerosol were given before allocation to propofol (group P n=19): loading 1.5 mg/kg/h, increased of 0.1 mg/kg/h (maximum dose 3.5 mg/kg/h); or midazolam (group M n=15): loading 0.05 mg/kg/h, increased after 5 minutes of 0.02 mg/kg/h (maximum dose 0.25 mg/kg/h). Both groups received supplemental oxygen. Primary endpoint was to compare the groups in terms of time needed to reach the target sedation in order to start the endoscopy (Entropia of 65-75). Secondary endpoint was to find out differences in term of complications and the endoscopist's satisfaction (blinded to the group).
Results and Discussion: Group M took a significantly higher time to reach the target sedation. However, the time of the whole procedure (from the start of the continuous infusion till the end) did not differ. There was no difference in term of complications and the endoscopist's satisfaction (Table 1).
Conclusion: Propofol allows adequate sedation in a shorter time, without being associated with more complications than midazolam during DISE.

Variables	Group P	Group M
Age (years)	49.8±8.9	43.6±5
BMI (kg/m2)	26.7±3.1	25.7±2.6
Time to reach target sedation (min)*	6.4±2.7	10.0±3.8
Duration of the whole procedure (min)	16.3±6.5	18.7±5.5
Hypo/Hypertension	0(0%)	0(0%)
Bradycardia (<50 beats/min)	0(0%)	0(0%)
Desaturation (<92%)	4(21%)	3(20%)
Endoscopist's satisfaction: Excellent Neutral Bad	 18(95%) 1(5%) 0	 14(93%) 0(0%) 1(7%)

Table 1-Data are mean±SD or patient's number (%);
*Mann-Whitney test p=0.0061

5326

Intraoperative intravascular effect of Ringers lactate and hyperoncotic albumin during haemorrhage in cystectomy patients

Wuethrich P. Y.[1], Löffel L. M.[1], Hahn R. G.[2]
[1]Inselspital, University Hospital Bern - Bern (Switzerland),
[2]Research Unit, Södertälje Hospital, Södertälje, and Karolinska Institutet at Danderyds Hospital (KIDS) - Stockholm (Sweden)

Background and Goal of Study: Crystalloids quickly equilibrate between the intravascular and interstitial volumes, consequently they are mainly used to treat temporary volume deficits. In contrast, iso-oncotic colloids induce a long-lasting plasma volume expansion. As doubts have been raised about synthetic colloids, albumin solutions have been used more extensively. The effect of 20% albumin on blood volume expansion and crystalloid kinetic in a clinical setting involving relevant intraoperative blood loss during major abdominal surgery is still unknown. We expect that fluid replacement with crystalloid will be better sustained intravasculary with the administration of 20% albumin during haemorrhage.
Materials and Methods: In this single-arm, single centre feasibility study, an i.v. infusion of 3 mL/kgBW of 20% albumin was administered over 30 min to 13 cystectomy patients during the bleeding phase (mean blood loss 973mL) in addition to Ringers lactate solution. Blood samples were collected at regular intervals over a period of 300 min to estimate clinical efficacy (i.e. plasma volume expansion / infused volume) which was analysed with a regression modelling equation.
Results and Discussion: Mean haemorrhage was 973 mL (SD ±395). The regression method showed a strong linearity (r = 0.82) between the blood loss minus the blood volume expansion and the independent effects of the infused volume of Ringers lactate and 20% albumin solutions (all P < 0.001). The mean clinical efficacy was for the Ringer solution 0.37 (95% CI 0.30 to 0.44) mL/mL and for the 20% albumin 1.77 (95% CI 1.17 to 2.37) mL/mL on an average of 5 hours. This resulted that the 20% albumin expanded plasma volume around 5 times stronger / more potent than the Ringers lactate solution.
Conclusion: The infusion of 20% albumin during haemorrhage of around 1000 mL expands blood volume by 1.8 times and its effect was long standing whereas Ringer solution expanded by 0.4 time. These results suggest that 20% albumin can be used as a potent blood volume expander in this setting, but also sustaining a pronounced longer intravascular effect of Ringers lactate solution.

Ambulatory Anaesthesia

4642

The effect of preoperative anxiety on pain after third molar tooth surgery

Sergin D.[1], Sipahi Çalış A.[2], Derbent A.[1]
[1]Ege University School Of Medicine - Izmir (Turkey), [2]Ege University Faculty of Dentistry - Izmir (Turkey)

Background and Goal of Study: This study aims to investigate the effects of preoperative anxiety upon postoperative pain in patients who will undergo third molar dental surgery.
Materials and Methods: 50 patients', aged 18-70, the anxiety levels were measured with Spielberger State-Trait Anxiety Inventory (STAI FORM TX-1) and (STAI FORM TX-2). Patients with scores of STAI-1 ≤ 35 and STAI-2 ≤ 35 were considered as low anxiety patients and the group was named as LA (n: 20). Patients with a score of STAI-1 >35 and STAI-2 >35 were considered as high anxiety level patients and the group was named as HA (n: 20). After their levels of anxiety were established, all the patients were administered dexketoprofen IV and they went into third molar dental surgery after local anesthesia. The pain scores of patients in the postoperative period (15 th minute, 30 th minute, 1 st, 2 nd, 4 th, 6 th, 8 th, 12 th and 24 th hours) were assessed using Visual Analog Scale (VAS). In the postoperative period, the patients were administered 275 mg naproxen sodium PO when VAS was ≥ 4. The first analgesic requirement time, total analgesic consumption, patient and doctor satisfaction were recorded.
Results and Discussion: Insignificant difference between Group LA and Group HA in terms of postoperative pain and analgesic consumption shows that preoperative anxiety is not too intensive to have an effect upon the postoperative pain related to the third molar dental surgery. Fear of dental extraction does not constitute a high level of anxiety. Preoperative anxiety is not significantly correlated with the postoperative pain in third molar dental surgery.
Conclusion: Our study shows that anxiety level has no effect on third molar dental surgery pain when an effective analgesia administered before pain mechanism triggered and patients' pain levels are controlled in frequent intervals.

4706

Driving skills of patients at the time of discharge after sedation for coloscopy are impaired by comparison with those of their escorts: a prospective study

Malengreaux C.[1], Lois F.[1], Massart Q.[1], Hallet C.[1], ww[1]
[1]CHU Liège - Liège (Belgium)

Background and Goal of Study: Driving performance is altered for several hours after anesthesia1. Most experts and guidelines for day-case surgery recommend a 12-24 hour non-driving period after general anesthesia2,3. However, driving skills after procedural sedation have not been assessed so far. We therefore designed this study to compare driving skills of patients who underwent procedural sedation with the ones of their escorts.
Materials and Methods: Driving skills of 30 patients who underwent colonoscopy under sedation were compared to the ones of their escorts. Sedation was provided with propofol. During the driving test, all patients had reached a PADSS score > 9. The duration of the sedation, the dose of propofol and the delay between PADSS > 9 and the driving test were recorded. For all participants, gender, age, number of collisions,speeding,crossings of traffic separating or shoulder lines as well as the distances travelled while speeding or weaving out of traffic lanes were recorded. Data are presented as mean(SD).For statistical analysis, Student-t test, Mann-Whitney test or chi-2 were used when appropriate.P<.05 was considered significant.
Results and Discussion:Participants' characteristics were similar.The mean duration of colonoscopy was 35 (18) min, the dose of propofol was 298 (133) mg and the delay between PADSS>9 and driving test was 51 (57) min.Results of the driving test are shown in table 1.

	Patients n=30	Escorts n=30	p-value
Collisions,n	0.40 (0.77)	0.33 (0.71)	0.74
Speeding,n	25 (9)	23(12)	0.39
% of distance driven while speeding	37 (20)	24 (17)	0.029
Traffic separation line crossing,n	3.27 (2.65)	1.97 (1.32)	0.015
Shoulder line crossing,n	22 (12)	19 (13)	0.34
% of distance driven while out of lane	3.79 (4.78)	3.91 (2.62)	0.25

Conclusion: Driving ability of patients at the time of discharge following sedation for colonoscopy is impaired. Hence, patients who underwent sedation require an adult escort for post sedation discharge.
References:
1. Anesthesiology 2005;103:951-6.
2. Anaesthesia 2019;74:778–792.
3. Curr Opin Anaesthesiol.2009;22:748-54.

4749

Degree of satisfaction in patients undergoing major outpatient surgery (OS) in our hospital

Congo Silva C.[1], Vila Rubina G.[1], Ceballos Burbano M.[1], Viedma Crespo S.[1], García Navia T.[1], Moret Ferrón M. L.[1]
[1]Hospital Plato - Barcelona (Spain)

Background and Goal of Study: Ambulatory surgery continues to increase, as a result of less invasive surgical techniques, improved patient selection and preparation. Patients need to be informed about what will happen on the day of surgery. A well-prepared patient tends to be more relaxed and is more likely to comply with important instructions. Patient satisfaction is difficult to define, depending somewhat on the patient's expectation of care. The objective of the study is to determine the degree of satisfaction with OS in our hospital.
Materials and Methods: A descriptive observational study has been conducted. By means of a satisfaction survey carried out during 4 weeks in the surgical area of OS. An evaluation of the information received prior to surgery, satisfaction with the care and treatment received, as well as demographic variables were collected. The responses were written using a Likert type scale scored as follows: very good 5, good 4, regular 3, bad 2 and very bad 1. The data were analyzed in SPSS Statistics 26, presented in means and standard deviation for descriptive variables.
Results and Discussion: 379 surveys of OS patients were collected over a period of 4 weeks. 193 (51%) females and 186 (49%) males. The evaluation of information received scored an average of 4.8; care received 4.9; privacy 4.9; resolution of doubts 4.9 and overall satisfaction 4.8. Finally, 374 patients (98.7%) would undergo surgery again in our hospital. 5 patients (1.3%) would not undergo surgery in our hospital again. It has been demonstrated that experience in OS improves with the friendly treatment and with the information provided by the entire surgical team.
Conclusion: Patient satisfaction in outpatient surgery of our hospital is high. The satisfaction survey is a useful tool to measure the degree of patient satisfaction with the surgical process.
References:
1. Teunkens A et al. Measuring satisfaction and anesthesia related outcomes in a surgical day carecentre: A three-year single-centre observational study. J Clin Anesth. 2017 Dec;43:15-23. doi: 10.1016/j.jclinane.2017.09.007. Epub 2017 Sep 29.
2. Chanthong P et al. Systematic rewiew of questionnaires measuring patient satisfaction in ambulatory anesthesia. Anesthesiology. 2009 May;110(5): 1061-7. doi: 10.1097/ALN.0b013e31819db079.

4958

Physical status of pediatric patients in outpatient anesthesiology

Siryy V.[1], Paykush V.[2], Andriyavska N.[1], Bilous A.[3], Ivanyuk Z.[4]
[1]Dental Implantation and Prosthetics Center MM - Lviv (Ukraine), [2]Ukrainian Association Sedation and Anesthesia in Dentistry - Lviv (Ukraine), [3]Dental Center PerfectDent - Lviv (Ukraine), [4]Dental Center Parodent - Lviv (Ukraine)

Background and Goal of Study: Children who demonstrate fear and anxiety of dental treatment require deep sedation or general anesthesia. Nowadays dentists treat multiple caries of primary teeth even in small patients, in whom such treatment is possible only under conditions of general anesthesia.Analysis of physical status, age and comorbidities in children who underwent general anesthesia in outpatient dental clinics.
Materials and Methods: The database of outpatient anesthesiology care in dental clinics for 2015-2018 was analyzed. The following data were recorded: indications for dental surgery under general anesthesia, age, gender, ASA, planned surgery, complications of anesthesia.
Results and Discussion: The number of patients 1687, boys 1147 (68%) girls 540 (32%), mean age 4.5 ± 2.3 yo. All patients were examined by a dentist, anesthetist and found to be in need of treatment for multiple dental caries under general anesthesia. 1248 (76%) children were treated as scheduled, 439 children (26%) were anesthetized ungently during the treatment of purulent processes in oral cavity. 604 children (40%) underwent multiple extractions of teeth with complicated caries, with boys predominating 398 (66%) girls 206 (34%). ASA I -1265 (75%), ASA II - 422 (25%) patients. 439 (26%) children has allergy to various factors. In 388 (23%) children, there were concomitant CNS diseases (cerebral palsy, autism, others) that caused treatment under general anesthesia. Anatomical and physiological barriers to dental treatment (gag reflex, increased salivation, limited mouth opening) were most commonly observed in children with congenital malformations of CNS - in 101 cases (6%). 978 (58%) children had an overwhelming fear of treatment as a result of unsuccessful previous dental treatment, including 649 boys (66%) 329 girls (34%).All patients underwent treatment - sevoflurane, propofol, fentanyl. Intubation - 81% of cases. The hemodynamics were stable, the recovery of consciousness occurred within 35 min after the treatment. There were no serious complications. The children were discharged home 90 min after surgery.
Conclusion: The vast majority of children who require treatment of multiple dental caries in an outpatient settings under anesthesia have concomitant CNS pathology, allergic reactions, ASA I-II, previous experience of unsuccessful dental treatment without anesthesia. General anesthesia - sevoflurane, propofol, fentanyl with intubation is optimal in such treatment.

5089

Are patients entering the operating room on foot less anxious than patients in a bed during an outpatient superficial venous laser surgery? A prospective randomized study

Bodson A.[1], Lois F.[1], Hallet C.[1], Brichant J. F.[1]
[1]CHU Liège - Liège (Belgium)

Background and Goal of Study: The operating room (OR) environment can be a source of anxiety for the patient, including the ambulatory patient where anxiolytic premedication is rarely used. Anxiety has been associated with a high incidence of complications in the recovery room (RR) after ambulatory superficial venous surgery1.A previous study demonstrates a reduction of anxiety for patients entering the operating room on foot in various surgeries2. We therefore designed this study to compare anxiety between patients entering the operating room on foot and in a bed during an outpatient superficial venous laser surgery.
Materials and Methods:100 patients undergoing outpatient venous surgery were randomized to either the on-foot group (n = 50) or the in-bed group (n = 50). An assessment of anxiety using the APAIS-score (/20) and an NRS-anxiety (0-10) was performed in the room before departure to the OR. The NRS-anxiety was repeated upon arrival at the OR. Other data collected was sex, age, ASA status and type of anesthesia. The data are expressed in median (IQR 25-75). For statistical analysis, Student-t, Mann-Whitney or chi-2 tests were used when appropriate. P<0.05 was considered significant.
Results and Discussion: Demographic data was similar between the 2 groups. Salient results for anxiety are shown in Table 1.

Table 1:

	In-bed N=50	On-foot N=50	p-value
In-room preop APAIS score for anxiety (/20)	6.5 (5-12)	6 (4.75-9)	0.22
In-room preop NRS-anxiety	4 (2-6.5)	2 (1-3)	0.01
Preop NRS-anxiety in OR	3 (1-6.5)	2 (1-5.25)	0.64
Reduction of NRS-anxiety between in-room and OR	0 (-2 – 0)	0 (0 – 1.5)	0.021

Conclusion: The perspective of entering the operating room on foot significantly reduces the anxiety perceived by the patient via the NRS-anxiety score performed in the room before departure but not the anxiety APAIS-score. The ambulation itself seems less efficient than in-bed transport to reduce the perceived anxiety upon arrival at the OR.
References:
1. Acta Chir Belg. 2015;115(1):42-8.
2. Can J Anaesth. 2002;49(8):885-6.

5829

Predicting factors of unplanned admission in ambulatory laparoscopic surgery

López-Torres López J.[1], Canales Lara P. M.[1], Íñiguez De Onzoño Pérez Á.[1], Martínez Villar C.[1], Sánchez López A.[1], Argente Navarro P.[2]
[1]Complejo Hospitalario de Albacete - Albacete (Spain), [2]Hospital Universitari i Politècnic La Fe - Valencia (Spain)

Background and Goal of Study: The objective of this study was to determine the factors associated with a higher probability of unplanned income after an ambulatory laparoscopic surgery.
Materials and Methods: This is a prospective study of 297 adult patients operated by laparoscopic surgery on an outpatient care at La Fe Hospital in Valencia during one year period. The inclusion criteria were age over 18 years old and indication of outpatient laparoscopic surgery. The diagnoses were coded according to the International Classification of Diseases (ICD-9). The variables of the study included preoperative,intraoperative and postoperative factors factors. The unplanned hospital admission on the same day were considered as a dependent variable. Admission criteria were preestablished. A comparative analysis was performed between patients with or without a hospital admission, using Student's t, Mann-Whitney U and Ji-Square in independent groups. Through logistic regression, the association of the variables regarding the necessity for hospital admission was verified.
Results and Discussion: The 8.1% of the patients required hospitalization (CI:4.8–11.3). It was significantly higher in gynecological surgery (12.1%vs5.5%;p=0.04), higher ASA (12.1%vs4.5%;p=0.017), smokers (13.9%vs6.2%;p=0.03), pneumoperitoneum time >45 minutes (11.7%vs4.7%;p=0.02), anesthetic complications (44.4%vs7.0%; p=0.003), surgical complications (36.4%vs4.6%;p<0.001), presence of NVPO (13.5%vs3.7%;p=0.003) or vomits (42.9%vs5.3%;p=0.006). The unplanned admissions rate is one of the most used factors in the outpatients units to analyze the results. The overall rate of unplanned admission in outpatients units is between 0.09-16. The appearance of complications increases the risk of unplanned admission. The NVPO has been the most common reason for unplanned admission after an ambulatory surgery (up to 50%).The presence of interventions in the abdominal cavity benefits the development of adhesions and fibrosis, difficulting surgical technique and reducing abdominal compliance.
Conclusion: The proportion of unplanned admissions in this type of surgery is about 8.1%, being higher in gynecological surgery. The probability of postoperative admission is 8.7 times higher when surgical complications appear, 6.5 times higher if pneumoperitoneum> 100 minutes and 4.1 times higher if NVPO.

5954

Outpatient Surgery Cancellations: Reasons and Suggestions for Improvement

Teles D.[1], Nogueira S.[1], Carneiro E.[1], Teles A.[2]
[1]Centro Hospitalar de Sao Joao - Porto (Portugal), [2]Instituto Português de Oncologia do Porto Francisco Gentil (IPO), EPE - Porto (Portugal)

Background and Goal of Study: Unexpected delay or cancellation of elective surgeries has significant impact on hospital performance and patients outcomes. Efficiency is at risk, waiting time increases, patient care may be compromised, resources are wasted, and cost increases.1 This study aims to identify the frequency and reasons of surgery cancellation in an outpatient surgical center during 2018 and to prioritize areas of improvement.
Materials and Methods: A retrospective evaluation of the rate of surgery cancellation in one outpatient center was performed. The data of scheduled surgeries from 5 different surgical specialties was collected from January to December 2018. The number of patients operated, canceled, and the reason for cancellation, whenever available, were recorded. We included all cases appearing on the definitive operative room (OR) list that were not performed on that day. We excluded the days when personnel absence led to complete cancelations. Statistical treatment was made with Microsoft Excel 2007 and proposed improvements were discussed. Results and Discussion:A total of 2802 surgeries were listed of which 288 (10,28%) were canceled. Contribution to total cancellation was highest in vascular surgery 17,58% followed by general surgery 10,05%, gynecology 9,8%, orthopedics 7,46% and plastic 4,43%. According to category, 30,7% of cancellations was related to patient absence, 29% unavailable OR time, 18,3% associated with anesthesia, 13% due to not recorded reasons, 4,8% related to surgeons and 4,5% due to other reasons. There was no mean of establishing the reason of cancelation for any particular patient, which constitutes a primary field of improvement.
Conclusion: Apart from patient absence, most cases of surgical cancellation were related to unavailable OR time, which is consistent with literature.2 Since the majority are preventable, the next step is to implement reduction strategies, starting by adequate documentation. Regarding anesthesia-associated causes, is important to understand the reasons for which a specific patient is cancelled, so we can further improve their preoperative assessment, risk stratification and clinical optimization.
References:
1. Hansson, M. G. & Ryd, L. Cancellations of elective surgery may cause an inferior postoperative course : the ' invisible hand ' of. 27–31 (2011).
2. Dimitriadis, P. A., Et al. The challenge of cancellations on the day of surgery. Int. J. Surg. 11, 1126–1130 (2013).

6107

Ambulatory surgery taken to the limit

Pinto A. M.[1], Duarte D. F.[1], Dahlem C.[1]
[1]Centro Hospitalar de Entre Douro e Vouga - Santa Maria da Feira (Portugal)

Background: The number and complexity of procedures and patients managed in ambulatory surgery have increased steadily.1 Dilated cardiomyopathy (DCMP) is associated with high perioperative morbidity and mortality 2,3.We report the anaesthetic management of a patient with alcoholic DCMP undergoing shoulder arthroscopy in the ambulatory setting.
Case Report: 44-year-old male, ASA IV, BMI 25.2, with recently diagnosed alcoholic DCMP (LVEF 30%), but clinicaly stable, was proposed for diagnostic shoulder arthroscopy in beach chair position. Patient was pre-medicated with 50mcg fentanyl + 1mg midazolam, and an interscalene and cervical superficial blocks were performed with 30mL 0,75% ropivacaine. Intraoperative sedoanalgesia was attained with 10mg ketamine, 10mg propofol and 1g acetaminophen. 30 mg cetorolac was the only analgesic required postoperatively. Surgery lasted 35 minutes and the patient was kept monitored in the postanaesthesia care unit for 2 hours, and discharged home the same evening. No complications were reported both in the immediate postoperative period nor the following 30 days.
Discussion: Major advantages of ambulatory surgery depend on adequate patient evaluation and optimization for each type of surgery.1 Anaesthetic management of patients with DCMP is challenging and can be complicated by congestive heart failure and malignant arrhythmias,2,3 although ASA status alone is not a rejection criteria for ambulatory surgery.1 Being able to perform the surgery with a peripheral nerve/plexus block (alone or in combination with sedoanalgesia) would avoid many of the complications associated with DCMP.2,3 Communication with the surgeon, the short-expected length and good patient collaboration were vital for the success of our anaesthetic approach.
References:
1. Korean J Anesthesiol 2017 August 70(4): 398-406.
2. J Anesth Crit Care Open Access 2015, 2(1): 00041.
3. Indian J Anaesth. 2017 Sep; 61(9): 728–735.

Learning points: The increasing number of patients and procedures performed in the ambulatory setting has numerous advantages for patients, healthcare providers and hospitals. Despite the high morbimortality associated to DCMP patients, ambulatory surgery is not contra-indicated as long as proper preoperative optimization and close cooperation between patient and medical staff is maintained, allowing for same day patient discharge.

6326

Surgical outcome with topic anaesthesia for intracorneal rings – our reality

Bastos C.[1], Pinto A. M.[2], Castro D.[2], Figueiredo P.[2]
[1]Centro Hospitalar do Baixo Vouga - Aveiro (Portugal), [2]Centro Hospitalar de Entre o Douro e Vouga - Santa Maria da Feira (Portugal)

Background and Goal of Study: Intracorneal ring implantation is used in the treatment of keratoconus in young patients, aiming to improve visual acuity. This surgery should take place in an outpatient regime with topic anaesthetic and light sedation. Despite the recommendations, most centres in our country often choose general anaesthesia as the first approach. This paper aims to describe our experience with this type of ambulatory surgery, evaluate surgeon satisfaction and surgical timing.
Materials and Methods: We have analysed physical and digital documentation about each patient submitted to ophthalmologic ambulatory surgery under the diagnosis of keratoconus between 2016 and the first semester of 2019. From a total of 88 cases we have excluded 31 due to bad codification or lack of information. Results and Discussion:From our final 57 patients, 47.3% were male and all 57 were classified as ASA I or II. All patients were submitted to pre anaesthetic evaluation to select candidates and to clarify about the anaesthetic procedure. Our protocol included premedication with 1000mg acetaminophen IV and 1 mg midazolam IV. Topic anaesthesia was performed with oxybuprocaine. During surgical intervention, 22.8% of patients needed extra sedation or analgesia due to anxiety or difficult collaboration. Only one case was converted to general anaesthesia probably due to bad patient selection. The median surgical duration was 24.8 minutes and median post anaesthetic care unit duration was around 45 minutes. All patients returned home within the same day. All data was collected and analysed after ethical approval from our Hospital Ethics Committee.
Conclusion: Our centre protocol was successful in more than 75% of our patients. Although topic anaesthesia is a safe approach we have to consider patient limitations such as fear, anxiety or claustrophobia. Sedation/analgesia helps tolerate the surgical procedure and improves patient collaboration. With this approach we improve recovery without compromising surgical time. Surgeon satisfaction also improves with topical anaesthesia since they have immediate feedback from the patient, quicker turnover between patients and no overnight stay.
References:
1. https://www.nkcf.org/intacs-for-keratoconus/.
2. Journal of Refractive Surgery. 2016; 32(12), 829–83.
3. https://www.nysora.com/regional-anesthesia.

4620

Dexmedetomidine sedoanalgesia in ophthalmology: can you see it?

Fernandes D.[1], Pereira A. I.[1], Amorim A.[1], Fernandes L.[1], Mendonça M.[1], Nunes S.[1]
[1]Hospital Central do Funchal - Funchal (Portugal)

Background and Goal of Study: A significant proportion of patients that anesthetists deal in ophthalmology are elderly and with multiple comorbidities, making it sometimes challenging to achieve an optimal level of sedation and good surgical conditions. Dexmedetomidine(Dex) is a selective alpha 2 agonist with sedative and anxiolytic action. It also seems to lower the intraocular pressure. The aim of this study is to evaluate the effect of dex sedation on patient and surgeon satisfaction in cataract surgery with intraocular lens implantation and vitrectomy.
Materials and Methods: We've conducted a prospective study on patients requiring sedation for cataract surgery with intraocular lens implantation and vitrectomy. Dex was initiated 30 minutes prior to surgery with an initial infusion dose of 0,4-0,5 mcg/Kg/h. Blinded interviews were conducted postoperatively in order to access patient and surgeon satisfaction using a 5-point satisfaction scale (very unsatisfied, unsatisfied, neither satisfied nor dissatisfied, satisfied, very satisfied). Data collection included RASS scale, perioperative pain, respiratory rate and hemodynamic parameters. Visual Analogue Scale(VAS) was used to quantify pain intensity.

Results and Discussion: We analyzed 21 patients: 12 patients submitted to cataract extraction and 9 to vitrectomy. The mean age of the sample was 73 ± 9,05(50-84); 52%(N=11) were ASA 2 and 48%(N=10) were ASA 3. At the end of the procedure 86%(N=18) of patients referred a VAS of 0(range 0 to 2), and 95%(N=20) said that were satisfied or very satisfied with the anesthesia provided. In 81%(N=17) of the cases the surgeon said that was satisfied and very satisfied with the surgical conditions. Most patients (62%) at the beginning of the procedure presented a RASS scale of -1(Range -2 to 1). The most frequent cardiovascular adverse effect was bradycardia and it occurred in 5 patients(24%). There were no respiratory adverse events.
Conclusions: Dex sedation can be a precious help in sedoanalgesia for ophthalmological surgery. Despite being a small sample, our analysis revealed that most of the patients experienced no pain and were at least satisfied with the anesthesia provided. The same was observed for surgical conditions: ophthalmologists were often satisfied or very satisfied. The low infusion of Dex allowed patients to be cooperative when verbally stimulated during the procedure. Bradycardia was the most frequent lateral effect but was easily reversed in all cases.

4688

A comparison of general anesthesia and conscious sedation in procedure-related complications during esophageal endoscopic submucosal dissection

Kim S. H.[1], Choi S. H.[1]
[1]*Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea)*

Background and Goal of Study: Endoscopic submucosal dissection (ESD) has a favorable outcome compared to esophagectomy for early esophageal neoplasia. General anesthesia has been used recently for esophageal ESD to minimize complications from insufficient sedation and patient movement.
Materials and Methods: We retrospectively reviewed the electronic medical records of 158 patients who underwent esophageal ESD under general anesthesia or conscious sedation provided by anesthesiologists. We evaluated the incidence of procedure-related complications, including perforation, post-ESD bleeding, cardiopulmonary adverse events (arrhythmia, hypotension, and hypoxemia), stricture, aspiration pneumonia, and procedure failure. Frank perforation, post-ESD bleeding requiring a vigorous diagnostic approach, and cardiopulmonary adverse events were regarded as acute complications of ESD.
Results and Discussion: Acute complications occurred only in the conscious sedation group (8/83 (9.6%) vs. 0/75 (0.0%), p-value = 0.007). The numbers of patients with frank perforation, post-ESD bleeding, and cardiopulmonary adverse events were four, one, and three, respectively. Moreover, aspiration pneumonia after ESD occurred only in the conscious sedation group (7/83 (8.4%) vs. 0/75 (0.0%), p-value = 0.014). The ESD procedure failed in four patients in the conscious sedation group. The incidences of stricture requiring stent insertion and hospital stay after ESD were comparable between the two groups.
Conclusion: General anesthesia is associated with a lower incidence of acute procedure-related complications in esophageal ESD compared to conscious sedation provided by anesthesiologists. Therefore, we recommend general anesthesia as a safer option for esophageal ESD.

	Conscious sedation group (N = 83)	General anesthesia group (N = 75)	p-value
Acute complications, n(%)	8 (9.6)	0 (0.0)	0.007
Frank perforation	4 (4.8)	0 (0.0)	0.122
Bleeding requiring VDA	1 (1.2)	0 (0.0)	> 0.999
Cardiopulmonary adverse events	3 (3.6)	0 (0.0)	0.247
Aspiration pneumonia, n(%)	7 (8.4)	0 (0.0)	0.014

Table 1. Comparison of complications between conscious sedation group and general anesthesia group

4689

A randomized controlled trial evaluating high flow nasal oxygen during ERCP in the prone position

Kim S. H.[1], Oh Y. J.[1]
[1]*Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea)*

Background and Goal of Study: Sedation for endoscopic retrograde cholangiopancreatography (ERCP) can be challenging in that deep sedation is required in elderly patients in the prone position. The aim of the present study was to investigate and compare the effects of a high flow nasal oxygen (HFNO) delivery system and conventional nasal cannula oxygen delivery on oxygenation.
Materials and Methods: A prospective randomized trial with patients undergoing endoscopic retrograde cholangiopancreatography in the prone position. For each patient, the lowest oxygen saturation (SpO2) level, incidence of hypoxemia (SpO2 < 90%), and procedure interruptions due to airway interventions, as well as end-tidal CO2 (mmHg) at the end of the procedure, were recorded.
Results and Discussion: The lowest SpO2 recorded during the procedure was higher in the high flow nasal oxygen group than in the conventional control group (99.8 ± 0.6 % vs. 95.1 ± 7.3 %; p = 0.001) (Fig 1). Hypoxemia occurred only in the control group [seven cases (19.4%); p = 0.011]. Procedural interruptions including discontinuing sedation, patient stimulation, and jaw thrusting occurred only in the control group ([nine (25.0%), 10 (27.8%), and 10 (27.8%) cases, respectively; p = 0.001 for each]. End-tidal CO2 was lower in the high flow nasal oxygen group than in the control group (30.4 ± 6.6 mmHg vs. 33.9 ± 7.4 mmHg; p = 0.045).
Conclusion: High flow nasal oxygen provided adequate oxygenation without causing procedural interruptions during endoscopic retrograde cholangiopancreatography compared with conventional nasal cannula. We thus suggest that high flow nasal oxygen may be used as a standard oxygen delivery method in endoscopic retrograde cholangiopancreatography.

	Control group (N = 36)	HFNO group (N = 36)	p-value
Baseline SpO2 (%)	98.2 ± 1.6	97.5 ± 1.7	0.089
Lowest SpO2 (%) during procedure	95.1 ± 7.3	99.8 ± 0.6	0.001*
Hypoxemia incidence (N, %)	7 (19.4%)	0 (0.0%)	0.011*
Procedural interruption (N,%)	10 (27.8%)	0 (0.0%)	0.001*
EtCO2 at end of procedure (mmHg)	33.9 ± 7.4	30.4 ± 6.6	0.045*

Table 1. Comparison of outcomes between the HFNO and control groups during ERCP

4886

Vascular surgery for varicose veins in ambulatory: is there a better analgesic protocol to prevent post operative pain?

Vieira A.[1], Santos S.[1], Maia N.[1], Vieira D.[1], Oliveira J.[1], Matos F.[1]
[1]*Centro Hospitalar Universitário de Coimbra - Coimbra (Portugal)*

Background and Goal of Study: Ambulatory surgery is growing from minor procedures performed on healthy patients to complex surgeries on elderly patients with multiple comorbidities. Thus, appropriate discharge assessment is important to secure safety and quality of care.(1) One of the major points for discharge is postoperative pain control. In this study we looked for diferences between the use of an intraoperative analgesic protocol and the need for rescue medication after surgery. We aim to establish a standard analgesic protocol to improve pain control and discharge time.
Materials and Methods: In a retrospective observational study we included 58 patients (P) submitted to Stripping between 01/2019 and 09/2019. The P was recruited according to the inclusion criteria: >18 years, outpatient, general anesthesia with fentanyl opioid used, and distributed into four groups, according to the intraoperative analgesia strategy: Paracetamol (PA) vs PA+Parecoxib (PX) vs PA+Cetorolac (C) and PA+Metamizol (M). The primary endpoint was the use of rescue analgesia in postoperative period. Demographic parameters are evaluated and Chi2 test were used to analyze and compare the main endpoit.
Results and Discussion: Mean age of the P was 49,5 (±12,5) years, with 60% female; 21% were classified as ASA I, 76% ASA II and 3% ASA III. The group distribution was: PA 21%; PX 28%; C 29% and M 22%. 26% of the patients had no pain in postoperative period, 24% mild pain, 34% moderate pain, 4% severe pain and 12% miss data. There were no significant statistical differences between the four groups (p=0,55). 64% of P required rescue analgesia in the postoperative period (29% non-opioid vs. 34% opioid use). Metamizol seems the most effective therapy but also without significant differences. All the patients were discharged before 24 hours of observation in PACU. 24h after discharge 96,5% reported no pain; 3,5% reported mild pain.
Conclusion: With the absence of statistically significant diferences, we reinforce

the importance of multimodal analgesia in the control of postoperative pain. We emphasize that a study with a larger number of patients may lead to different results. With the progressive requirement of outpatient surgery, it will be pertinent to conduct such studies in order to optimize analgesia, patient satisfaction and safety.
References:
1. Recovery and discharge criteria after ambulatory anesthesia: can we improve them? Jakobsson J. 2019.

4952

The outpatient anesthesiology problems with adult dentistry patients

Siryy V.[1], Paykush V.[2], Andriyevska N.[1], Bilous A.[3], Kolganova K.[4]
[1]Dental Implantation and Prosthetics Center MM - Lviv (Ukraine), [2]Ukrainian association sedation and anesthesia in dentistry - Iviv (Ukraine), [3]Dental Center PerfectDent - Iviv (Ukraine), [4]Dentistry center «Zablotskyy Clinic» - Kyiv (Ukraine)

Background and Goal of Study: A significant part of dental care is provided in outpatient dental clinics. For the quality treatment of adult patients with concomitant diseases, allergies, the presence of a vomiting reflex, fear and more, the special treatment approach and mental comfort of the patient are highly required. One of the best ways is anesthesiologic support, which consists of the combined use of analgosedation and local anesthesia. To analyze the problems that arise during analgosedation in outpatient dental patients.
Methods and materials: The evaluation term of 1454 analgosedations, which were conducted in 2013-2018 in adult patients at private dental clinics, was analyzed. Age, gender, ASA physical status, duration, and complications during the intraoperative period were recorded.
Results and Discussion: The average age of patients was 52 ± 13 years (25 to 93 years), 45% of patients were older than 60 years. There were 804 males (55%) and 650 females (45%). ASA I - 611 (42%), ASA II - 698 (48%), ASA III - 45 patients (10%). All patients were operated under local anesthesia and analgosedation: analgesia was administered by fentanyl and dexketoprofen, sedation by propofol, dexmedetomidine, sometimes by thiopental and midazolam. All patients were closely monitored. The average time of treatment was 100 min, analgosedation 115 min. The duration of the analgosedation was smooth, which made it possible to carry out the dental treatment as planned. The following problems were reported during the analgosedation: 14 cases of paroxysmal tachycardia; 37 bleeding from the operating wound; increase in BP, which required the introduction of antihypertensive drugs in 31% of patients, hemostatics were administered in 70% of patients. At discharge from the clinic, patients met the criteria of the PADS scale on average 2 hours after the end of the procedure. The emotional state of the patients after the intervention under the analgosedation is much more positive. The postoperative period was more smoothly because the toothache is favorably influenced by the residual background of central action analgesics.
Conclusions: The most common problems during analgosedation for outpatient dental interventions are arterial hypertension, cardiac arrhythmias, and bleeding. An analgosedation allows for outpatient dental manipulations of any complexity.

5415

Impact of anaesthesia on delay and failure-to-launch rate for same-day discharge total hip replacement patients

Hertling A.[1], Feder O.[1], Cuevas R.[1], Davidovitch R.[1], Furgiuele D.[1], Cuff G.[1]
[1]NYU Langone Med. Ctr. - New York (United States)

Background and Goal of Study: Same-day discharge (SDD) for total hip arthroplasty (THA) has been made possible by minimally invasive surgery and advances in ambulatory anaesthesia. We endeavoured to analyse the most recent data available over a year and determine which factors are associated with failure to discharge ("failure to launch") patients on the same day. We were especially interested in comparing intrathecal bupivacaine vs. ropivacaine to ascertain whether ropivacaine, which is shorter acting1, would lead to an earlier discharge from post-anaesthesia care unit (PACU).
Materials and Methods: Following IRB approval, data of patients undergoing THA and scheduled for SDD from May 2018 until April 2019 were retrospectively collected. Demographics including smoking status, anaesthesia type and medications, surgical time, time in Phase I PACU and opioid analgesics administered in the PACU expressed as morphine equivalent were recorded.
Results and Discussion: Two hundred eighty-one patients' records were analysed. Only three patients received general anaesthesia. No patient receiving spinal anaesthesia had to be administered unanticipated general anaesthesia. Fourteen patients could not be discharged on the day of surgery (aspiration: 1; syncope/light-headedness: 7; severe nausea: 2; uncontrolled pain: 2; excessive blood loss/drainage: 2). A further four patients, while being discharged on the day of surgery, were readmitted and/or revised within two weeks. A Pearson correlation coefficient table was built to explore the relationship between the various data collected. None of the variables was significantly associated with a failure to discharge the patient on the day of surgery. The use of intrathecal ropivacaine significantly shortened the time to discharge from Phase I PACU (79 ± 38.9 vs. 112 ± 54.1 minutes; $p < 0.001$).
Conclusion: The fact that we could not find any predictor of the failure to discharge is probably a reflection of careful pre-operative patient selection. Intrathecal ropivacaine is clearly shorter acting than bupivacaine and should be used preferentially. Using even shorter acting medications such as mepivacaine2 or chloroprocaine might lead to even shorter discharge times but an unanticipated longer duration of surgery might then necessitate conversion to general anaesthesia.
References:
1. McNamee DA et al. BJA 2002; 89(5): 702-6.
2. Chad Mahan M et al. Arthroplasty Today 2019; 5: 226-33.

5462

Anesthesia for gynecological major ambulatory surgery: our experience

Monteagudo L.[1], Pérez A. I.[1], Grasa C.[1], Igea L.[1], Guillen R.[1], Ibañez P.[1]
[1]Complejo Hospitalario de Navarra - Pamplona (Spain)

Background and Goal of Study: Major Ambulatory Surgery (MAS) is considered a big advance in health sector. It can be applied to many surgeries and the anesthesiologist has an important role on it. We present data from MAS gynecologic interventions performed in our centre.
Materials and Methods: We've made a study of women undergoing gynecological laparoscopic surgery in MAS. Patients were followed during the first postoperative week. Informed consent was obtained. Registered variables were age, ASA score, visual analog scale (VAS) score for pain, need for analgesic rescues, oral tolerance, presence of complications and general condition.
Results and Discussion: Our 56 patients were aged 20 to 70 and presented ASA scores I, II and III (68%, 28% and 4% respectively). Interventions included were diagnostic laparoscopy, tubaric ligation, salpingectomy, cystectomy, and laparoscopic adhesiolysis.
Results showed: In PACU (Post Anesthesia Care Unit), incidence of early PONV (Postoperative nausea and vomiting) was 5.35%. 80% of patients were discharged to MAS unit in less than 90 minutes. One patient required hospital admission for post-surgical complication (hemoperitoneum). Overall readmission rate was 1.78%. After 24h, only 62.71% took analgesics. 7.8% had nauseous sensation. All them had drunk normally and 90.2% had eaten normally. 27.45% had returned to normal activities. 45.09% had a good general condition. After 48h, incidence of nausea remained at 7.8%, and 50.98% reported having a good general condition. A week after surgery, no patient presented nausea or vomiting. 84.31% had returned to their normal activities and 7.8% had joined their job. 80.39% rated their general condition as good. MAS is acquiring a great importance due to the decrease of costs and great acceptance by users. Gynecological surgery on a MAS regimen has experienced an increase in recent years since it is minimally invasive surgery, with a low rate of local and systemic complications, and few anesthetic contraindications. In order to obtain satisfactory results it is important to have a well-structured circuit, make an adequate selection of patients and procedures, and inform patients extensively.
Conclusion: These data show the current state of MAS in our center, a tertiary hospital with 1086 beds. They are good general results showing MAS as a good alternative to perform gynecologic surgical procedures.

6014

Postoperative nausea and vomiting in children – our experience in the ambulatory setting

Cardoso G.[1], Campos C.[1], Silva A. P.[1]
[1]*ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)*

Background and Goal of Study: Postoperative nausea and vomiting (PONV) incidence in childhood ranges between 13 and 42% (1), can be even higher in outpatients (2) and is twice as high compared with adults. PONV can result in increased risk of bleeding, wound dehiscence, prolonged postanaesthetic care unit stay and unanticipated hospital admission (2). This high incidence warrants the use of antiemetic prophylaxis instead of therapy. Our main goal was to audit PONV rate in paediatric population, comparing it to the literature findings, and if measures to avoid PONV were adequately taken.
Materials and Methods: This study occurred in our hospital for a period of two years. Information about the patient, type of surgery and intraoperative period was recorded. In the PACU, nausea, vomit and PONV therapeutic administration were registered. In the first day after surgery, our staff called the parents to ask about nausea, vomit and the need to take the PONV prophylaxis prescribed. Descriptive analysis was performed with SPSS software, version 24.
Results and Discussion: Our population had 234 patients: 57% male, 11% under 3 years. ASA functional status was 1 in 71,8% of patients, 2 in 26,5% and 3 in 1,7%. 45,3% of surgeries performed had risk for PONV. The most common surgery performed was adenotonsillectomy, which increases PONV risk. Only 4,7% patients didn't have risk factor for PONV, almost half (47,4%) had 3 risk factors. Intraoperative PONV prophylaxis was performed in 88,9% patients: double therapy in 49,6% cases and triple in 27,8%. Any studies regarding prevalence and number of antiemetics used in paediatric setting were found to compare to these values. Nitrous oxide was used in 1,7% of patients and neostigmine in 10,7% of cases. PONV occurred in 1,7% of patients and no patient was unexpectedly admitted. Despite PONV incidence described is higher in child, in our ambulatory setting we had an expressively low incidence. The reduced number of PONV cases limited the statistical analysis.
Conclusion: In our population, we had a high prevalence of antiemetic prophylaxis administration and a low prevalence of PONV. Although a casual link can't be established, our data suggests that administration of prophylactic antiemetics and also eviction of emetic factors may play an important role in reducing PONV in children on day surgery.
References:
1. https://doi.org/10.1093/bja/ael256 [2] DOI:10.1155/2011/426813.

6281

Breast cancer with intraoperative radiotherapy in hybrid operating room under general anesthesia. First experience in Argentina

Taverna M. V.[1], Traglia M.[2], Paleari A.[2], Orieta D.[2], Benitez Gil L.[2], Rene L.[3]
[1]*Universidad Nacional Rosario - Rosario (Argentina),* [2]*Universidad Nacional De Rosario - Rosario (Argentina),* [3]*Centro De Radioterapia - Rosario (Argentina)*

Background: The possibility of reducing aggression and duration of brest cancer treatment is an option in select pacients or with difficulties accesing the radiotherapy treatment. The IORT technique (mammary quarantrantectomy plus sentinel node plus radiotherapy) is a novel technique that provides complete treatment to selected patients, saving several weeks of treatment and avoid radiating other organs. This hybrid operating room is placed in a day care center, where must be combined surgery, radiotherapy and anesthesia patiens, generating cost efficent outcomes, less time consuming treatment and satisfaction of patients. The benefits of this kind of rooms are safety, diagnosis and treatment in the same place, faster outcome
Case Report: We present our experience of more than 12 months, with 31 patients treated in an hybrid operating room in a Radiotherapy Clinic in day case surgery. The average of age was 68 years old. We had one unexpected dificult airway that has been waked up, one case of postoperatory hypertension that recevied labetalol ev and one case of postoperative delirium 24hs postoperative no need to be treated. Discussion: The IORT thecnique is a reality in the city of Rosario Argentina, improving the treatment of locoregional brest cancer. The key of succes is a correct selection of patients, team working, nursery care and communication.
References:
1. Andersen, K.Andersen, K. G., Gärtner, R., Kroman, N., Flyger, H., Kehlet, H. (2012). Persistent pain after targeted intraoperative radiotherapy (TARGIT) or external breast radiotherapy for breast cancer: A randomised trial. The Breast, 21(1), 46–49.The Breast, 21(1), 46–49.
2. Lermitte J, Chung F: Patient selection in ambulatory surgery, Curr Opin Anesthesiol 18:598-602, 2005.

Learning points: day care surgery. improving locoregional brest cancer treatment, team working, selecting patients.

6369

Comparison of pain between unilateral and bilateral inguinal hernia repair in a tertiary hospital surgical day care center

Valente M.[1], Castro A.[1], Costa A. I.[1], Carneiro E.[1]
[1]*Centro Hospitalar Universitário de São João - Porto (Portugal)*

Background and Goal of Study: we aim to measure pain at Post Anesthetic Unit entry, 24hours (h) and 30days, postoperative complications, daily activity constraints and time to professional reintegration between unilateral and bilateral inguinal hernia repair surgery to assess any potential benefit of bilateral surgery.
Materials and Methods: Observational study, retrospective cohort from a Portuguese tertiary hospital surgical day care center. Inclusion criteria: inguinal hernia repair performed in ambulatory setting. Exclusion criteria: age <18y, absent medical data from Electronic Health Record.
Results and Discussion: 176 unilateral and 39 bilateral hernia repairs, median age (interquartile range, IQR) 55(19) years vs 51(24) years (p=0.12). 85.8% vs 100% males (p=0.03) with similar ASA-PS (p=0.36) and no differences in the analgesic scheme between groups (table 1). Pain at PACU entry was similar in both groups (median VAS[IQR]: 0[0] , p=0.91). Although bilateral surgery was associated with greater pain (median VAS[IQR]) at 24h and 30 days (0[2] vs 0[3], p=0.03 and 0[2] vs 0[3], p=0.03) there were no statistically significant differences in restriction to daily life activity (p=0.28) or time to return to work (p=0.40). There were also no differences in incidence of postoperative complications (table 2).

	Unilateral n (%)	Bilateral n (%)	p-value
Acetaminophen	164 (93)	36 (92)	0.84
Cetorolac	149 (84)	32 (82)	0.68
Tramadol	126 (71)	30 (76)	0.50
Morfine	30 (17)	12 (30)	0.05

	Unilateral n (%)	Bilateral n (%)	p-value
Overall complications	15 (8)	4 (10)	0.75
Unplanned admission	1 (0.6)	0 (0)	1.00
Reintervention	2 (1)	1 (2)	0.45
Infection	9 (5)	2 (5)	1.00
Other	10 (5)	3 (7)	0.70

Conclusion: In terms of pain control at PACU, 24h and 30 days our study did not show differences between unilateral and bilateral hernia repair. And also there is no difference on resume normal daily activities and work. The main limitation of this work is the study design.

6377

Spinal versus general anesthesia for hemorrhoidectomy in a tertiary hospital surgical day care center

Castro A.[1], Valente M.[1], Costa A. I.[1], Carneiro E.[1]
[1]*Centro Hospitalar e Universitario São João - Porto (Portugal)*

Background and Goal of Study: We aim to measure pain at Post Anesthetic Care Unit (PACU) entry, 24 hours (h) and 30 days, nausea/vomiting, daily activity constraints and time to professional reintegration between general (GA) and spinal anesthesia (SA) in hemorrhoidectomies performed in ambulatory setting.
Materials and Methods: Observational study, retrospective cohort from a Portuguese tertiary hospital surgical day care center. Inclusion criteria: hemorrhoidectomy performed under general or spinal anesthesia in ambulatory setting. Exclusion criteria: age < 18 years, absent medical data from Electronic Health Record.
Results and Discussion: 49 GA and 13 SA, median ages (interquartile range) 49(14) years and 46(6) years (p=0.24). 51% vs 53% males (p=0.86) and all ASA-

PS ≤ 2 (p=0.20). Acetaminophen + tramadol was administered as per os analgesic scheme to all patients. Nonsteroidal anti-inflammatory drugs (NSAID) were more used in the GA group (79.6% vs 46.2%, p=0.03). There were no statistically significant differences in pain control in the PACU, at 24 hours or at 30 days (table 1). SA was associated with less opioid consumption (p=0.02), less NSAID consumption (p=0.03) and less rescue analgesia in PACU (p=0.04). There was no statistically significant differences in the incidence of postoperative nausea and vomiting in PACU (0 cases by group) or at 24h (p=0.38) and restriction in daily life activities (p=1.0) or time to return to work (p=0.48).
Conclusion: There is no differences in pain control between SA and GA. SA could be useful and safe alternative to GA in the ambulatory setting allowing opioid sparing. The main limitation of this work is the study design.

5384

Incidence of hypotension and hypoxemia during procedural sedation in relation to the duration of supraventricular cardiac ablations, a retrospective cohort study

Driesens M.[1], Barends C.[1], Mungroop H.[1], Wulfert F.[1]
[1]UMCG - Universitair Medisch Centrum Groningen - Groningen (Netherlands)

Background and Goal of Study: Arrhythmias are treated by cardiac ablation (CA) performed under moderate-to-deep sedation (MDS). CA can take up to several hours. A previous study found an association between the risk of a sedation related adverse event and procedure duration1. We investigated the incidence of sedation related events (SRE) during MDS using Target Controlled Infusions (TCI) of propofol and remifentanil in relation to the duration of the procedure.
Materials and Methods: In this retrospective cohort study we reviewed the anesthetic records of 229 patients undergoing CA for supraventricular arrhythmias under MDS, between January – November 2019 in the University Medical Center Groningen. An IRB waiver was obtained. Sedation related events were described as hypotension: mean arterial pressure below 65 mmHg, longer than 10 minutes requiring treatment. Hypoxemia: any oxygen saturation below 75% or oxygen saturation below 90% for more than 60 seconds. Procedures were divided into 2 groups: group A ≤120 minutes, group B >120 minutes. MDS was administered by effect-site targetted TCI using the Schnider model for propofol and remifentanil using the Minto model. Patients received a single bolus of 5-10 mg esketamine. Sedation was targeted at an Observer's Assessment of Alertness and Sedation score of 3 to 2. Statistical analyses included Student t-test and Chi-square test. P-values <0.05 were considered statistically significant.
Results and Discussion: Demographic characteristics were similar in both groups (table 1). There were no SRE's in group A and three SRE's in group B (p= 0.149): hypotension (2) and hypoxemia (1). However, all these events took place in the first two hours after the start of the procedure. All procedures were completed and no patient suffered lasting health consequences. Our data suggest that procedure duration was not a risk factor for hypoxemia and hypotension since all events occurred within 120 minutes.
Conclusion: In this study procedure duration is not a risk factor for hypoxemia and hypotension. However, a larger prospective study is needed to obtain more data.
Reference:
1. Koers et al. Eur J Anaesthesiol 2018; 35:659–666.

Table 1. *Patient and procedure characteristics*

	Group A	Group B	P value
N	93 (41%)	136 (59%)	
Mean age (SD, RANGE)	56 (15.6, 18-78)	57(14.3, 18-77)	0.41
Male	51(55%)	72 (53%)	0.87
Female	42(45%)	64 (47%)	0.86
ASA I	1 (1%)	2 (1%)	0.79
ASA II	71 (76%)	103 (76%)	0.96
ASA III	21 (23%)	31 (23%)	0.97
Min-max duration minutes	44-120	121-327	
Mean duration minutes (SD)	100 (15)	166 (42)	

4762

PONV in ambulatory surgery: the role of Apfel Score in early discharge!

Santos S.[1], Vieira A. L.[1], Infante C.[1], Castro M.[1], Martins I.[1], Matos F.[1]
[1]Coimbra Hospital and University Centre - Coimbra (Portugal)

Background and Goal of Study: The interest in outpatient surgery is increasing and the importance of enhanced recovery after surgery is nowadays a common practice. Thus, the therapeutic plan should be more demanding with high priority on patient safety and quality of care.1 PONV are the most frequent complaints and a major cause for late discharge. The Apfel Score (APF) predicts risk for postoperative nausea and vomiting and advises on the drug strategy based on the presented risk. It includes four risk factors (RF). The aim of this study is to determinate the compliance of anti-emetic medication for PONV according to APF and the need for rescue antiemetic medication during recovery time.
Materials and Methods: In a retrospective observational study, we included 80 patients (P) submitted to Stripping between 01/2019 and 09/2019. P was assessed for the APF, the intra-operative antiemetic medication and the ocurrence of PONV with the need for antiemetic medication during the recovery time, our main point. Demographic parameters are evaluated and Chi2 test were used to analyze and compare the main endpoit.
Results and Discussion: Mean age of the P was 51 years, with 64% female; 17,5% were classified as ASA I, 78,8% ASA II and 3,7% ASA III. The group distribution was: 0-1 RF: 35%; 2 RF: 45% and 3-4 RF:20%. In 61% of P was given antiemetic medication according to APF. Of the non compliance group, 84% were over-medicated. 12,5% P presented symptoms and required rescue medication but there were no statistically significant relationships between symptom ocurrence in postoperative period and therapy according or not to the APF. Other variables such as gender, age and ASA status were also unrelated to recovery therapeutic need. We focus on antiemetic overmedication given to patients that do not meet the Apfel Score criteria and also on the low incidence of PONV.
Conclusion: Most patients were medicated according APF, however we highlight that there is no relationship between rescue antiemetic medication and accomplishment of APF. It is important to recognize the existence of other risk factors for PONV. We emphasize that a study with more P may lead to different results. With the requirements of outpatient surgery, it is pertinent to conduct such studies in order to optimize P satisfaction and safety.
References:
1. Recovery and discharge criteria after ambulatory anesthesia: can we improve them? Jakobsson J. 2019.

4767

The effect of recall-dose propofol application on the duration of postictal agitation in patients undergoing electroconvulsive therapy

Etikcan K. T.[1], Baytaş V.[2], Özçelik M.[2], Alkış N.[2]
[1]Ankara University Faculty of Medicine Department of Anesthesiology and ICU - Ankara (Turkey), [2]Ankara University Faculty of Medicine Department of Anesthesiology and ICU - Ankara (Turkey)

Background and Goal of Study: Electroconvulsive Therapy (ECT) is a treatment for patients with drug-resistant bipolar and schizophrenia. Postictal agitation (PIA) may develop after ECT sessions due to the procedure itself. The present retrospective study aimed to analyze the effect of propofol application as recall-dose on the incidence of postictal agitation in patients received anesthesia during ECT sessions.
Materials and Methods: Nine ASA I-II patients who underwent 46 sessions of ECT from March 2018 to May 2018 at the ECT Laboratory were identified as eligible subjects retrospectively. After monitorization, all patients received lidocaine 0.5mg/kg, propofol 1 mg/kg, rocuronium 0.6mg/kg and sugammadex 8-16 mg/kg according to their posttetanic count values. All patients were ventilated by using a bag-mask until full recovery of neuromuscular block. The information on demographic characteristics and duration of seizures were noted. The presence and severity of PIA according to PIA classification system (no,mild,moderate,severe according to the symptoms of agitation) were also recorded at 5th, 10th and 15thminutes after ECT. Patients were classified according to either receiving 0.5mg/kg recall-dose propofol (GroupP) or not (GroupC) after ECT, from their medical records.
Results and Discussion: Fourty-six ECT sessions were identified as eligible subjects in this study. Two patients who had underwent two or more ECT sessions previously were excluded from the analysis. In Group P, recall-dose propofol after ECT were applied in 19 ECT sessions while in the remaining 19 other sessions no drug was applied after ECT. In Group P, there was no PIA at the 5th minutes after ECT in 16 sessions. However, PIA was developed in 11 sessions at the 5th minutes after ECT in Group C (p=0.034). The statistically significant difference regarding PIA was disappeared at 10th and 15th minutes after ECT. There were 2 sessions

developing PIA graded as severe in Group C, whereas none in Group P.
Conclusion: The present study demonstrates that an additional dose of bolus propofol (0.5mg/kg) after ECT sessions seems to be ideal for reducing the incidence of PIA,especially at 5th minutes after ECT.Due to its short half life,recall-propofol does not affect the incidence of PIA emerging at the late period after ECT. In conclusion, recall-dose propofol should be considered in patients undergoing ECT who may develop severe PIA.

4954

Laparoscopic nissen fundoplication on a patient with patent foramen ovale in ambulatory surgery

Cardoso G.[1], Félix F.[1], Castedo J.[1], Silva A. L.[1], Carneiro S.[1]
[1]ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background: Patent foramen ovale (PFO) is estimated to have a prevalence of 25%. PFO has the potential for right-to-left shunt, hypoxemia, paradoxical embolization and ischemic stroke. Despite its advantages compared to open surgical techniques, the safety of laparoscopic surgery in patients with congenital heart disease has been controversial, being contraindicated in some reports(1). During pneumoperitoneum, the possibility of paradoxical air embolism (PAE) in patients already at risk makes the anaesthesia special. Furthermore, there are no case reports in ambulatory surgery and no consensus of the minimal standard care.
Case Report: A 60 year old female patient with gastroesophageal reflux disease was evaluated for laparoscopic Nissen Fundoplication as day surgery. The patient had been recently diagnosed with a PFO with a left-to-right shunt without surgical indication. After discussion, the team decided to perform laparoscopic surgery with increased surveillance for embolic events, limited intraabdominal pressure and slow rate of pneumoperitoneum insufflation. Additionally, if necessary, a hyperbaric chamber is available at the hospital. Surgery was conducted without complications, and the patient was then taken to the postoperative recovery unit. It was decided to keep the patient under surveillance during an overnight stay, in order to quickly detect and respond to any complications. The patient was discharged the day after.
Discussion: Noting both the benefits of laparoscopic surgery and the substantial incidence of PFO in the general population(2), the attending and consulting surgeons reasoned that the benefits of laparoscopy greatly exceeded an immeasurably small risk of paradoxical emboli. Although transoesophageal echocardiography is the most sensitive monitor for PAE diagnosis, its implementation is not always possible(3). We report a successful case of ambulatory surgery in the presence of a heart condition in which laparoscopic surgery was safely applied with a previously outlined multidisciplinary plan, careful clinical observation and haemodynamic monitoring.
References:
1. https://doi.org/10.1093/bjaceaccp/mkr027.
2. https://doi.org/10.1016/j.jclinane.2009.09.011 (3)DOI:10.5152/TJAR.2016.13007.
Learning points: A previously outlined multidisciplinary plan was decisive for the success of the case. There are no anaesthesia guidelines for the management of these patients, so it is advised to have high standards of care.

4792

Low flow anesthesia: Comparison of the Effects of BASKA Mask and Endotracheal Tube on Hemodynamics and Postoperative Recovery in Outpatient Surgery

Ozturk A. C.[1], Akdaş Tekin E.[1], Yakar M. N.[1], Gün I.[1], Turgut N.[1]
[1]Ministry of Health Okmeydanı Training and Research Hospital, İstanbul, Turkey - Istanbul (Turkey)

Backgroundand: Goal of Study:Low flow anesthesia can lead to reduction of anesthetic gas and vaporconsumption. Baska Mask® has proved to be an effective and safe supraglottic airway device. The aim of this study is to assess the feasibility of new generation laryngeal mask Baska Mask® airway during controlled ventilation using low fresh gasflow (1.0 L/min) as compared to endotracheal tube (ETT) in outpatient surgery.
Materials and Methods: The study was approved by The Ethics Committee of the University of Health Sciences with a decision number of 1193, March19th, 2019.81adultpatients;ASA I-II, beingscheduledforelectivesurgicalprocedures, with an expectedduration of anesthesia 120 min.orless, were randomly allocated into two groups -Group I (Baska Mask®, n=41) had been ventilated using Baska Mask®; and Group II (ETT,n=40) were intubated using ETT. After 10 minutes of high fresh gas flow, the flow was reduced to 1 L/min. Patients were monitored for intraoperative HR, SpO2, MAP,ETCO2, PPLAT(cm/H2O). The effectiveness of the airway device on intraoperative hemodynamic, postoperative recovery and postoperative airway-related complications (cough, sore throat, difficulty in swallowing) were evaluated.
Results and Discussion: Patient demographics are shown in Table1.No significant difference was found between the two groups when intraoperative hemodynamic data were compared. Although the mean value was within normal limits, ETCO2 levels were found to be significantly higher in patients who were treated with Baska Mask®(32,61±2,14vs31,68±2,11;p=0,040,Table 2.).Themedian (min.-max.) duration of insertion in the Baska and ETT groupswas 9 (6-13) and 15 (10-22) seconds, respectively (z=-7.392;p<0.001,Table 3.). Postoperative recovery time for Baska Mask® were significantly shorter than the ETT (16,46±1,47min.vs18,10±2,06 min.;p=0.001).In the early postoperative period, no significant difference was observed in complications such as cough, dysphagia and sore throat (Table4.).
Conclusion: Low-flow sevoflurane anesthesia with Baska Mask®might be considered in patients with short operations who need rapid recovery from anesthesia.

4986

Jaw Elevation Device(JED™) use during In-Vitro Fertilization(IVF) procedures under deep sedation

Dagtekin M. I.[1], Karaoğlan L. I.[1], Özbilgin Ş.[1], İnce I. E.[1], Ellidokuz H.[1]
[1]Dokuz Eylul University Faculty of Medicine - Izmir (Turkey)

Background and Goal of Study: IVF is a painful and disturbing interventional procedure and often requires analgesia or anesthesia.Upper airway obstruction may occur in varying degrees in patients undergoing this procedure under sedation. The aim of this study consists of collecting upper airway obstruction occurance, haemodynamic and ventilatory data and validating the effectiveness of the device, on patients undergoing IVF procedure with procedural sedation and analgesia, with or without the use of Jaw Elevation Device(JED™).
Materials and Methods: This study is a retrospective data analysis from outpatient, ASA (American Society of Anesthesiologists) I-II and over 18 years of age patient files who underwent IVF procedure in our hospital's IVF center between the dates May 2016 and May 2018 after approval from Non-Interventional Research Ethics Committee, Dokuz Eylül University Faculty of Medicine.Patients were separated into two groups, according to JED utilization.Demographics and ASA standart monitorisation data are collected.Upper airway obstruction time and durations and occurances during procedure, applied airway maneuvers and their effectiveness, JED utilization and alternative airway management data are collected.
Results and Discussion: In our study, data from a total of 130 patients, who underwent oocyte collection procedure under deep sedation is evaluated.In 65 of these patients there were JED utilization. Mean age of patients were 32,9, 33.2 and 33.09; mean body mass index values were 25,79, 24,15 and 24,97; in the control group, JED group and total,respectively. ASA risk score distribution was 44 and 39 ASA I patients; 21 and 26 ASA II patients in the control and JED groups, respectively. Upper airway obstruction occurance noted in 32 of the patients in control group and in 30 of the patients in JED group.Alternative airway management were employed in 3 and 7 patients in control and JED groups, respectively.The study has the largest population according to similar studies which are associated with JED, providing better opinion about the use of the device.
Conclusion: Jaw Elevation Device's utilization is useful for maintaining an open upper airway during interventional procedures which require a deep sedation plane. However it is necessary to make proper patient selection without head/neck abnormalities and usage under close vigilance/supervision due to the device's "slight" inadequacy/imperfection at maintaining an open upper airway.

5257

Ephedrine Prevents Orthostatic Hypotension Immediately After Dental Treatment under Dexmedetomidine Sedation

U. Adachi Y.[1], Taharabaru S.[2], Sakaguchi K.[3], Hibi H.[3], Sato-Boku A.[4], Okuda M.[5]
[1]Nagoya University Hospital - Nagoya (Japan), [2]Nagoya Medical Center - Nagoya (Japan), [3]Nagoya University Graduate School of Medicine - Nagoya (Japan), [4]Aichi Gakuin University School of Dentistry - Nagoya (Japan), [5]Aichi Gakuin University School of Dentistrye - Nagoya (Japan)

Background and Goal of Study: Office based dental treatment is undergone in patients with semi-supine position using a reclining chair. We administer dexmedetomidine (Dex) as a sedative during surgical procedure for maintaining patients' comfortably. Dex has a sympatholytic effect, and heart rate and blood pressure are decreased. After the treatment, the patient is returned to sitting position. Some patients demonstrate mild orthostatic hypotension without reflective increase of heart rate. Thus, we preliminary evaluated the prophylactic effect of ephedrine (Ephe) administration at the end of surgery to prevent from hypotension. Materials and Methods: After the approval of Ethical Committee of the Institute, prospective, single-blinded randomized study was conducted. 20 adult patients participated in the study after giving written informed consent. The patients were allocated into 2 groups: no intervention otherwise Dex infusion (Control group) and 10-mg Ephe was administered 5 min before the position change to sitting from semi-supine (Ephe group). ASA standard monitor was applied. 6-μg/kg/h Dex was infused 10 min as a loading and subsequently 0.7-μg/kg/h Dex was continuously infused. The infusion was terminated 10 min before the end of the procedure. The changes in the vital signs were observed until returning to the patient to a bed in the ward.
Results and Discussion: There was no difference in patients' background between the groups (Table). Immediately after the position change, there was no significant difference in heart rate (Figure). However, blood pressure was significantly higher in Ephe group.

Table. Patients' characteristics and results of the study.

	Control (No intervention)	Ephedrine 10 mg i.v.
n	10	10
Age (yr)	27 ± 10	27 ± 5
Sex (m/f)	4/6	4/6
Weight (kg)	58 ± 11	57 ± 12
Height (cm)	165 ± 10	166 ± 11
Operation time (min)	114 ± 31	95 ± 45
Anaesthetic time (min)	129 ± 46	116 ± 45
Total dose of dexmedetomidine (μg)	117 ± 27	114 ± 31
During anaesthetic management		
Lowest systolic blood pressure (mmHg)	108 ± 13	106 ± 16
Lowest diastolic blood pressure (mmHg)	61 ± 9	64 ± 13
Lowest heart rate (/min)	62 ± 10	72 ± 7*

Data was presented as mean ± SD. *: A $P = 0.05$ between groups.

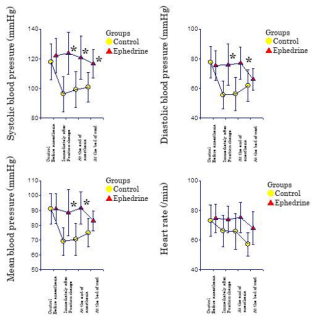


Figure. The change in the blood pressure (systolic, diastolic and mean) and heart rate before and after the position changes with or without 10-mg ephedrine administration. Data was presented as mean ± SD. *: A $P < 0.05$ between two groups.

Although one of the most emphasized advantage of Dex is providing mild analgesic effect in addition to sedative properties. Cardiovascular effect might be small but sympathetic activities decreased during and after the infusion. 10-mg Ephe administration immediately before the position change effectively maintained the blood pressure after the Dex sedation.
Conclusion: Sedation using Dex might enhance orthostatic hypotension at the position change immediately after the dental treatment, Ephe appropriately prevented from the adverse response.

5299

Comparison of dexmedetomidine-propofol and ketamine-propofol administration during sedation-guided endoscopy

Tekeli A. E.[1], Oğuz A. K.[1], Tunçdemir Y. E.[1]
[1]Van Yuzuncu Yil University - Van (Turkey)

Background and Goal of Study: Dexmedetomidine and ketamine popular sedative agents that result in minimal respiratory depression and the presence of analgesic activity. Dexmedetomidine-propofol combination and ketamine-propofol combination were compared during upper gastrointestinal endoscopy sedation for sedation depth, hemodynamic stability, patient and endoscopist satisfaction, recovery time, desaturation, apnoea, cough and frequency of nausea and vomiting. Materials and Methods:The study commenced after receiving approval local ethics committee. Patients between 18 and 60 years, American Society of Anesthesiologists (ASA) I and II groups were included. Patients that had severe organ disease, allergies to study drugs, refused to participate were excluded. Cases were divided into the dexmedetomidine-propofol group (Group D, n=30) and ketamine-propofol group (Group K, n=30). Cardiac monitoring, peripheral oxygen saturation, bispectral index(BIS) monitoring were performed. Group D received 1mg/kg dexmedetomidine+0.5mg/kg propofol intravenous(iv)bolus, 0.5 μg/kg/h dexmedetomidine+ 0.5 mg/kg/h propfol infusion. Group K received 0.125 mL/kg bolus, 0.125 mL/kg/h ketamine+ propofol=ketofol infusion (ketofol was prepared with 4 mg propofol+2 mg ketamine). Patients were followed up with Ramsay Sedation Scale (RSS) of≥4. SPSS 22.0 program was used for the analyses.
Results and Discussion: In Group K, recovery time and mean arterial pressure (MAP) values were significantly shorter, coughing rate, pulse and BIS values were higher than Group D($p<0.05$). Our study produced different findings about ketofol and deeper anaesthesia than El Mourad et al.'s study but similar findings to Yagan et al.'s study on patient and endoscopist satisfaction evaluations.Although there were no significant differences, we believe dexmedetomidine group experienced more comfortable levels of sedation.
Conclusion: Dexmedetomidine-propofol and ketamine-propofol combinations may be suitable for endoscopy sedation due to their different properties.
References:
1. El Mourad MB, et al. Comparison of intravenous dexmedetomidine propofol versus ketofol for sedation during awake fiberoptic intubation:A prospective randomized study. Anesth Pain Med. 2019 Feb 26;9:e86442.
2. Yagan O, et al. Comparison of dexmedetomidine versus ketamine-propofol combination for sedation in cataract surgery. Turk J Anaesthesiol Reanim 2015;43:84-9.
Acknowledgements: We thank scribendi for editing.

5843

Performance of Spinal Block With Prilocaíne 2% Hyperbaric Solution in Ambulatory Surgery Clinical Setting

Barbosa C.[1], Gomes da Costa J.[2], Carvalho J.[1], Pinto C.[1]
[1]ULSM Hospital Pedro Hispano - Porto (Portugal), [2]ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background and Goal of Study: Prilocaine is a local anesthetic characterized by intermediate potency and duration and fast onset of action. A recent formulation of 2% hyperbaric solution is currently available in Europe. With an advocated better safety profile, prilocaine is suggested as substitute to lidocaine, mepivacaine, and to low doses of long-acting local anesthetics in spinal anesthesia for ambulatory surgery. The relatively sparse and low quality amount of evidence available does not allow a rigorous evidence-based evaluation of its characteristics in the clinical setting.
Materials and Methods: We evaluated the patients who went through ambulatory surgery under spinal block with prilocaíne 2% hyperbaric solution over a period of six months at our institution and analysed the data using standard statistical methods.
Results and Discussion: We assessed data from 41 patients: 21 cases of lower limb surgery, 14 cases of inguinal hernia repair and 6 cases of other pelvic region procedures. The time to achieve desired level block was 6 ± 2.2 min. Time to regression of the motor block was 101.8 ± 28.7 min. Time to regression of the sensorial block was 118.4 ± 38.1 min. Time to unassisted ambulation was 247.8 ± 81.9 min. Time to first voiding was 298.2 ±186.1 min. Time to home discharge was 267.4 ± 92.7 min. There was one failed block. There were no severe adverse events recorded. Three patients had hypotension easily treated.
Conclusion: Spinal Block With Prilocaíne 2% Hyperbaric Solution proved to be an efficient and reliable anesthetic strategy for short to intermediate length ambulatory procedures.

6049

Anaesthetic management in a patient with glucose-6-phosphate dehydrogenase deficiency undergoing an out-patient surgery

Cortez M.[1], Almeida C.[1], Marques C.[1], Cadilha S.[1]
[1]*Centro Hospitalar Lisboa Central - Lisbon (Portugal)*

Background: Glucose-6-phosphate dehydrogenase (G-6-PD) deficiency is an X-linked recessive enzymopathy responsible for acute haemolysis following exposure to oxidative stress. Drugs which induce haemolysis in these patients are often used in anaesthesia and perioperative pain management. Here, we present a patient with G-6-PD deficiency who underwent uneventful ambulatory surgery.
Case Report: A 20-year-old female patient, ASA II, presented for multiple dental extraction under general anaesthesia in our Ambulatory Unit. Past history revealed well-controlled asthma and G-6-PD deficiency with no history of haemolysis, jaundice or blood transfusion. All the routine investigations were within normal limits (haemoglobin 13.4 g%). In the operating room, fentanyl 0.1mg and propofol 200mg were administered and nasotracheal intubation was facilitated with rocuronium 40mg. Standard ASA monitoring as well as bispectral index and neuromuscular monitoring were applied. Anaesthesia was maintained with iv propofol and intermittent boluses of rocuronium and fentanyl. Cefazolin 2g was given IV as prophylactic antibiotics. The uneventful surgery lasted for 55 minutes. At the end of procedure, anaesthetic agents were discontinued, residual neuromuscular blockade was reversed with neostigmine and atropine and patient was extubated. Paracetamol 1g and metamizole 2g were given for postoperative analgesia. After 3 hours without incidents in the Post Anaesthesia Care Unit, the patient was informed of signs of acute haemolysis and was discharged. Post-surgery calls at 24 hours, 72 hours and at the 7th day revealed the remaining postoperative course was uneventful.
Discussion: During surgery, anesthetic management should focus on minimizing oxidative stress, and monitoring and treating hemolysis. Drugs that cause oxidative stress and/or induce methemoglobinemia should be avoided in G6PD-deficient patients. However, there is no evidence-based consensus regarding the use of anesthetic agents in patients with G6PD deficiency. In our case, fentanyl, propofol, rocuronium, paracetamol and metamizole were found to be safe.
References:
1. N Dogra, GD Puri, SS Rana, Glucose-6-phosphate dehydrogenase deficiency and cardiac surgery, 25(6) 417-421, Perfusion 2010.
Learning points: The inadequate management of G6PD-deficient patients increases the risk of them developing acute hemolytic anemia. We found that, with careful selection, G6PD-deficient patients can be eligible for out-patient surgery.

Regional Anaesthesiology

4357

A randomised comparison of lumbar plexus, fascia iliaca and femoral nerve blocks for analgesia after hip fracture surgery: a preliminary report

Leurcharusmee P.[1], Wanishpongpan S.[1], Samerchua A.[1], Lorsomradee S.[1]
[1]*Chiang Mai University - Muang Chiang Mai (Thailand)*

Background and Goal of Study: Postoperative pain following hip fracture surgery limits patient's mobility and thereby increases morbidity and mortality. Several peripheral nerve block (PNB) techniques provide adequate analgesia for hip fracture operations which involve the hip joint, proximal femur, and skin of the lateral thigh. This study aims to compare three PNBs, the lumbar plexus block (LPB), fascia iliaca block (FIB) and femoral nerve block (FNB), for acute pain control after hip fracture surgery.
Materials and Methods: This study obtained ethics approval and was registered at the Thai Clinical Trial Registry prior to patient enrollment. A total of 135 patients undergoing dynamic hip screw, intramedullary nail or bipolar hemiarthroplasty were planned to be equally randomised to either the LPB, FIB or FNB groups. All patients received ultrasound-guided PNB, using a mixture of 25 mL of levobupivacaine 0.3%, adrenaline 5 µg/mL and dexamethasone 5 mg, before a spinal block (SPB). Postoperative pain scores and morphine consumption were recorded as primary outcomes. The secondary outcomes were PNB performance time (starting from the ultrasound probe placement to the completion of the local anaesthetic injection), complications of PNBs, and walking ability after surgery.
Results: From August 2018 to October 2019, 80 out of 135 patients were recruited with comparable demographic data, types of operation, and SPB technique among the three groups. Three patients were excluded due to conversion to general anaesthesia, leaving 25, 26 and 26 patients in the LPB, FIB and FNB groups, respectively. Postoperative morphine consumption [median(IQR); 2(0-3) vs 3(0-4) vs 3(0-4) mg; P=0.905] and 4-point verbal rating scale [median(IQR); 0(0-1) vs 0(0-0) vs 0(0-1); P=0.216] at 24 hours were not different among the groups. The median(IQR) times for performing the LPB, FIB and FNB were 5.4(4.2-6.7), 3.5(3.0-6.4) and 2.9(2.5-4.1) minutes. When compared between groups, the procedural time of the LPB was more than the FIB [P=0.019] and the FNB [P<0.001], and that of the FIB was longer than the FNB [P=0.015]. There were no vascular puncture, paresthesia or LA toxicity from all PNBs. Patients started walking with aid on postoperative day 1-3 in all groups [P=0.863].
Conclusions: From the preliminary results, the LPB, FIB and FNB provided effective pain control after hip fracture surgery. The ultrasound-guided FNB had the shortest procedural time as implying the simplest technique.

4558

Compartment psoas block efficacy and safety for elderly patients with proximal femur fractures

Kuchyn I.[1], Bielka K.[2], Tokar I.[3], Artemenko V.[3]
[1]*Bogomolets National Medical University - Kyiv (Ukraine),* [2]*Bogomolets National Medical University - Kiyv (Ukraine),* [3]*Medical Center «Into-Sana» - Odesa (Ukraine)*

Background and Goal of Study: Proximal femur fractures are most common fractures in the elderly and associated with significant mortality and morbidity, with high economic and social impact. Perioperative pain management influence outcomes and mortality after femur surgery with early mobilization being possible. The goal of the study was to compare the efficacy and safety of the compartment psoas block for perioperative analgesia in elderly patients with proximal femur fractures.
Materials and Methods: The randomized controlled study was held in medical center «Into-Sana» (Odesa, Ukraine). Patients with proximal femur fractures and older than 60 years were included in the study. They were randomly allocated to 3 groups – compartment psoas block group (bupivacaine analgesia was started as soon as possible before surgery and prolonged during and after surgery with additional ischiadicus block for surgical anesthesia); spinal anesthesia (SA) group and general (inhalational) anesthesia (GA) group, both with systemic analgesia perioperatively (acetaminophen, NSAIDS, nalbuphine on demand). Categorical data are presented as proportions and continuous data as medians with 25–75% interquartile ranges (IQRs). To assess significance levels, a Kruskal-Wallis test and Fisher's exact test were used. A p-value of <0.05 was considered significant.
Results and Discussion: 90 patients were included in this study (30 in each group

respectively). Patients in groups did not differ by the demographic characteristics and comorbidity. Perioperative compartment psoas block was associated with better pain control (number of patients with severe pain 10% vs 47% and 60% in SA and GA groups, p<0.05), decreased opioid consumption in first 24 hours after surgery (0 [0-5] mg vs 15 [10-20] and 20 [15-25] mg respectively, p<0.001), better sleep quality, earlier mobilization after surgery, decreased incidence of opioid-associated vomiting/nausea (OR 7 95 CI 1,3-35, p=0,02) and myocardial injury (OR 9 95 CI 1,01-77, p=0,048 for SA group and OR 11 95 CI 1,2-91, p=0,03 for GA group). There were no difference in the incidence of hospital acquired pneumonia and delirium.
Conclusion: Perioperative compartment psoas block is effective and safe for perioperative analgesia in elderly patients with proximal femur fractures, and is associated with better pain control and decreased complications incidence.

4621

Comparison of the analgesic effects of adding infiltration between popliteal vessel and capsule of the knee (IPACK) to femoral triangle block for anterior cruciate ligament reconstruction (ACLR): retrospective cohort

Moyano P.[1], Vescovo A.[1], Fraidenraij U.[1], Arteaga F.[1], Pagotto V.[1]
[1]Hospital Italiano de Buenos Aires - Buenos Aires (Argentina)

Background and Goal of Study: ACLR is associated with moderate to severe pain, performed generally on an ambulatory basis. Hamstring graft technique, as well as tibial or femoral tunnels, gives a potential source of pain at the posterior aspect of the thigh and knee, exceeding the territory covered by femoral (FB) or femoral triangle (FT) blockades1. IPACK blocks sensory nerves coming from the posterior aspect of the knee. The aim of this study was to evaluate the analgesic effects of adding IPACK to FT in ACLR since there are no studies comparing these strategies.
Materials and Methods: This study was conducted at Hospital Italiano de Buenos Aires. Data was extracted of clinical records. We included patients undergoing ACLR (hamstring graft) under general anesthesia and receiving ultrasound guided FT (at the apex of FT) with or without IPACK (20 ml 0.375% ropivacaine) between June 2016 and June 2019. Patient demographics, anesthetic strategy, post-operative verbal numerical pain scale (VNS), AINEs and opioids (as oral morphine equivalents) administration and total time in post anesthesia care unit (PACU) were examined. Qualitative data were compared by using chi-square or Fisher's exact tests, and quantitative data using Wilcoxon rank-sum test. We used multiple logistic regression to evaluate association between anesthetic strategy and rescue analgesic needs.
Results and Discussion: 180 patients were included, 84 in the FT group and 96 in the IPACK+FT group. VNS pain scores within the first 60 minutes were lower in the IPACK group (table 1). IPACK group required less rescue opioids (29%) than the FT group (50%). There were no significant differences in total opioid administration. The lack of addition of IPACK to FT was associated to a greater need of rescue analgesia (OR 2.45 CI 1.29-4.65 p=0.006) and rescue opioid requirements (OR 2.07 CI 1.1-4 p=0.028) after adjustment for age, BMI and total intraoperative morphine.

Table 1. Comparison of demographic and perioperative data between groups.

Variable	FT (n= 84)	FT + IPACK (n= 96)	p value
Male[1]	72 (85.71%)	76 (79.16%)	0.26
Age[2]	31.5 (26.7-39.00)	28 (23.7-36.00)	0.038
BMI category [1]			
Healthy weight	38 (46.3)	38 (40)	0.08
Overweight	40 (47.6)	41 (43.2)	
Obese	6 (7.1)	16 (18.6)	
VNS at PACU arrival [3]	1.98 (3.09)	1.08 (2.18)	0.025
Intraoperative Morphine IV mg[3]	3.40 (2.57)	2.81 (2.02)	0.085
Time in PACU[2]	132.50 (90.00, 167.00)	127.50 (89.75, 171.25)	0.730
Rescue analgesic (AINEs+Opioids)[1]	56 (66.7)	40 (41.7)	0.001

1 Absolute frequency (percentage)
2 Median (interquartile range)
3 Mean (standard deviation)

Conclusion: Adding IPACK to FT reduce VNS scores during the first postoperative hour in the PACU and significantly reduce rescue analgesic requirements during total stay in PACU.
References:
1. Anesthesia & Analgesia 2019. 128 (4): 631–40.

4726

Ultrasound-guided Anterior Approach to Sciatic Nerve Block: Influence of Lower Limb Positioning on the Visibility and Depth of the Sciatic Nerve

Kim H.[1]
[1]University of Ulsan College of medicine, Asan Medical Center - Seoul (South Korea)

Background and Goal of Study: We aimed to identify the optimal lower limb position for the ultrasound-guided anterior approach to sciatic nerve block.
Materials and Methods: We included 45 patients who met the following criteria: 1) ASA physical status of 1-3; 2) age between 18 years and 80 years; and 3) scheduled to undergo knee surgery that required a sciatic nerve block. The lower limbs of each subject were placed in the following four positions: N, neutral position; ER, external rotation of hip (angle, 45°); ER/F15, external rotation (angle, 45°) and flexion (angle, 15°) of hip; ER/F45, external rotation of (angle, 45°) and flexion (angle, 45°) of hip (Figure 1). An investigator acquired ultrasound scans of the sciatic nerve in each position. From the scans, the visibility score and depth from the skin of the sciatic nerve were analyzed.
Results and Discussion: Figure 2 is an example showing the change in the sciatic nerve at each position. Visibility score was significantly higher in positions ER/F15 and ER/F45 than in positions ER and N (p<0.0001). However, there was no difference between the visibility scores in positions ER/F15 and ER/F45 (p=0.0959). Depth from the skin decreased with external rotation and an increase in the angle of hip flexion (p<0.0001).
Conclusion: Based on the visibility score and depth from skin, external rotation of the hip to 45° with a greater angle of flexion (45° vs. 15°) of the hip appears to be the optimal position for the ultrasound-guided anterior approach to sciatic nerve block.

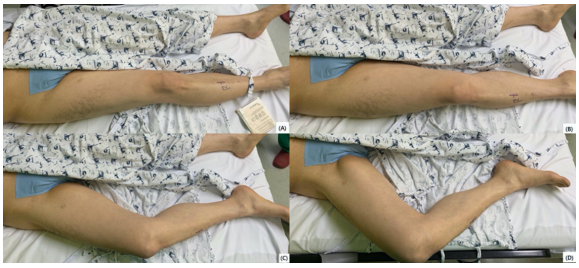


Figure 1. The 4 leg positions included in the analysis

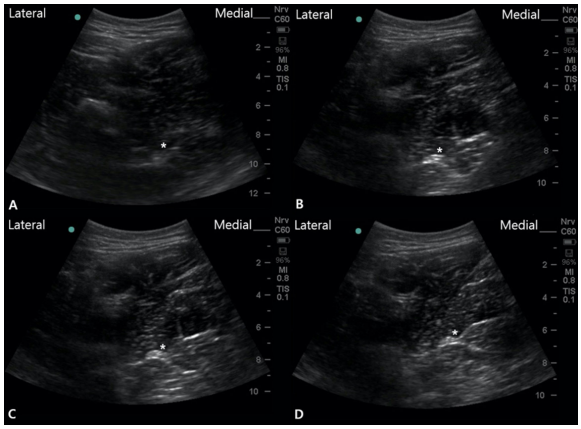


Figure 2. The ultrasound images of the sciatic nerve in 4 leg positions

4951

Popliteal sciatic nerve block occurence according to the injection distance to the nerve: a multimodal study

Fontaine M.[1], Pandin P. C. A.[1], Truong H. N.[1], Estruch I.[1], Van Hecke D.[1], Van Obbergh L.[1]
[1]CUB Erasmus Hospital - Brussels (Belgium)

Background and Goal of Study: Inject anesthetic dye (AD) too close to the nerve is related to the risk of persistant and disabling peripheral nervous lesion. In this context, using a multimodal (M) setting (clinical, sonographical and electrophysiological), during an ultrasound-guided & nerve-stimulated Popliteal

Sciatic Nerve BLock (PSNB) we have compared a close injection to the nerve (1mm) to a remote one (3mm).
Materials and Methods: For this prospective single-blind study we included 10 patients (foot surgery). They received PSNB (lateral approach). Patients were randomly divided into 2 groups: AD (Ropi0.5% 13ml + Lido2% 7ml) was injected 1mm (Grp1mm / n=5) vs 3mm (Grp3mm / n=5) to the nerve. Each PSNB was finally assessed using clinical, sonographical and electrophysiological (sensory evoked potientals SEP, and electromyographical responses as M response and H reflex) assessments from before the block performance until 30min after. Results are presented as mean±SD. Statistics consisted in bilateral Student, Levenne, Fischer and ANOVA tests.
Results and Discussion: PSNB succeeded in 100% of patients allowing respective surgeries, despite the significant difference of AD distribution between the groups (Fig1). Finally, after 30min, clinical assesment did not differ (Fig2). SEP & EMG depicted two different time courses of anesthetic blockade (rapid for motor vs progressive for sensory). Although, the final electrophysiological block was complete without any difference between the groups. Alternatively, in the Grp3mm the electrophysiological sensory block onset was delayed while a correlation between the final SEP amplitude and the percentage of contact between AD & nerve existed.
Conclusion: This M study advocates for the lack of difference between 1 and 3mm to the nerve about the PSNB performance, with a preserved final quality of the block.

Fig.1. Sonoanatomical morphological results of the PSNB
On left, individual short axis view sonograms of the proximal popliteal cruise area for the PSNB performance in Grp1mm (upwards) and Grp3mm (below). In each group, when the sciatic nerve is located (above the distal division into tibial and common fibular branches) , the needle is advanced in-plane from lateral to medial until 1mm to the nerve in the two groups. Then, the sciatic nerve is electrically stimulated (300µs, 1Hz) to elicit tibial and fibular muscular twitches (Step1). After refinment for eliciting detectable muscular twitches, the minimal intensity is noted (Step 2). Then, the needle tip is removed to 3mm from the nerve only in the Grp3mm. The final intensity to observe equivalent muscular responses in the two groups are noted (Step 3). Nerve stimulation results are presented below in the table as mean+/-SD ($p<0.05$). Finally, the 20ml AD is injected. The individual AD extend is measured using an original eight sectors matrix (in red) centered to the respective needle tip. In each sector, the individual longest distance and its relative position between the center and the border of the AD is measured.
On right, the mean values and positions in the respective eight sectors of the matrix (calculated for the 5 patients of each group ,Grp1mm upwards & Grp3mm below) are reported on an orthogonal plane (centimeters) centered to the needle tip. Subsequently, these eight mean points are connected to determine the mean AD "extendogram" (light blue area). Finally, this last one is schematically positioned to the mean sciatic nerve representation (yellow area obtained by the averaging of the respective great and small diameters of the individual sciatic nerve). This method depicts accurately the difference of morphology of the AD extend. in the different groups because of the relative needle tip position.

Electric nerve stimulation (300µs, 1Hz) intensity (mA)	Grp1mm	Grp3mm	p-Value
Step 1 : first stimulation 1mm to the nerve	0.96 ± 0.11	1.12 ± 0.08	**0.031**
Step 2. refined stimulation 1mm to the nerve	0.26 ± 0.07	0.28 ± 0.08	0.552
Step 3 : final stimulation respectively 1mm and 3mm to the nerve (AD injection site)	0.26 ± 0.06	1.36 ± 0.49	**0.001**

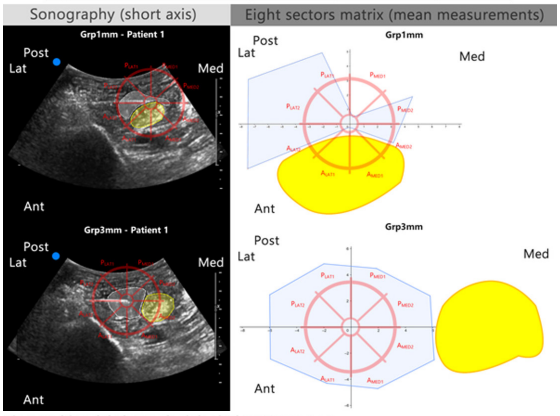
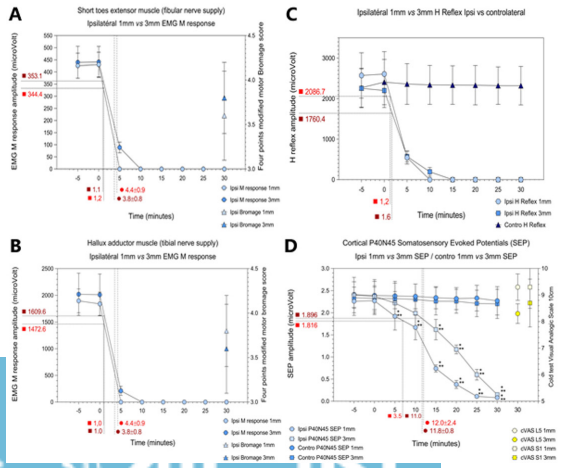


Fig.2. Multimodal electrophysiological PSNB assement
General methodology: the time courses of the amplitude of the respective considered electrophysiological responses are presented. A quantitative decrease of at least 20% of the pre-block amplitude (light & dark red squares in respectively Grp1mm & Grp3mm) is considered as significant (minimal invariant structured modification), corresponding to the minimal pharmacodynamic effect of the AD matching for the electrophysiological occurence of the anesthetic block. Alternatively, the light & dark red circles indicates the time of occurence of the respective motor (on A & B) and sensory (on D) blockade objective feeling.
Motor responses, whatever the sort of response is (EMG M responses on A and B, and H reflex on C), the AD injection induces a rapid (within the 2 first minutes after injection) significant decrease of the signals amplitudes. there is no significant impact of the distance of injection to the nerve. On A & B, on the right side, no difference regarding the final modified motor Bromage score was recorded between the two groups. On C, the stability of the amplitude of the controlateral H Reflex (dark blue triangles) may be used as comparison term reagrding the blocked side. These results testifies to a comparable quite complete final induced motor block related to the clinical efficacy .
Somatosensory responses, on D, the time course of the respective signals amplitude decrease is more progressive after the AD injection (light blue squares and circles). Consequently, the significant threshold of amplitude decrease is delayed until 11min. There is a significant difference between the two group (Grp1mm faster) from T5 which persists to T30 where the two profiles meet up together. The respective controlateral SEP recordings (medium blue squares and circles) testify to the stability of the signals on the unblocked side and, similarly to the H reflex, may be used as comparison term. At T30, the deep SEP block (very weak amplitude in both groups) is coherent with the high values of the cVAS (on right, light and medium yellow squares and circles) corresponding to an effective surgical anaesthetic block.
Finally, the multimodal electrophysiology depicts two different time courses of amplitude decrease (motor vs sensory) in relation to the respective nervous fibers physiology leading to comparable PSNB, whatever the distance to the nerve is.



6386

Comparison of adductor canal block and IPACK block (interspace between the popliteal artery and the capsule of the posterior knee) with adductor canal block and periarticular injection after total knee arthroplasty: preliminary results of a prospective randomized trial

Daiki M.[1], Mannai Y.[2], Amri K.[2], Labbene I.[2], Ennaas I.[2]
[1]Hôpital Militaire de Tunis - Tunis (Tunisia), [2]Military Hospital of Tunis - Tunis (Tunisia)

Background and Goal of Study: Total knee arthroplasty (TKA) has become one of the most common surgical procedures worldwide. Optimal post-operative pain management with multimodal analgesia approach based on regional techniques and systemic analgesics is the cornerstone of enhanced recovery after surgery. The aim of our study was to determine whether the infiltration between the popliteal artery and capsule of the posterior knee block (IPACK), in combination with adductor canal block (ACB), improved analgesia compared to periarticular injection (PAI) after unilateral TKA.
Materials and Methods: This randomized controlled trial included patients undergoing unilateral TKA. Patients either received a PAI with ACB (Group1) or an IPACK with an ACB (Group2). The primary outcome was opioid consumption during the first 48 hours post-operatively. The secondary outcomes included visual analogue scale (VAS) at rest and on ambulation on post-operative day one and two (POD 1 and POD2), time up and go (TUG) test, the range of movement (ROM) and patient satisfaction.
Results and Discussion: Nineteen patients were included in each group. Patients of the Group1 had less opioid consumption (p=0.05) with significantly lower VAS scores on ambulation (POD1: p=0.033/ POD2: p=0.033) and at rest from the 18-post-operative hour and were more satisfied. However, there was no significantly differences in the mean ROM of knee or in median TUG test between the two groups.
Conclusion: ACB + PAI offers improved pain management in the immediate postoperative period resulting in better patient satisfaction compared to ACB+IPACK. Further studies with larger sample size, evaluating the dose and mode of administration (single shot vs. continuous infusion) of the anesthetic used will probably help in designing optimized pain management protocols after TKA.
Acknowledgements: We gratefully acknowledge Mme Sonia, the kinesiologist for her outstanding contribution to achieve the study.

5486

Femoral triangle and adductor canal blocks versus femoral nerve block for total knee arthroplasty: postoperative pain management and functional recovery

Lukasevic K.[1], Jaremko I.[1], Gelmanas A.[1], Smailys A.[1]
[1]Hospital Of Lithuanian University Of Health Sciences Kauno Klinikos - Kaunas (Lithuania)

Background and Goal of Study: Adequate postoperative pain control after knee joint replacement surgery helps to improve patient satisfaction, promote earlier mobilization and functional recovery and reduce the risk of postoperative complications. The aim of the study is to compare femoral triangle and adductor canal blocks with femoral nerve block in order to evaluate postoperative pain management and functional recovery in patients following elective knee arthroplasty.
Materials and Methods: the prospective, double-blinded, randomized study was approved by the local Ethics Committee. 77 patients undergoing elective knee arthroplasty under the spinal anaesthesia were included. Preoperatively all patients were randomized into one of two groups: femoral triangle and distal adductor canal blocks (FT + AC blocks) group and femoral nerve block (FN block) group. All blocks were performed by one anaesthesiologist under the guidance of a linear ultrasound transducer probe. The FT and AC blocks were performed by injecting 10 ml of 0.125% bupivacaine for each block separately and FN block was performed with injection of 20 ml of 0.125% bupivacaine by a single injection. Patients in both groups postoperatively received standard doses of analgesic medications such as paracetamol and dexketoprofen. At 3, 6, 24 and 48 hours after the surgery pain control efficacy (using visual analogue scale (VAS)) when the operated leg was at rest, during active and passive operated knee flexion, requirement of additional opioid analgesics and their adverse effects, extent of motor blockade (using Bromage scale) were assessed. Statistical significance was determined as $p < 0.05$.
Results and Discussion: at first 6 postoperative hours unrestricted operated leg movements were significantly more frequent in FT + AC blocks group (95 %) than in FN block group (67.6 %), $p < 0.05$. Moreover, patients in both groups rated

postoperative knee pain in different leg positions less than 5 points according to VAS. However, there was no difference in pain scores at all time points after the surgery (p > 0.05). Furthermore, there was no difference in requirement of additional opioid analgesics and their adverse effects at all time points (p > 0.05).
Conclusion: FT + AC blocks result in lower extent of motor blockade at first 6 postoperative hours. FT + AC blocks and FN block effectively reduce postoperative pain after the elective knee arthroplasty.

5796

Continuous PENG block: is it possible?

Palacios M.[1], Botos N.[2], Thibault S.[1]
[1]Centre Hospitalier «Henri Duffaut» Avignon - Avignon (France), [2]Centre Hospitalier «Henri Duffaut» Avignon - Avignon (France)

Background: Peripheral nerve blocks are becoming popular in hip surgery analgesia. Ultrasound guided techniques for blockade of articular hip branches include the PENG block, described by Girón-Arango, Peng and col., with proven good results1. The possibility in placement and permanence of catheters on this anatomic site has not yet been tested. We studied the placement of a catheter at the level of the injection target site of the PENG Block, analysing the challenges and advantages of this technique.
Case Report: A 78-year-old female patient, (155cm, 50kg), ASA III, hospitalized with hip fracture was submitted to hip replacement technique. A combined general anaesthesia with an ultrasound guided PENG block with catheter was proposed to the patient and fully accepted. The PENG block technique, before general anaesthesia, was used: needle tip psoas tendon anteriorly / pubic branch posteriorly. Hydrodissection was performed with Ropivacaine 0.5%, 20ml and the catheter was introduced. The catheter placement was between the psoas tendon and the ischiopubial branch and fixation site at 10cm at the skin. In the postoperative period the analgesia was assured by continuous pumping infusion of Ropivacaine 0.2% 6ml/h for 48h. Analgesia was supplemented with paracetamol and tramadol. Patient reported no resting pain during the next 48h and Visual Analog Scale for Pain was 3/10.
Discussion: Analgesia and early rehabilitation in hip surgery is a challenge for the anaesthesiologist. PENG Block is a recent approach that covers the blockage of 3 nerves that give innervation to the anterior hip capsule2. We placed this catheter with the aim of prolonging analgesia, reducing opioid consumption and accelerating rehabilitation process.
References:
1. Girón-Arango L, Peng PWH, Chin KJ, Brull R, Perlas A (2018), Pericapsular nerve group (PENG) block for hip fracture. Reg, Anesth Pain. Med 43: 859-863.
2. Olga Santos, Rui Pereira, Tiago Cabral, Neusa Lages and Humberto Machado, Is Continuous PENG Block the New 3-in-1? J Anesth Clin Res 2019, 10:6.
Learning points: The fixation site for the continuous PENG block is a true point to consider with the surgeon before the intervention. The correct location of the catheter tip is very important to achieve correct diffusion of local anaesthetic. We believe that this is just the tip of the iceberg and there is still much to know about the placement and handling of catheters at the PENG block site.

4890

The anaesthesia effect on the perioperative stress in patients with “fast –track” surgery in hip replacement

Jeleva Z.[1], Belitova M.[1], Marinov T.[1], Mladenova M.[1]
[1]University hospital ISUL - Sofia (Bulgaria)

Background and Goal of Study: Hip replacement is considered to be a large surgical intervention, related to a high level of stress-response, manifestation of strong pain and patient’s discomfort. The systemic stress respond, triggered by surgical trauma is characterized with neuroendocrine dysregulation. The activation of Hypotalamus-Pituitary-Adrenal axis is critical for the coordination of stress response by human ‘s body against surgical intervention. The cortisol reduces ACTH-secretion and inhibits the release of Corticotropin releasing hormone. During surgical stress, trauma or infection, ACTH- and Cortisol’s levels increase significantly and could keep those levels for 24 hours after the operation.
Aim: To determine the dependence on stress response by anaesthetic technics in “fast-track” hip endoprosthesis
Materials and Methods: Prospective search between August-November 2019 in a Single center, cohort divided in to two groups, depending on the type of anaesthesia – General (GA) or Neuroaxial anaesthesia. The first group consists of 25 people with GA protocol: Propofol, Lysthenon, Isoflurane maintenance, and intraoperative analgesia with Fentanyl.
The second group consists of 25 patients with spinal block, accomplished with Marcaine and intrathecal Morphine, providing postoperative analgesia for about 20-24 hours. Postoperative analgesia is provided by Metamizole and Tramadol in recommended doses for patients with GA. Venous blood samples are tested among all patients in order to follow the cortisol’s levels before operation, 30 minutes after surgical incision and one hour after the end of the surgical intervention.
Results and Discussion: There were significant differences between the two groups of patients (with spinal block or general anaesthesia) in intraoperative (p=0,003) and postoperative (p=0,0001) cortisol levels.
Conclusion: Neuroaxial anaesthesia is a powerful reducer of stress response in “fast-track” hip prosthesis - atenuates the perioperative stress, postoperative pain and discomfort.

4386

Single injection ultrasound-guided thoracic paravertebral block versus transversus abdominis plane block in peritoneal dialysis catheter implantation: a randomized controlled trial

Li Q.[1], Zhang H. Y.[1], Jiang X. J.[1], Zhu T.[1]
[1]West China Hospital of Sichuan University - Chengdu (China)

Background and Goal of Study: Ultrasound-guided thoracic paravertebral block (US-TPVB) is generally used for postoperative analgesia. We hypothesized that single-injection US-TPVB could be used as the principal anesthetic technique for peritoneal dialysis catheter (PDC) implantations. The anesthetic effect of a single-injection TPVB would be compared with that of a transversus abdominis plane (TAP) block and local anesthetic infiltration (LAI).
Materials and Methods: Patients undergoing PDC implantations were randomized into Groups TPVB, or TAP or LAI. In Group TPVB, single-injection US-TPVB at T10-T11 level was performed with 20ml of 0.25% ropivacaine. In Group TAP, ultrasound-guided oblique subcostal TAP block was performed with 20ml of 0.25% ropivacaine. In Group LAI, 40ml of 0.25% ropivacaine were used. The quality of anesthesia was compared among the three groups.
Results and Discussion: Eighty-eight eligible patients were enrolled. The majority of patients in Groups TPVB (24 of 28), TAP (30/30) and LAI (24 of 30) underwent PDC implantations successfully. Lower general anesthesia conversion rate and higher satisfaction rates by nephrologists and patients were observed in Group TAP, compared with Groups TPVB and LAI.VAS at the majority of time points were lower in Group TAP, except for at the catheter exit sites. Less rescuing sufentanil was consumed in Group TAP. The boundaries of area with surgical anesthesia after a single-injection TPVB was much wider and more variable than that after a TAP block. Theoretically, that TPVB might block ipsilateral, segmental, somatic and sympathetic nerve, including the lateral and anterior cutaneous branches of the related somatic nerve (a TAP block covers the anterior cutaneous branches only). Therefore, TPVB could possibly provide a better anesthetic effect than that of a TAP block for PDC implantation. However, poor predictability of spread of local anesthetics in TPVB consequently affected the reliability of its block. In the contrast, a TAP block provided a more reliable and better anesthetic effect, though such an area with surgical anesthesia was smaller.
Conclusion: Although a single-injection US-TPVB could be the principal anesthetic technique for PDC implantations and provided a comparable anesthetic effect to that of LAI, oblique subcostal TAP block provided a better and more reliable anesthesia than US-TPVB or LAI did for PDC implantations.

4510

Combination of erector spinae plane block and transversus abdominis plane block for incarcerated inguinal hernia repair

Malinovska-Nikolovska L.[1], Milevski A.[2], Shirgoska B.[3]
[1]GOB 8-mi Septemvri,Skopje - Skopje (Republic of North Macedonia), [2]GOB 8-mi Septemvri, Skopje - Skopje (Republic of North Macedonia), [3]University clinic of otorhinolaryngology - Skopje (Republic of North Macedonia)

Background: Both, the erector spinae plane (ESP) block and transversus abdominis plane (TAP) block have been previously described for analgesia in inguinal hernia repair1,2. In this case report we describe a combination of these two blocks in order to achieve intraoperative anesthesia.
Case Report: A 44 year old patient with incarcerated left sided inguinal hernia was presented to us on our night shift. He had also a dilatative myocardiopathy, mainly right sided due to severe tricuspid valve insufficiency and pulmonary hypertension. Also the left side of the heart was affected with EF 35%. For anesthesia we decided to use a left sided ESP block at level Th9-Th10 and left sided TAP block. For the ESP block we used L- Bupivaccain 0,25% 20 ml + Dexason 2 mg and for the TAP block 0,25% L-Bupivaccain 20 ml. After 20 min. the operation started with good operating conditions and anesthesia. We also gave the patient ketamin 50 mg, midazolam 1 mg and fentanyl 0,05 mg i.v. A desincarceration of the sigmoid colon and hernioplastica was done. The bowel was vital and needed no resection.
Discussion: We searched the literature, but we could not find a combination of these two blocks in one patient for this indication3. These techniques had been described separately for inguinal hernia repair, mainly for postoperative analgesia, but there are some reports for intraoperative anesthesia as well. We decided to use both blocks in order to increase our success rate. Side effects of this technique may be local anesthetic toxicity because of larger volumes used and also technical difficulties and patient refusal due to two point puncture.
References:
1. Luis-Navaro JC, Seda-Guzman M, Luis-Moreno C, Chin KJ. Erector spinae plane block in abdominal surgery: case series. Indian J Anesth. 2018;62:549-54.
2. Deepanshu Mallan, Sandeep Sharan, Sumi Saxena, Tapas Kumar Singh. Anesthetic techniques: focus on transversus abdominis plane (TAP) blocks. Local Reg Anesth. 2019; 12: 81-88.
3. Tulgar S, Ermis MN, Ozer Z. Combination of lumbar erector spinae plane block and transmuscular quadratus lumborum block for surgical anesthesia in hemiarthroplasty for femoral neck fracture. Indian J Anesth. 2018;62:802-5.
Learning points: A combination of peripheral nerve blocks, targeted to similar nerves, but at different levels, can be used to achieve good anesthetic and operative conditions in high risk patients.

4584

Effectiveness of Bilateral Ultrasound-Guided Erector Spinae Plane Block in Intraoperative and Postoperative Pain control in Lumbar Spine Surgeries. A Randomized Controlled Trial

Wahdan A.[1], Mostafa M.[1], Radwan T.[1], Ali A.[1], Salem A.[1]
[1]Cairo University Hospital - Cairo (Egypt)

Background and Goal of Study: Control of Postoperative pain after spinal surgery is a prerequisite to enable early mobilization, which leads to improved functional recovery and enhance patient satisfaction.The aim of this study is to estimate the efficacy of the ultrasound guided ESP block in intraoperative pain control and postoperative pain management in lumbar spine surgeries.
Materials and Methods: The study was conducted on 70 patients scheduled for elective lumbar spine surgeries in any 2 levels (L1-L5) under general anesthesia in Kasr Alainy School of medicine. Patients were randomly allocated into two groups: Group (A) (n= 35) include the patients who will undergo ultrasound guided ESP block after induction of GA. Group (B): (n = 35) include the patients who will undergo GA with conventional analgesia. During the surgery, the MAP and HR were traced every 15 minutes. Total Intraoperative fentanyl requirement, and postoperative VAS and time to 1st request of rescue analgesia as well as Incidence of complications were recorded.
Results and Discussion: The Intraoperative MAP, HR and fentanyl requirement were statistically lower in Group (A) compared Group (B). The Postoperative Visual Analogue score and total morphine consumption were statistically lower in Group (A) compared with Group (B). . There were no statistically significant differences among the two groups as regards incidence of complications when assessed postoperatively.
Conclusion: The study offered a new technique using Bilateral Ultrasound-Guided Erector Spinae Plane Block during Lumbar Spine Surgeries aiming to decrease intra and postoperative pain together with reducing analgesic needs to minimum during and after the operation with the consequent beneficial reduction of narcotic side effects.
References:
1. Zorrilla-Vaca A, Healy RJ, Mirski MA. A Comparison of Regional Versus General Anesthesia for Lumbar Spine Surgery. J Neurosurg Anesthesiol. 2017 Oct;29(4):415–25.
2. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The Erector Spinae Plane Block. Reg Anesth Pain Med. 2016;41(5):621–7.
3. Chin KJ, Malhas L, Perlas A. The Erector Spinae Plane Block Provides Visceral Abdominal Analgesia in Bariatric Surgery. Reg Anesth Pain Med. 2017;42(3):372–6.

4596

Retrospective evaluation of postoperative analgesia in minimally invasive cardiac surgery: comparison of erector spinae plane block and paravertebral block

Akiizumi H.[1], Yamane Y.[1], Kuroda M.[1], Kosaka M.[1], Yamabe R.[1]
[1]Hyogo Brain and Heart Center - Himeji (Japan)

Background and Goal of Study: Minimally invasive cardiac surgery (MICS) reduces surgical invasion by avoiding median sternotomy. Because MICS is performed via a lateral thoracotomy, postoperative pain management can be difficult. Erector spinae plane block (ESPB) is a recently described technique for providing thoracic analgesia. Ultrasound-guided ESPB may be a simpler technique entailing fewer complications than ultrasound-guided thoracic paravertebral blockade (TPVB), but the efficacy of ESPB for MICS remains unclear. The aim of the present study was to compare postoperative analgesic effects of TPVB versus ESPB following MICS.
Materials and Methods: The medical records of MICS patients treated at a single institution from April 2017 to September 2019 were retrospectively reviewed, following approval of the study protocol by the Institutional Review Board. The patients were classified into two groups based on the type of regional anesthesia utilized; a TPVB group (n = 6) and an ESPB group (n = 6). In all cases, either ultrasound-guided TPVB or ESPB had been performed at the T5 level. Prior to surgery, a catheter had been placed followed by the injection of 15-20 mL of 0.375% ropivacaine. After the surgery, continuous administration of TPVB or ESPB was initiated, and fentanyl was continuously administered to provide additional analgesia. The primary outcome was the highest patient-reported score on a numerical rating scale (NRS) on postoperative day (POD) 1. The secondary outcomes were: time required to achieve regional anesthesia, duration of anesthesia, duration of surgery, postoperative fentanyl consumption, frequency of adjunctive analgesics use, highest NRS score on POD 2, postoperative nausea and vomiting, length of stay in the intensive care unit, and length of stay in the hospital. Medians and interquartile ranges (IQRs) were calculated. Statistical analyses were performed using Mann-Whitney U and Fisher's exact tests. Statistical significance was defined as $p < 0.05$.
Results and Discussion: Patient characteristics did not significantly differ between the two groups. The median highest NRS score on POD1 was significantly lower in the ESPB group than in the TPVB group (0, IQR 0.0-0.75 vs 4.5, IQR 2.5-5.0; $p < 0.05$). None of the secondary outcomes differed significantly between the two groups.
Conclusions: This research suggests that ESPB may be an effective analgesic technique to manage post MICS pain.

4681

Ultrasound-guided rectus sheath block as a part of a multimodal analgesia plan in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity

Yevsieieva V.[1], Zenkina L.[2], Savchenko S.[2]
[1]Diagnostic and Treatment Centre For Children and Adults Of The Dobrobut Medical Network - Kyiv (Ukraine), [2]State Scientific Institution Center for Innovative Medical Technologies of The National Academy of Sciences Of Ukraine - Kyiv (Ukraine)

Background and Goal of Study: Various method of abdominal field block have been used in anesthetic practice over recent decades. But the last recommendations in multimolal analgesia have luck of information aboult these techniques in obese patients [1].The aim of this study is to compare the efficienty of analgetic action of ultrasound guided rectus sheath block (USGRSB) and the local infiltration anesthesia (LIA) of troacar entry points in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity.
Materials and Methods: The retrospective study included 110 patients with BMI≥35 who underwent laparoscopic surgery on upper and middle section of abdominal cavity. Retrospectivly patients were divided on tow equal groups according to the tipe of analgesia; group I had bilateral USGRSB, group II received LIA in troacar entry points. Patients in both groups had inhaled low-flow anesthesia with sevofluran combined with pre-entry analgesia (i.v. paracetamol and dexketoprofen) and systemic analgesia by fentanyl. The primary efficacy endpoits-reduction of intraoperative dose of opioids, the need of rescue analgesia in the first 6 postoperative hours. The statistical processing of the study results was carried out using the statistical analysis package MedCalc v. 18.11 (MedCalc Software Inc, Broekstraat, Belgium).
Results and Discussion: The intraoperative fentanyl i.v. dose in group I is conciderably decreased:0.94±0.11 μg/kg/h vs 1.7±0.16 μg/kg/h in group II (p=0.027). The pain level by VAS in patients in both groups in avarage did not exceed 3 points in the first post-operative day, and there was no need in life-saving analgesia with opioids.
Conclusion: The USGRSB has analgetic and opioid-sparing advantages in obese patients undergoing laparoscopic surgery on upper and middle section of abdominal cavity and may be a part of efficient multimodal analgesia plan in that patient's group.
References:
1. Beverly A, Kaye AD, Ljungqvist O, Urman RD. Essential Elements of Multimodal Analgesia in Enhanced Recovery After Surgery (ERAS) Guidelines. Anesthesiol Clin 2017; 35(2): 115-143. DOI: 10.1016/j.anclin.2017.01.018.

4813

The Analgesic Efficacy of Transversus Abdominis Plane Block after Laparoscopic Bariatric Surgery: A Systematic Review and Meta-analysis

Grape S.[1], Albrecht E.[2]
[1]Valais Hospital and Lausanne University - Sion (Switzerland), [2]Lausanne University Hospital - Lausanne (Switzerland)

Background: After bariatric surgery, patients suffer from moderate to severe postoperative pain. The transversus abdominal plane (TAP) block might be a useful analgesic technique, but literature reports conflicting results. This meta-analysis investigated whether TAP block reduces postoperative pain in patients undergoing bariatric surgery.
Methods: The electronic databases PUBMED and Embase were queried until October 2019. We included trials that reported pain outcomes and compared TAP block to a control or placebo group, in adult patients undergoing any bariatric surgical procedure. Meta-analyses were mostly performed by employing a random-effects model. We rated the quality of evidence for each outcome. The primary outcome was rest pain score at rest (analogue scale, 0-10) at 2 postoperative hours. We performed subgroup analyses for our primary outcome according to the type of surgery, timing (pre- vs postoperative) and technique (ultrasound- vs laparoscopy-guided) of TAP block. Secondary outcomes included rest and dynamic pain scores at 12, 24 and 48 postoperative hours, postoperative opioid consumption, rate of PONV at 24 hours and postoperative complications.
Results: Twelve controlled trials including a total of 857 patients were identified. The risk of bias was low to moderate in most studies. Pain score at rest at 2 postoperative hours was significantly reduced in the TAP block group (mean difference [95%CI] -1.8 [-2.5;-1.1], I2=85%, P<0.00001). Our subgroup analyses showed that TAP block was more effective in sleeve gastrectomy than in other types of surgery and when performed at the end rather than at the beginning of an intervention. All other pain-related outcomes were significantly reduced by TAP block (table 1). There were no differences between groups regarding PONV or postoperative complications.

	Mean difference [95% CI] or Risk ratio [95% CI]	I^2 (%)	P value	Quality of evidence (GRADE)
Rest pain score (VAS, 0-10)				
At 12 postoperative hours	-0.86 [-1.54, -0.18]	93	0.01	moderate
At 24 postoperative hours	-0.96 [-1.63, -0.28]	96	0.005	high
Dynamic pain score (VAS, 0-10)				
At 12 postoperative hours	-2.18 [-3.55, -0.81]	95	0.002	moderate
At 24 postoperative hours	-1.31 [-2.21, -0.40]	90	0.005	moderate
Cumulative i.v. morphine consumption equivalent (mg)	-13.7 [-26.67, -0.62]	100	0.04	moderate
PONV	0.62 [0.30, 1.27]	79	0.19	high

Table 1. Acute pain-related outcomes and PONV.

Conclusion: There is moderate evidence that TAP block provides effective analgesia after bariatric surgery.

4845

Efficacy of programmed intermittent bolus infusion erector spinae plane block on postoperative analgesia after video-assisted thoracoscopic surgery: A preliminary randomized controlled trial

Yamamoto A.[1], Hashimoto A.[1], Kinoshita T.[1], Fujita Y.[1], Fujiwara Y.[1]
[1]Aichi Medical University Hospital - Nagakute (Japan)

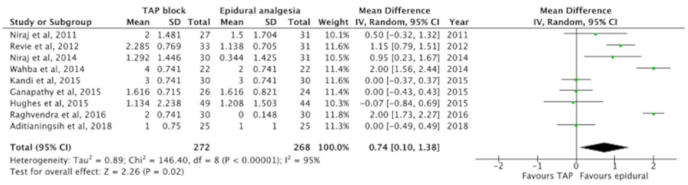
Background: Although thoracic epidural anesthesia and paravertebral block are effective analgesic techniques after thoracic surgery, they cannot be performed because of the risk of hematoma in patients with anticoagulant therapy or coagulopathy. Erector spinae plane block (ESPB), which first reported in 2016, is a relatively superficial interfascial plane block between thoracolumbar transverse process and erector spinae muscle and has a little evidence for analgesic effects after thoracic surgery. We intended to assess the efficacy of ESPB on postoperative analgesia after video-assisted thoracic surgery (VATS).
Materials and Methods: After approval of Institutional Ethics committee, we conducted a prospective, randomized controlled trial. Among patients undergoing VATS at the age of 20–80, with an American Society of Anesthesiologists physical status 1 and 2, we recruited patients with contraindications for epidural anesthesia due to coagulopathy, anticoagulant or antiplatelet therapy. The patients were randomly assigned to ESPB (group E) or control (group C). In group E, after general anesthesia induction, we performed ultrasound-guided ESPB at the level of T5 or T6 with 30ml of 0.25% levobupivacaine, inserted catheter and started intermittent bolus infusion of 0.25% levobupivacaine (20ml every 4hours). In group C, prior to skin closure, the surgeon infiltrated all surgical strata with 20ml of levobupivacaine. In both groups, an intravenous patient-controlled analgesia containing fentanyl and a regular intravenous administration of acetaminophen were initiated as postoperative analgesia. The primary outcome was the fentanyl consumption within 24 hours after the surgery. The secondary outcomes were visual analog scale pain scores under the status of rest and movement, pruritus, nausea and vomiting, drowsiness, and dermatomes anaesthetized to pinprick and cold testing until the second postoperative day and opioid consumption during the surgery.
Results: Twelve patients were included. There was no significant difference between two groups in the consumption of fentanyl within postoperative 24 hours (120 vs 175μg, P=0.94). Intraoperative opioid usage was significantly lower in group E. There were no intergroup differences in terms of other outcomes.
Conclusion: Our results show that postoperative opioid usage and pain were not significantly reduced with ESPB after VATS. During the surgery, ESPB may provide hemodynamics stability and reduce opioid consumption.

4833

Epidural versus transversus abdominis plane block for abdominal wall analgesia – a systematic review, meta-analysis and trial sequential analysis

Desai N.[1], El-Boghdadly K.[1], Albrecht E.[2]
[1]Guy's and St Thomas' NHS Foundation Trust - London (United Kingdom), [2]Lausanne University Hospital - Finchley (United Kingdom)

Background and Goal of Study: In the past, pain relief for abdominal surgery has centered on epidural analgesia but transversus abdominis plane (TAP) block is now increasingly used. Our aim in the present meta-analysis was to compare analgesic efficacy, side effects and functional outcomes of TAP block versus epidural analgesia.
Materials and Methods: After a systematic search of electronic databases from inception to April 2019, we screened the retrieved citations for eligibility. Only randomised controlled trials that included adult patients having abdominal surgery with TAP block as the intervention and epidural analgesia as the comparator were considered for inclusion. The risk of bias in each trial was assessed with Cochrane Collaboration's tool. Following data extraction, we conducted meta-analysis if appropriate and performed trial sequential analysis.



Results and Discussion: Sixteen studies with 1110 patients were included. Our first co-primary outcome, postoperative pain score at rest at 12 h, was decreased by a mean difference of 0.74 (95% CI 0.10 to 1.38; p = 0.02) with epidural analgesia compared to TAP block. No difference was found for the second co-primary outcome, postoperative pain score at rest at 24 h. In comparison to epidural analgesia, intravenous morphine equivalent consumption was increased by a mean difference of 9.7 mg (95% CI 5.3 to 14.2 mg; p < 0.0001) at 0–24 h interval, risk ratio of hypotension at 72 h was 0.17 (95% CI 0.06 to 0.48; p = 0.0008), and length of time needed to fulfil discharge criteria was shorter by 0.51 day (95% CI -0.91 to -0.10; p = 0.01) with TAP block. Our systematic review was limited by high risk of detection and performance bias in included trials, significant statistical heterogeneity and publication bias.
Conclusion: Epidural analgesia and TAP block are clinically equivalent in decreasing the postoperative pain score at rest at 12 h and 24 h. The reduced intravenous morphine equivalent consumption at 0–24 h interval with epidural analgesia should be balanced against its increased risk of hypotension. In view of this, TAP block is a favourable alternative to epidural analgesia in abdominal surgery.

4728

Optimization of anesthetic management during operations on the mammary gland

Sazhyn D.[1], Kuchyn I.[2], Patlazhan G.[1]
[1]Dr. Patlazhan Clinic - Odessa (Ukraine), [2]Bogomolets National Medical University - Kyiv (Ukraine)

Background and Goal of Study: Despite the considerable achievements of world anesthesiology in recent years, the effectiveness of perioperative analgesia for reconstructive and aesthetic surgical interventions on the mammary glands has a reserve for optimization. The important issues are determining the path of safe analgesia, taking into account the possibility of developing side effects from various organ systems, possible cognitive consequences and impaired quality of life, changes in central and cerebral hemodynamics.
Materials and Methods: The results of 70 surgical interventions, reduction / augmentation mammoplasty with areolar or T-inverted access, with the installation of implants under the pectoralis major muscle performed in the period from 2018 to 2019. The amount of anesthetic spent, the incidence of postoperative nausea and vomiting, changes in heart rate and blood pressure were determined. Postoperative analgesia was determined using an analog visual scale. Patients are divided into three groups according to the types of anesthesia: the 1st group (No. 28) inhalation anesthesia with sevoflurane, analgesia with nalbuphine; the 2nd (No. 16) inhalation anesthesia with sevoflurane, analgesia with paracetamol + dexketoprofen; the 3d (No. 26) inhalation anesthesia with sevoflurane + PECs block (in specific, own modification).
Results and Discussion: The depth of anesthesia in all groups according to the BIS monitor was comparable. The frequency of PONV in the first group was the highest (21.42%), in the second and third 12.5% and 3.84%, respectively (p <0.001). In the third group, the lowest intraoperative anesthetic consumption was observed (6 ± 1.22 ml / h). Postoperative analgesia is comparable in groups 1 and 3, but significantly lower in the second one (on average, 43.75% of AVS in the first 3 hours was ≥ 5, which required additional analgesia.
Conclusion: The use of regional methods, in particular such as PECs blocks, allows you to get a good analgesic effect, and reduce the number of complications of anesthesia during mammary gland surgery.

4921

Efficacy of ultrasound-guided erector spinae plane block for postoperative analgesia in robotic-assisted mitral valve repair and lung resection surgery: a retrospective observational study

Hauquiert B.[1], Stouffs A.[1], Van Regemorter V.[1], Kahn D.[1], Watremez C.[1], Lemaire G.[1]
[1]UCL - Cliniques Universitaires Saint-Luc - Brussels (Belgium)

Background: Robotic-assisted minimally invasive techniques are increasingly used as part of enhanced recovery after surgery (ERAS) programs for mitral valve repair (MVR) and lung resection surgery (LRS). Yet, surgical incision in the thoracic region remains associated with significant postoperative pain1 which delays early mobilization. Erector spinae plane block (ESPb) is a simpler and safer analgesic technique compared to thoracic epidural analgesia or paravertebral block, and has been suggested as an alternative in thoracic surgery2. This study aims to assess the efficacy of ESPb in robotic-assisted minimally invasive cardiothoracic surgery.
Methods: This retrospective observational study over 2 years included 84 patients undergoing robotic-assisted MVR and LRS. 19 out of 57 MVR patients received ESPb postoperatively and 14 out of 27 LRS patients received ESPb preoperatively. Ultrasound-guided ESPb was performed at T5 level with an initial bolus of 30mL chirocaine 0.25%, followed by placement of a perineural catheter allowing delivery of programmed intermittent bolus of chirocaine 0.125% 10mL per hour. All patients (ESPb and controls) were given patient-controlled intravenous analgesia using morphine. Morphine consumption and pain score using Visual Analogic Scale (VAS) were both recorded at end of postoperative day 1 and day 2. Statistical analysis was carried out with the Mann-Whitney U test.
Results and Discussion: There was a significantly lower morphine consumption in ESPb patients compared to controls after MVR and LRS (Fig 1). In both surgeries, there was no significant difference between ESPb patients and controls regarding VAS.

	Postoperative morphine consumption (mg) – mean ± SD			
	Robotic-assisted Mitral Valve Repair		Robotic-assisted Lung Resection Surgery	
	DAY 1	DAY 2	DAY 1	DAY 2
ESPb	20.11 ± 16,88	18.26 ± 11,86	16.00 ± 12,53	21.14 ± 12,15
Controls	29.68 ± 18,5	32.63 ± 20,07	32.46 ± 12,33	44.62 ± 19,33
p-value	0.0382	0.0042	0,0048	0.0009

Fig 1. Postoperative morphine consumption

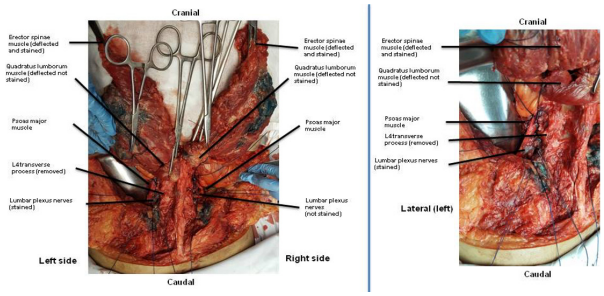
Conclusion: This study has demonstrated a significant opioid-sparing analgesic effect when ESPb was performed in patients undergoing robotic-assisted minimally invasive cardiothoracic surgery. Due to its safety profile, ESPb might become an appropriate analgesic technique in the context of ERAS. In that matter, prospective randomized placebo-controlled trials are needed.
References :
1. Van der Ploeg A et al. J Robot Surg. 2019.
2. Taketa Y et al. Reg Anesth Pain Med. 2019.

5651

Lumbar erector spinae plane block: a cadaveric study

Azevedo A.[1], Silva V.[2], Xavier A.[2], Gomes N.[2], Vieira J.[2], Fernandes H.[2]
[1]Hospital das Clinicas da Faculdade de Medicina da Universidade de São Paulo - São Paulo (Brazil), [2]Hospital das Clinicas da Faculdade de Medicina da Universidade de São Paulo - São Paulo (Brazil)

Background and Goal of Study: Erector spinae plane block (ESP block) is a recently described block for chest pain. Total hip arthroplasty is a potential postoperative pain surgery. Postoperative analgesia options are intrathecal morphine; femoral nerve block, obturator and lateral femoral cutaneous block; lumbar plexus block (posterior approach); continuous epidural block; fascia iliaca block. Lumbar ESP (LESP) block has emerged based on the same principle as the ESP block, but for lumbar level dermatomes. This study aims to evaluate local anesthetic spread in LESP block.
Materials and Methods: An experimental study in which six fresh adult human cadavers underwent 20-30ml (each side) of 0.01% methylene blue solution injection, under ultrasound guidance (low-frequency curve probe) in the plane between the transverse process of L4 and the erector spinae muscle. After injection, the cadavers were submitted to posterior lumbar region dissection. Then, it was verified if lumbar plexus or lumbar spinal nerves would be blue stained.
Results and Discussion: Nine dissections were performed. Spread was homogeneous from L2 to L5, between the erector spinae muscle and the transverse processes, in the specimens submitted to 20ml injection. Lumbar plexus nerves were stained in one side of the specimen submitted to 30ml injection. LESP block emerged, based on ESP principles, as hip region analgesia option. So far, to the best of our knowledge, there are only a few case reports that evidence its use for hip surgery analgesia. It has potential advantages: ease of execution, low risk of nerve damage and safety in patients with coagulation disorders. However, the literature lacks of cadaveric studies that demonstrate local anesthetic spread and possible anatomical mechanisms that explains clinical effectiveness.



Conclusion: In face of the results, the perspective is to reproduce the method with larger volumes, since solution spread seems to be volume dependent.

4664

Emery-dreifuss muscular distrophy: A challenging anesthetic management

Da Silva Ramos S.[1], Leite A. I. D.[1], Carvalhas J.[1], Vilhena I. R.[1], Inácio R.[1]
[1]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Emery-Dreifuss Muscular Dystrophy (EDMD) is a rare form of muscular dystrophy associated with muscle weakness, contractures and cardiomyopathy, conditioning severe bradyarrhythmias.1 These patients represent ananesthetic challenge for the susceptibility to malignant hyperthermia (MH), cardiac involvement and difficulty in approaching the airway and the neuro-axis, due to cervical and lumbar contractures.1
Case Report: Male, 59 years-old, history of EDMD and pulmonary sarcoidosis, proposed for umbilical and inguinal hernioplasty and hydrocele correction. In the pre-anesthetic evaluation, he had cervical and lumbar contractures (lumbar hyperlordosis) and reduced cervical mobility. Pre-operative tests included elevated LDH and grade II left ventricular diastolic dysfunction. Discussing with the cardiologist, it was considered that there was no need for a temporary pacemaker placement. The chosen technique was an epidural anesthesia (EA), under ASA standard monitoring, with titrated administration of 0.75% ropivacaine and sufentanil (18mL), reaching T8 sensory block level. Although painful, the correct positioning was reason ably achieved, allowing the approach of epidural space at L3-L4 level. The patient remained hemodynamically stable throughout the two hours of surgery and also in Post Anesthetic Care Unit.
Discussion: The anesthetic plan prioritized the increased risk of MH, potential difficult airway (DA) and the need to preserve hemodynamic stability. Intravenous general anesthesia reduces the risk of MH, but it doesn't avoid the potential DA.1 Regional anesthesia provides greater patient safety by avoiding the risk of MH and the approach of the potential DA and by interfering less with ventilatory dynamics, desirable in a patient with pulmonary sarcoidosis. Surgical time greater than 2 hours, lower hemodynamic impact and possibility of administering prolonged analgesia led to the preference for an EA over a subarachnoid block.
References:
1. Aldwinckle, R.J. &Carr, A.S. Can J Anesth (2002) 49: 467.
Learning points: The rarity of this pathology and the scarcity of literature mean that there is no recommended anesthetic technique. It should be determined by the patient's condition and characteristics of the procedure. EA allowed evading the susceptibility to MH and the potential DA, as well as maintaining cardiorespiratory homeostasis, ensuring adequate perioperative analgesia and adapting the anesthesia time to the duration of surgery.

4697

Uterine leiomyomatectomy in a 41 year old patient with myotonic dystrophy: a case report of opioid-free anesthesia

Tzima M.[1], Bilali P.[1], Grousouzakou E.[1], Katsanoulas K.[1], Fileli A.[1], Katsika E.[1]
[1]Hippokrateion General Hospital Thessalon - Thessaloniki (Greece)

Background: Myotonic dystrophy (DM), an autosomal dominant disorder, affects skeletal, smooth and cardiac muscle.Heart conductions defects and central nervous system alterations are also found. Sleep study may be necessary for central or obstructive sleep apnoea. There is no specific treatment, apart from managing complications. Anaesthetic management of these patients is challenging. Hypothermia, shivering and mechanical/electrical stimulation may precipitate myotonia. Moreover, patients are more sensitive to sedative, anaesthetic and neuromuscular blockade, resulting in intraoperative or early postoperative cardiovascular and respiratory problems, along with prolonged recovery from anaesthesia.
Case Report: A 41y old woman admitted for scheduled uterine leiomyomatectomy, suffering from DM since the age of 16. Unable to walk unassisted, she had mild mitral regurgitation and lung restriction (FEV1=58%). According to the neurologist's consultation and since her respiratory function was severely impaired, she should avoid sedatives and opioids, rendering regional anesthesia the preferable technique. On examination she had a HR of 73/min, BP 128/84 mmHg, respiratory rate 14/min and slight pallor. Airway evaluation showed normal mouth opening, adequate neck mobility, Mallampatti grade II and thyromental distance over 6,5 cm. Epidural anaesthesia was performed. The catheter was inserted at L3-4 level in the sitting position, through an 18G Tuohy needle. Epidural space was detected at 4cm from skin and the catheter was fixed at 10 cm, followed by a lidocaine 2% without adrenaline, test dose, which was negative for numbness or temperature change. Ropivacaine 100mg and clonidine 150mcg were administered. Anaesthetic blockade at T6 level was achieved; operation was uneventful with SpO2 99% throughout and had an excellent outcome.
Discussion: Opioid free anaesthesia although a novel approach, is already the gold standard for certain patients, as in this case with DM. Awareness of specific illnesses and anaesthetic possibilities may provide excellent anesthetic conditions especially when respiratory function is at risk.
References
1. Russell SH et al. Anaesthesia and myotonia. Br J Anaesth. 1994;72:210–6.
2. Gupta N et al.,Myotonic Dystrophy: An Anaesthetic dilemma, Indian J Anaesth. 2009;53:688–691.
Learning points: Opioid free epidural anesthesia, when feasible, is a safe choice for patients with myotonic dystrophy, providing excellent anaesthetic conditions and outcome.

5167

Erector spinae plane block for postoperative analgesia after hemilaminectomy in a 7 year old patient with ataxia telangiectasia syndrome

Pineschi G.[1], Campello J.[1], Gutman R.[1], Rivoli A. L.[1], V. Lemos Neto S.[1]
[1]NCI (INCA) - Ministry of Health, Brazil - Rio de Janeiro (Brazil)

Background: The erector spinae plane block (ESP Block) was described1 by Forero et al. in 2016 and since then it has been an emerging technique for thoracic analgesia, alternative to neuraxial assessment. The injection of local anaesthetics can spread to paravertebral, intercostal and dorsal rami of the spinal nerves and promote consistent analgesia2,3.
Case Report: A 7 year old boy diagnosed with ataxia telangiectasia syndrome and non hodgkin's lymphoma with bone lesions from T7-T9 and to the spinal canal, scheduled for a control MRI 48 hours after hemilaminectomy. Admitted at the radiology department he was unable to move and exhibiting multiple indirect signs of pain despite regular IV opioids. He received general inallatory anesthesia with sevoflurane for the MRI and afterwards it was performed bilateral USG guided ESP block at the level of T6 with of 10 ml of Ropivacaine 0,4% and Lidocaine 0,6%. After 1 hour he was able to sit straight in bed and a pain score of 0 on the FLACC (Face, Legs, Activity, Cry, Consolability) scale was maintained until discharge from the PACU. He remained hospitalized and after 24h he presented FLACC scale of 3. No complications were reported.
Discussion: The ESP block is a newly described form of peripheral block that can offer analgesia of the posterior thoracic wall. In this case we describe the use of this type of local anesthesia in a pediatric patient with a neurological syndrome as a form of rescue analgesia 48h after the surgical procedure.The result shows that it may be a valuable therapeutic in the pediatric population and as a form of rescue analgesia considering it´s relative simplicity and safety when USG guided.
References:
1. Forero M, Adhikary SD, Lopez H, Tsui C, Chin KJ. The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Reg Anesth Pain Med 2016;41:621–7.
2. Cassai A, Andreatta G, Bonvicini D, Boscolo A, Munari M, Navalesi P. Injectate spread in ESP block: A review of anatomical investigations. J Clin Anesth. 2019 Nov 26:109669. doi: 10.1016/j.jclinane.2019.109669.
3. Hernandez MA, Palazzi L, Lapalma J, Forero M, Chin KJ.Erector Spinae Plane Block for Surgery of the Posterior Thoracic Wall in a Pediatric Patient. Reg Anesth Pain Med. 2018 Feb;43(2):217-219.
Learning points: The use of ESP block in a pediatric patient shows us that infants do profit from local anaesthesia dispensing neuraxial assessment and reducing opioid consumption in the pain management.

5438

Bilateral rectus sheath block as the sole perioperative anesthetic technique for open surgical jejunostomy placement to a high-risk patient

Sifaki F.[1], Gkiouliava A.[1], Koraki E.[1], Papaioannou A.[1], Katsakis Z.[1], Trikoupi A.[1]
[1]Pappanikolaou General Hospital - Thessaloniki (Greece)

Background: Rectus sheath block (RSB) is a trunk block usually performed under general anesthesia (GA) which provides postoperative analgesia to patients undergoing minor surgical interventions. This case report describes the performance of bilateral RSB as the sole perioperative anesthetic technique to a high-risk patient undergoing open surgical jejunostomy.
Case Report: We present the case of an elderly patient with multiple comorbidities (ASA V) undergoing open surgical jejunostomy. The patient suffered from final stage pancreatic cancer expanding to the superior esophagus and causing superior esophageal stenosis. Open surgical jejunostomy was scheduled so that enteral nutrition could be accomplished. Bilateral RSB was performed as the sole perioperative anesthetic technique, with ultrasound guidance at T8 level, administering at each side 20ml of local anesthetic and 25γ of dexmedetomidine. Shortly after the performance of the block, anesthesia of the surgical field was observed. The patient remained hemodynamically stable throughout surgery. No complications were observed. A month after this surgery, the patient was rescheduled for open surgical jejunostomy, after its accidental removal. The surgery was performed with the same anesthetic technique.
Discussion: When confronting a surgical patient with multiple comorbidities, trunk blocks can serve as a safe, alternative technique of analgesia and can also be used alone to provide sufficient anesthesia for minor surgeries. In our case, the performance of RSB to a high-risk patient, helped to completely avoid GA, administration of opioids and contributed to the patient's post-operative analgesia, helping him to be mobilized the same day of surgery and discharge him shortly after surgery. Only one case of open surgical jejunostomy under regional anesthesia (Transversus Abdominis Plane block) has been reported combined with perioperative infusion of dexmedetomidine.
References: Husain,Ultrasound guided ilio-inguinal and rectus sheath nerve blocks, Anaesthesia. 2006;61:1126, Bharati,Anesthesia for feeding jejunostomy in a case of difficult airway: A novel approach. Saudi J Anaesth. 2013;7(4):486.
Learning points: Trunk blocks performed alone or in combination with GA can provide superior perioperative analgesia. RSB performed under ultrasound guidance, can serve as a safe and adequate anesthetic technique for high-risk patients undergoing minor abdominal surgeries.

5603

Neuraxial anesthesia in a patient with Factor VII deficiency – a case report

Ribas R.[1], Dias C.[1], Damas A.[1]
[1]Centro Hospitalar Lisboa Norte - Lisbon (Portugal)

Background: Epidural haematoma is a rare but potentially disastrous complication associated with neuraxial anesthesia. Risk is higher during times of insertion and removal of epidural catheters, especially in the presence of coagulation disorders1. Factor VII (FVII) deficiency is an autosomal recessive coagulation disorder with an estimated prevalence of 1:300,000 and highly variable clinical expression. For surgery, clotting factor levels of 20-25% are thought to provide adequate hemostasis but data for neuraxial anesthesia is missing.
Case report: A 21y male patient with history of asthma and smoking habits, was admitted in the emergency operating room with a femoral neck fracture after a high fall. Pre-operative blood tests, including coagulation routine tests, were normal and a combined sequential spinal-epidural technique was performed. Nearly the end of an uneventful reduction and cephalomedullary nailing, information about an important coagulation anomaly in rotational thrombelastometry (ROTEM) was received.The patient was then found to have a FVII deficiency. After multidisciplinary discussion, 3g of fibrinogen and 2 units of fresh frozen plasma were administered and epidural catheter removed. The patient remained under close monitoring for 24hours. His postoperative period was unremarkable without focal neurologic signs or abnormal bleeding.
Discussion: This case report describes a young patient with an indwelling epidural catheter in whom a FVII deficiency was incidentally discovered. Guidelines for epidural catheter removal in patients receiving anticoagulant therapy are well established. However, little data is available addressing specific times and precautions on removal an epidural catheter in patients with other coagulation disorders. His clotting factor level was 47%, which is above the limits defined for adequate surgical hemostasis.
Learning points: The successful management of this case indicates that it may be safe to perform neuraxial anesthesia in patients with FVII deficiency and an abnormal ROTEM. An appropriate discussion with immunohemotherapy team is crucial. The risk-benefit ratio should always be considered when deciding whether to use neuraxial techniques.
References:
1. Gulur, P. et al. (2015). Retrospective analysis of the incidence of epidural haematoma in patients with epidural catheters and abnormal coagulation parameters. British Journal of Anaesthesia, 114(5), 808–811. https://doi.org/10.1093/bja/aeu461.

5631

Bezold- Jarisch reflex: a cause of cardiac arrest in spinal anaesthesia

Mendes Â.[1], Ferreira C.[1], Lages N.[1], Amadeu E.[1]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Cardiac arrest after spinal anaesthesia (SA) has an incidence of 7/10000 cases.1 This case consists of a successful intraoperative resuscitation during SA.
Case Report: Male patient, 78 years old, ASA II, hypertension, was admitted for transurethral resection of the bladder. SA was performed with 5% hyperbaric bupivacaine 9mg. Before the incision, a T10 sensitive block level was documented. The patient was hemodynamic stable until 50min after SA, when bradycardia (36-48bpm) with hemodynamic repercussion (MAP 40-45mmHg) occurred. Head-down position and rapid infusion of intravenous fluids were performed, as well as ephedrine 10mg and atropine 0,5mg were administrated simultaneously. Shortly the ECG showed asystole. Adrenaline 1mg was immediately administered. Sinus rhythm and spontaneous circulation resumed after 1 cycle of CPR. Next to the critical event, hypotension was managed successfully with additional ephedrine bolus. Blood loss was minimal and until the time of cardiac arrest the patient had received 500mL of crystalloid fluid. After surgery he was transferred to the PACU and heart disease was excluded.
Discussion: Cardiac arrest has been reported within 12–72min after intrathecal administration.2 In elderly patients, it was shown a biphasic change in cardiac output after SA with an initial increase (a fall in afterload), followed by a progressive fall from baseline (a fall in preload).3 Probably inadequate volume loading potentiated relative hypovolemia established by sympathetic block from SA. Vigorous ventricular contractions of an underfill heart were the mechanical stimulus to initiate Bezold-Jarisch reflex which causes inhibition of sympathetic outflow coupled with bradycardia, peripheral vasodilation and cardiovascular collapse. Although anticholinergic drugs are often the initial agent for bradycardia during anaesthesia, it wasn't a good choice in this case since it prevented ventricular filling by inducing tachycardia. However, α-adrenergic agonists counteract the vasodilation in both the arterial and venous circulations, allowing increased venous return and cardiac output improvement.
References:
1. Cooper J et al. Anesth Analg 2001;93(1):245.
2. Alegbeleye BJ. J Med Case Rep. 2018;12(1):1–5.
3. Meyhoff CS et al. Eur J Anaesthesiology 2007;24(9):770-775.
Learning points: This is a rare complication which can been seen during SA. α-adrenergic agonists are the most logical choice as 1st line agent to treat bradycardia during SA.

5645

Safe neuraxial anesthesia in a patient with Charcot-Marie-Tooth disease: a case report

Lima De Morais L.[1], Carmo Pinheiro A.[1], Pratas A.[1], Windels A.[1], Fino C.[1], Fernandes P.[1]
[1]Hospital Espirito Santo Evora EPE - Evora (Portugal)

Background: Charcot-Marie-Tooth disease (CMT) is the most common inherited neurologic disorder, affecting 1 in 2500 people. It compiles a spectrum of disorders caused by demyelination, with patients experiencing progressive distal muscle weakness and wasting with hyporeflexia, sensory loss and neuropathic pain.1 Despite being common, considerations regarding the anaesthetic management of these patients remain limited. Nevertheless, major concerns include the risk of adverse reactions to neuromuscular blocking agents, susceptibility to malignant hyperthermia, post-operative respiratory weakness and exacerbated neurological symptoms.1,2
Case Report: A 62-year old female, ASA III, with CMT type I disease, with diminished lower limb motility, and a history of idiopathic chronic cough and hypothyroidism, presented with fractures of the tibia and fibula and underwent open reduction with internal fixation under subarachnoid block with bupivacaine and sufentanil. A focused neurological assessment was performed preoperatively and complete recovery of previews neurological state was evidenced during postoperative follow-up.
Discussion: Reporting uneventful neuraxial anaesthesia in a patient with a neuromuscular disease comes in light of the lack of evidence regarding the safety of this technique in such patients. Neuraxial anaesthesia in adult patients has been reported in the literature though remaining controversial with concern for worsening neurological symptoms.2,3 This case contributes to corroborate the benefits and safety of this anaesthetic approach as compared with other options available for CMT patients.
References:
1Miller, Ronald D. Miller's Anesthesia. 8th ed. Philadelphia, PA: Saunders/Elsevier, 2015.
2. Zangani AP, Ghorbani A, et al. Epidural Anesthesia Combined with Light General Anesthesia for a Juvenile with Charcot-Marie-Tooth Disease Undergoing Corrective Spine Surgery: A Case Report. Anesth Pain Med. 2017 October; 7(5):e14189.3.
3. Rodriguez Ortiz E., Martínez, E., el al. Spinal anesthesia in a patient with Charcot-Marie-Tooth disease undergoing orthopedic surgery: case report. Colombian Journal of Anesthesiology. 2019;47(3):180-183.
Learning points: CMT is a progressive neuromuscular disease with lacking anaesthetic management recommendations. Preoperative risk and neurologic state assessments are crucial to choose an individualized anaesthetic approach. Neuraxial anaesthesia is a safe alternative to general anaesthesia in selected patients.

5963

Anesthetic approach of Madelung Disease in performing axillary vein-prosthesis bypass at the deltopectoral sulcus level: a case report

Roriz D.[1], Brandão J.[1], Gonçalves D.[1], Caramelo S.[1], Correia C.[2], Abrunhosa R.[1]
[1]Centro Hospitalar Tras os Montes e Alto Douro - Vila Real (Portugal), [2]Trofa Saúde Hospital - Vila Real (Portugal)

Background: Madelung's disease (MD) is a rare disorder of unknown etiology, defined as the presence of multiple and symmetric fatty accumulations, usually involving the upper trunk, neck and head (1). These fat masses cause significant deformity and cervical immobility. Airway management of these patients is challenging and postoperative respiratory failure is a frequent complication (2). We present a clinical case of a patient with MD who underwent peripheral nerve block (PNB) for axillary vein-prosthesis bypass.
Case Report: A 84-year-old male, classified as ASA IV, was scheduled for axillary vein-prosthesis bypass due to fistula dysfunction for hemodialysis. Past medical history included MD, COPD, chronic kidney disease in stage 5, stroke with aphasia and hemiparesis sequela and excessive alcohol intake. Airway examination revealed inability to mandibular protrusion and limitation of cervical mobility by a giant anterior and posterior cervical lipoma that made it impossible to evaluate thyromental distance and tracheal orientation. We decided to perform the procedure under ultrasound-guided clavipectoral fascial plane block (CFPB) in association with supraclavicular brachial plexus block and intercostal block (T2) using 375 mg lidocaine 1,5% (150 mg + 75 mg + 150 mg, respectively), without respiratory, vascular or neurological complications. 24-hour post-procedure, the patient had no pain, sensory or motor block and no adverse effects.
Discussion: The predictors of difficult airway in association with MD patient comorbidities become a challenge for any anesthesiologist. In this case, the recourse to regional anesthesia, with CFPB and intercostal block (T2), was fundamental for the construction of the fistula at the deltopectoral sulcus level, allowed anesthesia and postoperative analgesia at the surgical intervention sites, preventing the risks associated with general anesthesia in a patient with multiple comorbidities and difficult airway; reduction in opioid-related adverse effects and patient satisfaction.
References:
1. T. Bulum, L. Duvnjak, N. Car, Ž. Metelko. Madelung's disease: case report and review of the literature. Diabetologia Croatica 36-2, 2007.
2. A. Becerra-Bolaños et al. Madelung's Disease and Airway Management. Anesthesiology 2019; 130:313.
Learning points: Peripheral nerve block becomes an added advantage when we have a predictable difficult airway, reducing anesthetic risks and even promoting postoperative analgesia.

5970

Shoulder adduction weakness and paraesthesia post PECs block: a rarely described and rarely discussed complication

Gordon C.[1], Ail D.[1]
[1]Darent Valley Hospital - Dartford (United Kingdom)

Background: Pectoral plane blocks (PECs) were first described in 2011 and are growing in popularity. They are most commonly used as an analgesic adjunct for patients undergoing breast surgery but also other procedures such as cardiac defibrillator insertion.
Case Report: We present a case report of a 51 year old lady undergoing wide local excision of the breast and sentinel node biopsy. She received a PECs I and PECs II block; 10mls of 0.25% levobupivacaine was infiltrated below pectoralis major and 20 of mls 0.25% levobupivacaine below pectoralis minor. This block was performed under ultrasound guidance, which demonstrated a good spread of local anaesthetic in these planes. The patient received an uneventful general anaesthetic. Post-operatively, reduced power of shoulder abduction and arm numbness was reported and she was kept overnight for observation. The patient was reviewed the next day and her symptoms had resolved with conservative management and she was safely discharged home.
Discussion: Literature search demonstrates only two previous case reports of reduced power in shoulder adduction and arm paraesthesia in the post-operative period. We submit this case report to increase awareness of this complication and suggest it should routinely be part of the consent process for PECs I and PECs II blocks.
Learning points: Complications of PECs blocks and informed patient consent.

5988

Continuous Spinal Anesthesia in the frail orthopedic elderly patient: a case report

Roriz D.[1], Brandão J.[1], Santos C.[1], Pereira E.[1], Gonçalves D.[1], Caramelo S.[1]
[1]Centro Hospitalar Tras os Montes e Alto Douro - Vila Real (Portugal)

Background: High-risk elderly patients scheduled for urgent orthopaedic procedures are becoming more common. They often present with severe comorbidities, poor physiologic reserve and overall frailty (1). We present an example of patient management using an uncommon anaesthetic technique: continuous spinal anaesthesia (CSA).
Case Report: A 95-year-old man was scheduled for total hip arthroplasty due to a hip fracture. After hospital admission he developed a nosocomial pneumonia and was not accepted for surgery for 30 days. He had congestive heart failure and COPD, so we decided to perform the procedure under peripheral nerve blocks and CSA. Ultrasound-guided femoral and lateral cutaneous femoral nerve blocks were done with 20 ml of ropivacaine 0.5%. Dural puncture was at L4-L5 level, using a 18G Tuohy needle, and the catheter was introduced 3 cm intrathecally. 1.8 ml of levobupivacaine 0.25% were given through the catheter, satisfactory surgical sensitive blockade was achieved. The procedure lasted for 1 hour without any further local anesthetic requirements. No adverse hemodynamic effects or intraoperative pulmonary complications were noted. The patient did not complain of postdural puncture headache or pain after surgery, and was safely discharged from anesthesia care.
Discussion: CSA remains a useful anesthetic technique for the high-risk frail patient. An aging population and yours health problems, challenges practitioners to provide effective and safe anesthesia. This technique not only allows us to carefully titrate local anesthetic dose and minimize the risk of a sudden hemodynamic collapse, but also enables us to slowly reach the desired surgical sensory blockade level without the risk of respiratory depression.
References:
1. Amin S, Sadek A; Continuous spinal anesthesia for elderly patients with cardiomyopathy undergoing lower abdominal surgeries; Egyptian Journal of Anaesthesia 2016; 32: 535–540.
Learning points: BSC has been shown to be a safe and effective anesthetic technique. With the aging of the population and the associated fragility, especially at the cardiovascular level, there is a need to resort to different techniques for the benefit and safety of the patient.

4365

Wide Awake Local Anesthesia No Tourniquet (WALANT) technique for carpal tunnel release and trigger finger: a retrospective series of cases

Abad Motos A.[1], Corella Montoya F.[1], Stolle Dueñas D.[1], Ocampos Hernández M.[1], Salvachúa Fernández R.[1], Abad Gurumeta A.[1]
[1]Hospital Universitario Infanta Leonor - Madrid (Spain)

Background: Despite the traditional rhyme 'Never inject epinephrine into fingers, nose, penis and toes', evidence supports the safety of its use1. Wide Awake Local Anesthesia No Tourniquet or WALANT was described by Canadian hand-surgeon Lalonde2. Its main advantage is tourniquet avoidance by injecting in the area of surgery a local anaesthetic and epinephrine mixture, with no or minimal sedation. Patients can actively move their hand during surgery, which allows assessment of repair success.
Materials and Methods: During 2019, 22 patients underwent carpal tunnel and trigger finger release with WALANT at our institution. 30 minutes before surgery midazolam 1mg i.v. was administered. A mixture of Lidocaine 1%, 1:100,000 epinephrine with 10:1 8.4% bicarbonate was injected with a 27G needle in the subcutaneous tissue following WALANT technique2. For carpal tunnel release a total volume of 10ml was administered, and 4ml for trigger finger.
Results and Discussion: 22 patients underwent carpal tunnel or trigger finger release, without tourniquet or additional sedation. Patients were discharged home with no adverse events, and there were no cases of skin or finger necrosis. One of the reported reasons for success of WALANT technique worldwide is the lack of need for sedation, and it is even performed out of the operating room in clinics and offices, with no anesthesiologist3. Nevertheless at our institution hand-surgeons and anaesthesiologists believe these procedures performed with an anaesthesiologist gain safety and patient comfort. Besides, preoperative routine tests are unnecessary for these surgeries at our institution, one of the advantages stated for performing WALANT without an anaesthesiologist.
Conclusion: WALANT for carpal tunnel and trigger finger release is rapidly growing. Although one of the stated reasons for success has been no need for an anaesthesiologist, at our institution the hand-surgeon and anaesthesiologist team believe patients gain comfort and safety with monitored anaesthesia care.
References:
1.Thomson CJ, Lalonde DH et al. A Critical Look at the Evidence for and against Elective Epinephrine Use in the Finger. Plast Reconstr Surg 2007;119(1):260-6.
2. Lalonde DH, Martin A. Epinephrine in Local Anesthesia in Finger and Hand Surgery: The Case for Wide-awake Anesthesia. J Am Acad Orthop Surg 2013;(21):443-7.
3. Lalonde DH. Conceptual origins, current practice, and views of wide awake hand surgery J Hand Surg Eur 2017;42(9):886-95.

4645

Efficacy of ultrasound-guided peripheral nerve block versus forearm Bier's block in patients undergoing carpal tunnel release: a randomized controlled trial

Rottiers R.[1], Jalil H.[1], Claes M.[2], Swinnen V.[1], Callebaut I.[1], Stessel B.[1], Department of Anesthesiology and Intensive Care, Jessa hospital, Hasselt, Belgium
[1]Jessa Hospital Hasselt - Hasselt (Belgium), [2]Hasselt University - Diepenbeek (Belgium)

Background and Goal of Study: The optimal anesthesia technique for hand surgery is still undecided. Forearm Bier's block is equally effective in providing a surgical block as compared to a conventional upper arm IVRA, even with a reduced, non-toxic dosage of local anesthetic. The ultrasound-guided peripheral nerve block is an alternative anesthesia technique which targets the median and ulnar nerve at the lower third of the forearm combined with a block of the distal branches of the radial nerve by subcutaneous infiltration of the radial side of the wrist. Thus, we set out to compare a forearm Bier's block and a distal peripheral nerve block in patients undergoing ambulant carpal tunnel release.
Materials and Methods: In this prospective, mono-center, randomized, observer-blinded superiority trial, a total of 100 patients undergoing elective carpal tunnel release were randomized to receive either forearm Bier's block (n=50) or ultrasound-guided peripheral nerve block (n=50). The anesthetic efficacy was evaluated by the blinded surgeon. Complete anaesthesia was defined as a full (grade 1) or partial motor (grade 2) block combined with total sensory block (pin prick). Incomplete anaesthesia was defined as a partial motor block and mild pain requiring more intravenous analgesics (grade 3) or an incomplete motor block with the need of general anaesthesia (grade 4). Furthermore, the satisfaction of the surgeon with the visibility in the surgical field and the patient with perioperative analgesia was evaluated with a 7-point Likert Scale.

Results and Discussion: The results of the quality of the block are presented in table 1. Forearm Bier´s block was significantly more associated with an incomplete block as compared to the peripheral nerve block (17 vs 7; p=0.034). The surgeon(Chi-square test p=0.027) as well as the patients (p=0.021) were more satisfied with the peripheral nerve block compared to the forearm Bier's block.

Table 1.

	Foream Bier's block	Peripheral nerve block
Complete (grade 1 and 2)	33 (66%)	43 (86%)
Incomplete (grade 3 and 4)	17 (34%)	7 (14%)

Conclusion: Ultrasound-guided peripheral nerve block is superior compared to forearm Bier's block in providing a surgical block to patients undergoing carpal tunnel release.

4897

Comparison of Ultrasound Guided interscalene brachial plexus block and intra-articular injection of local anesthetics for Arthroscopic shoulder surgery

Kaneko T.[1], Suzuki T.[1], Kawasaki Y.[1], Kato T.[1], Koyama K.[1], Department of Anesthesiology, Saitama Medical Center, Saitama Medical University
[1]Saitama Medical Center Saitama Medical U - Saitama (Japan)

Background and Goal of Study: Arthroscopy shoulder surgery is one of the most painful operation. The use of interscalene block (ISB) has been proven to be effective for pain management in shoulder joint surgery. However, ISB may be difficult to perform due to anticoagulant therapy. Total knee arthroplasty is also one of the most painful operation. Epidural anesthesia and femoral nerve block are effective for postoperative pain management. On the other hand, recently some literature reported that periarticular injection (PAI) of local anesthesia is as well as epidural anesthesia or femoral nerve block.The present study is aimed to compare PAI and ISB in patients underwent arthroscopy shoulder surgery.
Materials and Methods: The retrospective observational study was conducted with approval of local ethics committee (authorization number: 2251), Patients underwent arthroscopy shoulder surgery from January 2018 to September 2019 in this institution were included. 96 patients were assigned to PAI group (n = 21) and ISB group (n =75). Patients were excluded if they were provided intravenous patient-controlled analgesia and continuous ISB. Data was extracted in medical chart, anesthesia record, nurse chart and blood test. The primary outcome was whether patients used ancillary analgesics in 24 hours. The secondly outcomes were time to first use of ancillary analgesics, and times, kinds and amount of ancillary analgesics in 24 hours, and any complications. Data were analyzed by the Fisher exact test. Confounding factors were controlled by multivariate analysis. P values <0.05 were considered statistically significant.
Results and Discussion: In the patients' characteristics, there were significant difference in age. Mean age of the patients was 50 in PAI group, 66 in ISB group (p=0.0352). There was no significant difference between groups in use of ancillary analgesics in 24 hours in the multivariate analysis performed for adjusting the effect of age. More patients in ISB group tend to use ancillary analgesics than patients in PAI group, odds ratio: 1.696 (95% CI: 0.615-5.018, p=0.316). And there was also no significant difference in time to first use of ancillary analgesics, and times, kinds and amount of ancillary analgesics in 24 hours.
Conclusion: There was no significant different in use of ancillary analgesics in 24 hours between PAI group and ISB group in arthroscopy shoulder surgery.

5040

A randomized comparison of two injection techniques for supraclavicular brachial plexus block for arthroscopic shoulder surgery: extrafascial versus subfascial injection

Jimyeong J.[1], Wonjun C.[1], Chunwoo Y.[2]
[1]Inha University Hopsital - Incheon (South Korea), [2]Inha University Hospital - Incheon (South Korea)

Materials and Methods: Patients Patients scheduled for arthroscopic shoulder surgery were randomly assigned to receive ultrasound-guided supraclavicular block either with subfascial- (intra-cluster injection, n = 25) or extrafascial-injection technique (posterolateral injection, n = 25). We assessed the incidence of HDP as the primary outcome and pain scores, supplemental analgesia, duration of analgesia, sensory and motor block, adverse effects, and patient satisfaction as secondary outcomes.
Results and Discussion: The incidence of HDP was significantly lower in the extrafascial-injection group than in the subfascial group (4% vs. 44.0%, P = 0.003). The pain score at 0.5 h (P = 0.020), and supplemental analgesia at 0.5 (P = 0.039) and 6 h (P = 0.014) after surgery were significantly different between groups. However, at other times of analysis, there were no significant differences in outcomes between the groups. The onset of sensory and motor block was significantly faster in the subfascial-injection group. The rates of complete sensory and motor block were higher in the subfascial-injection group, except 20 to 30 min after the block onset in the C4 and C8 dermatomes. Other secondary outcomes were similar between both groups.
Conclusion: The extrafascial-injection technique for SCB provides a lower incidence of HDP with similar postoperative analgesia than the subfascial-injection technique.

5094

Randomized, Controlled Trial Comparing Respiratory and Analgesic Effects of Interscalene Block with Anterior and Posterior Approaches of Suprascapular Nerve Block for Arthroscopic Shoulder Surgeries

Lim Y. C.[1], Koo Z. K.[2], Ho V.[2], Chang S. S.[2], Manohara S.[2], Tong Q. J.[2]
[1]Singhealth, Singapore - Singapore (Singapore), [2]Changi General Hospital - Singapore (Singapore)

Background and Goal of Study: Interscalene brachial plexus block provides excellent analgesia for arthroscopic shoulder surgeries but is associated with adverse effects including hemidiaphragmatic paresis from phrenic nerve blockade. The aim of this study is to compare the respiratory and analgesic effects of suprascapular nerve block with interscalene block.
Materials and Methods: Sixty patients were recruited after taking informed consent and randomized into 3 groups, interscalene block, anterior and posterior suprascapular blocks. Lung function was evaluated at baseline and 30 minutes after the intervention. All blocks were performed under ultrasound guidance with 15 ml of 0.5% ropivacaine. Sensory and motor testing were performed 30 minutes after blocks. Pain scores were assessed at 6, 12 and 24 hours.
Results and Discussion: The interscalene group had a reduction of forced vital capacity of mean (SD), 31.2% (17.5) while the anterior and posterior suprascapular groups had significantly lower reduction of 3.6% (18.6) and 6.8% (6.5) respectively. Similarly, the diaphragmatic excursion in the ISB group decreased more than the anterior and posterior SSB groups; median (IQR) %, -85.7 (-95.3 to -63.3) vs -1.8 (-13.1 to 2.3) and -1.2 (-8.8 to 16.8), p<0.001. Mean pain scores in interscalene and anterior suprascapular groups were lower than the posterior suprascapular group at 6 hours (1.5, 2.2 vs 4.9) and 12 hours (2.9, 3.9 vs 5.4). There were no statistically significant differences in oxycodone consumption post-operatively.
Conclusion: Anterior suprascapular nerve block preserves lung function compared to interscalene block and has a comparable analgesic effect. The anterior suprascapular block is recommended for arthroscopic shoulder surgeries, especially in patients who have reduced lung function.

5124

Anesthesia-controlled time of intravenous regional anesthesia with a forearm versus conventional upper arm tourniquet: a randomized controlled trial

Derwael R.[1], Van Rossum P.[1], Callebaut I.[1], Degryse F.[2], De Wachter G.[3], Stessel B.[1], Department of Anesthesiology and Intensive Care, Jessa Hospital, Hasselt, Belgium; Hasselt University, Diepenbeek, Belgium
[1]Jessa Hospital Hasselt - Hasselt (Belgium), [2]Hasselt University - Diepenbeek (Belgium), [3]Department of Orthopedic Surgery, Jessa Hospital Hasselt - Hasselt (Belgium)

Background and Goal of Study: The dose of local anesthetic (LA) required to produce a good block with a forearm Bier's block or IVRA can be decreased to non-toxic levels compared to conventional upper arm IVRA. Consequently, there is no minimal tourniquet inflation time after forearm IVRA in contrast to the suggested minimum 20-30 minutes tourniquet inflation time after conventional IVRA. Forearm IVRA may be also be associated with reduced anesthesia-controlled time (ACT) and improved operation room (OR) efficiency. Therefore, our goal was to assess if a forearm IVRA is superior in reducing total OR stay time compared to an upper arm IVRA.
Materials and Methods: In this prospective, mono-center, randomized controlled trial, patients undergoing elective hand and wrist surgery were randomized to receive either forearm Bier's block (n=140) with 0.5% lidocaine 25ml or upper arm Bier's block (n=140) with 0.5% lidocaine 40ml. Minimal tourniquet inflation time after upper arm IVRA was set at 25 minutes. To improve homogeneity of the study sample, only patients operated on by one single surgeon (GdW) were selected for analysis. Total OR stay time was defined as departure time from the OR minus arrival time in the OR. Surgical time is time from incision to surgical completion and application of dressings. Differences were evaluated with the Mann Whitney U test. A p-value <0.05 was considered significant.
Results and Discussion: In total, 280 patients were enrolled in this study. Surgery was performed by GdW in 91 patients receiving a forearm IVRA and 102 patients receiving an upper arm IVRA. This resulted in data of 193 patients for analysis. Total OR stay time was significantly shorter after forearm IVRA (29 {28, 35.5} minutes versus 34 {31, 36.25} minutes; p<0.001). Tourniquet inflation time was also significantly shorter after forearm IVRA (20 {17, 23.25} minutes versus 25 {22, 25} minutes; p<0.001). Surgical time was statistically not significantly different (forearm IVRA 7 {4, 9} minutes vs Bier block 7 {5, 9} minutes; p=0.32).
Conclusion: Forearm IVRA is superior to upper arm IVRA in reducing OR stay time by reduction of anesthesia-controlled time. Application of forearm IVRA in patients undergoing hand and wrist surgery with short surgical time may therefore improve OR efficiency.

5305

The anesthetic efficacy of intravenous regional anesthesia with a forearm versus conventional upper arm tourniquet: a randomized controlled trial

Romont M.[1], Broux V.[1], Jalil H.[1], Hens C.[1], Ory J. P.[1], Stessel B.[1], Department of Anesthesiology and Intensive Care, Jessa hospital, Hasselt, Belgium - Hasselt University, Hasselt, Belgium
[1]Jessa Hospital Hasselt - Hasselt (Belgium)

Background and Goal of Study: Forearm Intravenous Regional Anesthesia (IVRA) has a better safety profile compared to a conventional upper arm IVRA: the dose of local anesthetic (LA) required to produce a good block with a forearm IVRA may be decreased to non-toxic levels. However, only a few studies with small sample sizes and various doses of LA have compared the anesthetic efficacy of forearm and upper am IVRA. Therefore, our goal was to assess if a forearm IVRA is equally effective in producing a surgical block as an upper arm IVRA in patients undergoing ambulatory hand and wrist surgery.
Materials and Methods: In this prospective, randomized, observer-blinded non-inferiority trial, a total of 280 patients undergoing elective hand and wrist surgery were randomized to receive either forearm IVRA (n=137) with 0.5% lidocaine 25ml or upper arm IVRA (n=138) with 0.5% lidocaine 40ml. The surgical block was evaluated by the blinded surgeon. Complete anaesthesia was defined as a full (grade 1) or partial motor (grade 2) block combined with absence of pain and deep pressure sensitivity. Incomplete anaesthesia was defined as a partial motor block and mild pain with need for local or opioid rescue medication (grade 3) or an incomplete motor and sensory block with the need for sedation or conversion to general anaesthesia (grade 4). The quality of the surgical field, based on the degree of incomplete hemostasis was assessed by the surgeon. The patient satisfaction with perioperative analgesia was evaluated with a 7-point Likert Scale.
Results and Discussion: The results of the quality of the block are presented in table 1. No significant difference was observed in occurrence of an incomplete block after forearm IVRA compared to upper arm IVRA (p=0.301). No significant differences between forearm IVRA and upper arm IVRA were demonstrated in quality of the surgical field (Chi-square test p=0.443) nor patient satisfaction with the perioperative analgesia (p=0.021).

Table 1. Quality of the block.

	Forearm IVRA	Upper arm IVRA
Complete (grade 1+2)	105 (76.64%)	113 (81.88%)
Incomplete (grade 3+4)	32 (23.36%)	25 (18.12%)

Conclusion: Forearm IVRA is non-inferior compared to upper arm IVRA in providing a surgical block to patients undergoing hand and wrist surgery.

5618

Comparison of general and regional anesthesia in elderly patients undergoing shoulder surgery: A retrospective analysis

Kang H. Y.[1], Hwang T.[1]
[1]Kyung Hee University Hospital - Seoul (South Korea)

Background and Goal of Study: Elderly patients are uniquely vulnerable and particularly sensitive to the stress of trauma, hospitalization, surgery and anesthesia. Additionally, older patients also have co-existing diseases and concurrent medications, with diminished functional status. Because the elderly are also at higher risk of adverse consequences from surgery and unrelieved or undertreated pain, the effects of general and regional anesthesia on postoperative pain control and complications are discussed.
Materials and Methods: This is a retrospective study of patients older than 65 years who underwent shoulder surgery between 2014 and 2017. This study was approved by the hospital's Institutional Review Board, and written informed consent was received from all subjects. (KHUH2018-05-020) Patients were divided into two groups: group G (n=85) with general anesthesia, and group R (n=65) with surgery under interscalene nerve block. The choice of anesthesia was determined by the patient's choice after providing adequate explanation and time before surgery. The preoperative underlying diseases, postoperative complications, and postoperative pain were analyzed.
Results and Discussion: The patients with older age (p <0.001) and those with more underlying diseases (p <0.001) were more likely to choose regional anesthesia for surgery. Operative time (p = 0.015) and anesthetic time (p = 0.002) were statistically analyzed to be less in regional anesthesia. There was no statistical difference between the patients' gender and length of hospital stay. The incidence of postoperative complications was not statistically significant in both groups. (p = 0.953) Postoperative pain was lower in the group R than group G in the post anesthetic care unit (p <0.001) and 6 hours postoperatively (p = 0.02), but the pain level from 12 to 48 hours postoperatively was not significant between the two groups.
Conclusion: The incidence of postoperative complications and length of hospital stay were not different between general and regional anesthesia for shoulder surgery in elderly patients, but there were differences in early postoperative pain. In elderly patients who are susceptible to pain, regional anesthesia may be more effective in controlling pain than general anesthesia.

5640

An alternative way to test the brachial plexus block

Winckles S.[1], Gupta P.[2], Van Greunen M.[2]
[1]University of Nottingham - Nottingham (United Kingdom), [2]Leeds Teaching Hospital Trust - Leeds (United Kingdom)

Introduction: Aα fibres carry the somatic motor and proprioceptive input centrally. The aim of the study was to find out if the proprioceptive position of arm can be used to assess effectiveness of brachial plexus block.
Methods: After ethical approval, twenty adult patients were enrolled in the study. Prior to the block, each patient was first trained to touch the middle finger of their hand to be blocked arm with the middle finger of the unblocked hand with their eyes open in three positions (10 o'clock, 12 o'clock and 2 o'clock). 10 o'clock was 45o from the patient's hip, 12 o'clock perpendicular to the patient, and 2 o'clock 45o from the patient's shoulder. This was repeated in the same positions after the

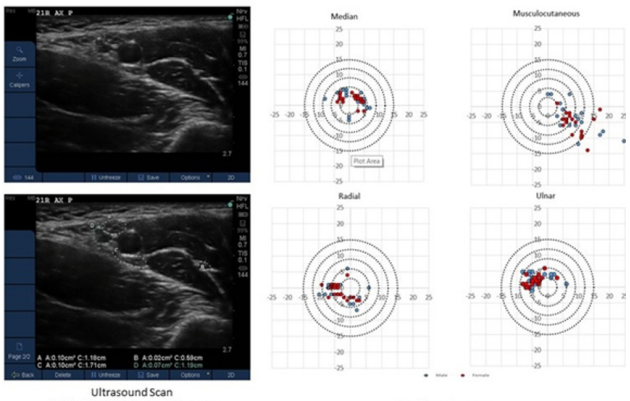
arm was successfully blocked with their eyes closed. The position that the patient's reached for with their eyes closed was recorded for each of the set of blocked hand positions.
Results: A total of 60 individual tests were carried out for twenty patients. The patients were able to correctly locate their blocked hand in two tests (12 o'clock and 10 o'clock). In all remaining 58 tests, patients reached between the 10 o'clock and 12 o'clock position. The commonest position was 11 o'clock (45 out of 58).
Discussion: Ninety-seven percent patients were unable to locate their arm after a successful brachial plexus block and went between 10 and 12 o'clock positions irrespective of the actual position of the arm. The results of this study can be useful to test the block, during the consent process, inform patients about this expected conflict and improve their experience.
Conclusion: This study suggests that the perceptive position of anaesthetised upper limb can be used to test effectiveness of brachial plexus block.

4506

Relationship between gender, BMI and side of body on the size and position of nerves of the brachial plexus in axilla

Lalloo J.[1], Gupta P.[1], Hurren C.[1], Berrill A.[1]
[1]Leeds Teaching Hospitals NHS Trust - Leeds (United Kingdom)

Background and Goal of Study: Studies demonstrate that there are variations in the size and position of the nerves in the brachial plexus. The goal of this study was to determine the effect of age, gender, BMI and side of body on the size and position of the nerves in the brachial plexus.
Materials and Methods: Twenty volunteers (10 males and 10 females) were recruited. The ultrasound position of the nerves at the level of insertion of the pectoralis major muscle was confirmed by a dynamic scan. The size of the nerves was calculated directly using the freehand calliper tool. A graph was designed to study the position of the nerves. Keeping the axillary artery in the centre, concentric circles were drawn which were divided into 4 quadrants using two perpendicular vertical lines. The centre of each nerve was plotted onto this graph. ImageJ was used to analyse the position of the nerves. Student T-tests were carried out to compare the gender and side of arm with the size of the nerve. Pearson's correlation coefficients were calculated to determine the correlation between BMI and the size of the nerves. The position of the nerves was compared between male and female, and left and right sides of the body.
Results and Discussion: The mean size of the median nerve, musculocutaneous nerve, radial nerve and ulnar nerve, was 0.099, 0.032, 0.179 and 0.076 cm2 (males) and 0.091, 0.022, 0.128 and 0.026 cm2 (females) respectively. The radial nerve was found to be the largest of the four nerves. There were significant differences with regards to the size of nerves and gender in the musculocutaneous, radial and ulnar nerves (P value <0.05). The correlations between the sizes of the nerves with BMI and Age were not significant. The position of the radial nerves was found to be variable within the same genders and between males and females (fig 1). The position and size of brachial plexus branches in axilla is very variable.
Conclusion:We suggest a minimum of forty supervised scans plus blocks before a trainee could be deemed suitable to perform blocks independently in an isolated area.
References :
1. Jin Hye Han et al: Korean J Anesthesiol. 2014 Nov; 67(5): 310–316.



Ultrasound Scan
A: Median, B- Musculocutaneous
C- radial D- Ulnar nerve

Position of nerves

5066

Thoracic epidural analgesia or patient controlled intravenous analgesia for pain management following colorectal surgery. A prospective, randomized, multi-center study

Falk W.[1], Henningsson R.[2], Eintrei C.[3], Magnuson A.[1], Gupta A.[4]
[1]University Hospital Orebro - Orebro (Sweden), [2]Central Hospital Karlstad - Karlstad (Sweden), [3]University Hospital Linköping - Linköping (Sweden), [4]Karolinska University Hospital - Stockholm (Sweden)

Background and Goal of Study: Thoracic epidural analgesia (TEA) is recommended as first-line pain treatment for open colorectal surgery according to the latest enhanced recovery after surgery (ERAS) guidelines (1). However, as the use of minimal invasive surgical techniques increases, the use of TEA has been questioned. The aim of this study was to assess pain intensity using either TEA or patient-controlled intravenous analgesia (PCA) with morphine for open and laparoscopic colorectal surgery in the context of an established ERAS protocol.
Materials and Methods: In this multi-center, Swedish study, 226 patients scheduled for elective open or laparoscopic colorectal cancer surgery were randomized to TEA or PCA. Surgery and anaesthesia were standardized in both groups. Numeric rating scale (NRS) pain scores at rest and during activity were registered postoperatively for 48 h. Primary endpoint was NRS pain intensity during activity on day 1. Secondary endpoints were postoperative complications, hemodynamic instability, use of vasoactive drugs and fluids, and length of hospital stay (LOS).
Results and Discussion: Final analysis included 203 patients, 99 received TEA and 104 PCA. There were no differences in baseline characteristics between groups. In both groups, pain scores were generally low, specifically 24 h after surgery. Statistically significant reduction in pain on activity was seen during the first 24 h after surgery in group TEA compared to PCA (mean diff -1.8, 95% CI -2.5 to -1.1), but not thereafter. Patients who underwent laparoscopic procedures also had significantly less pain on activity during the first 24 h in group TEA compared to PCA (mean diff -2.6, 95% CI -3.7 to -1.5). Patients receiving TEA needed significantly more vasopressors during surgery (p<0.001). There was no significant difference in postoperative complications (p=0.76) or LOS (p=0.4).
Conclusion: Although pain on activity was lower when using TEA compared to PCA on the first day after surgery for colorectal cancer surgery after open and laparoscopic procedures, the need for vasoactive drugs was greater, and no difference was found between the groups in postoperative complications or LOS.
References:
1. Gustafsson UO, et al 2018. World J Surg 43: 659-695, 2019.

5073

A study of malposition of epidural catheter inserted in our hospital outpatient department

Kimura S.[1], Ando T.[1], Nishiwaki K.[1]
[1]Nagoya University Hospital - Nagoya (Japan)

Background: In our anesthesiology outpatient clinic, we insert an epidural catheter for the pain treatment during brachytherapy for prostate cancer in the urology department, and for vascular surgery on the next day. Radiopaque epidural catheter position is checked by X-ray after insertion, since a certain number of position errors are confirmed by X-ray.
Materials and Methods: After approval of ethics committee, twenty-seven cases were studied retrospectively who requested for an epidural catheter insertion to the anesthesiology clinic from January 2018 to March 2019. All epidural catheters were inserted by an anesthesiologist with over 10 years of experience. Twelve cases were placed in the lumbar region for brachytherapy for prostate cancer in the urology department, and 15 cases were placed in the thoracic region for intraoperative analgesia for open prosthetic angioplasty for abdominal aortic aneurysm on the next day. At the time of insertion, 3 ml of 1% lidocaine was injected as a test dose, and after 5 minutes, cold signs were confirmed and X-ray were checked for final confirmation. If a positional error is observed on the X-ray, catheter is reinserted.
Results: Of the 27 cases, 20 were correctly indwelled in the epidural space with X-ray. There were four cases of prolapse from the nerve root, and one case of not being able to follow the tip with X-ray but having an analgesic effect. In the 4 cases of prolapse, there were 1 thoracic and 3 lumbar region.
Discussion: Previous studies have showed the probability of intravascular placement of the epidural catheter, but the probability of prolapse from the nerve root has not been studied. We showed that a certain number of catheter prolapse from the nerve root. This pilot study suggests that lumbar catheter prolapse more often than thoracic region. Although the study could not detect the reason. Further study may reveal the technique to avoid prolapse of the catheter.

5189

Effect of Clonidine on heart rate variability during spinal anaesthesia: randomized clinical trial

Guerra Lucena Matias Alencar L.[1], Melo Teixeira Batista H.[2], Ferreira Cavalcante S. L.[1], Gonçalves Da Silva Leite A.[1], Rodrigues Nunes R.[1], Costa Araújo B. K.[1]
[1]Hospital Geral de Fortaleza - Fortaleza (Brazil), [2]Centro Universitário de Saúde do ABC - Santo André (Brazil)

Background and Goal of Study: Spinal anaesthesia blocks sensory, motor and autonomic nerve conduction from the periphery to the CNS. Adjuvants administered in combination with local anesthetics prolong its duration. Discharge from PACU is based on return of motor function and does not take into account recovery of autonomic activity. It is unclear in the literature whether motor block regression is accompanied by return of autonomic function. Heart Rate Variability (HRV) consists of a simple, noninvasive measurement of electrocardiogram RR intervals using mathematical methods, as well as the Chaos Theory, that represents the autonomic nervous system activity and may be useful in assessing postoperative autonomic recovery. The aim of this randomized, double-blind clinical trial is to evaluate autonomic function at the time of return of motor function in patients who received spinal anaesthesia.
Materials and Methods: The sample consisted of 71 ASA I to III patients who underwent surgery of the lower limbs and lower abdomen under spinal anesthesia. They were randomized into 2 groups: group B, which received 20mg isobaric bupivacaine; and group C, which reveiced 20mg of isobaric bupivacaine and 75mcg clonidine. HRV was evaluated at 3 moments: rest, 20 minutes after spinal block and at the time of motor function recovery, stablished as a grade II in the Bromage scale. Linear methods in the frequency domain and nonlinear methods, focusing in approximate entropy, were used. Data were collected using a Polar V800® HR monitor and subjected to analysis and filtering by Kubios 3.0® software.
Results and Discussion: Comparing the approximate entropy (p = 0.027) and frequency domain (p=0,028) of the C group HRV in T3 with T1, a significant difference was observed, indicating a persistence of sympathetic block even after return of motor function. There was no difference in the bupivacaine group when comparing the same moments.

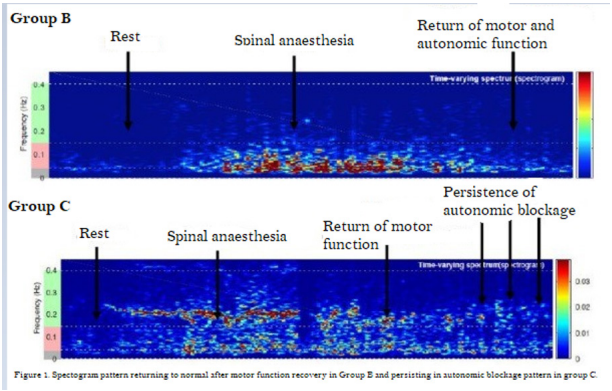


Figure 1. Spectogram pattern returning to normal after motor function recovery in Group B and persisting in autonomic blockage pattern in group C.

Conclusion: The use of clonidine in spinal anaesthesia prolongs duration of sympathetic block, even after motor function recovery.

5322

Boundary prediction during epidural punctures based on OCT relative motion analysis

Latus S.[1], Breitfeld P.[2], Neidhardt M.[1], Reip W.[2], Zöllner C.[2], Schlaefer A.[1], MTEC, AGIM
[1]Institute of Medical Technology, Hamburg University of Technology - Hamburg (Germany), [2]Universitätsklinikum Hamburg-Eppendorf (UKE) - Hamburg (Germany)

Background and Goal of Study: Physicians mainly use their haptic impression when positioning a epidural Tuohy-needle (ETN). ”Blind” techniques such as Loss-of-Resistance support the identification of the epidural space (ES). Alternatively, optical fibers are integrated in ETN to either measure forces at boundaries with embedded Fiber bragg gratings1 or to facilitate optical coherence tomography (OCT) image based differentiation of tissue structures2. In this study, we present a concept to obtain both boundary interactions and tissue structures from a forward facing OCT probe. In addition to image analysis, we propose relative motion estimation based on the OCT phase data.
Materials and Methods: We integrate a forward facing optical fiber in an ETN and derive the relative motion in front from OCT phase differences of successively allocated A-scans3. While performing ex-vivo punctures in a pig cadaver we allocate OCT intensity and phase data, track the needle pose, and measure forces at the ETN-shaft (Fig. 1, left). In addition, the physician reports his haptic impression.
Results and Discussion: The intensity data (gray), estimated relative motion (red), and measured force in ETN direction (blue) for one of 12 punctures are compared exemplary (Fig. 1). Comparing the force and relative motion estimates it is obvious that both indicate the boundaries B, C, E, and F. While the external forces are also reflecting friction the relative motion is much more sensitive to the actual boundary penetration. Small ruptures of structures inside the ligamentum flavum and when entering the ES are more clearly visible in the relative motion signal. Using the relative motion, we are able to detect the tissue deformations and ruptures at boundaries. Furthermore, negative forces due to re-orientations lead to negative relative motion estimations.

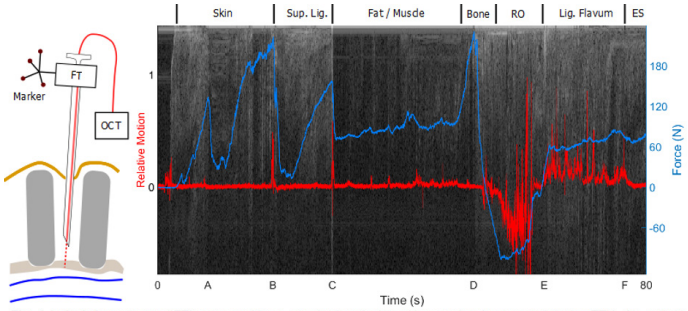


Fig. 1 Left: A force-torque (FT) sensor with an attached optical tracking marker is mounted to the ETN. An optical fiber (solid red) allowing forward facing A-scan acquisition (dashed red) is embedded into the ETN. Right: OCT intensity values (gray) and relative motion estimated from OCT phase (red) and forces at the FT (blue) for a puncture. The events (A-F) relate to different ETN-tissue interactions: A) Re-orientation of ETN, B) first rupture at skin, C) second rupture at supraspinous ligament, D) bone contact and following ETN re-orientation (RO), E) start of multiple ruptures at ligamentum flavum, and F) ES entrance.

Conclusion: Relative motion estimated from within an ETN tip allows detecting tissue boundaries. Using the gray values and the motion estimates may further the precision of ETN navigation.
References:
1. A. Beisenova IEEE Sensors Journal 2018.
2. M.-C. Kao Biomed.Opt.Express 2018.
3. C. Otte Medical Imaging 2012.

5352

Comparison between intrathecal morphine and Quadratus Lumborum block for postoperative analgesia in cesarean sections

Ferreira T.[1], Nakamura A.[2], Frari H.[2], Ashmawi H.[2], Nani F.[2], Fernandes H.[2]
[1]Hospital das Clinicas HCFMUSP, Faculdade de Medicina, Universidade de Sao Paulo - Sao Paulo (Brazil), [2]University of Sao Paulo - Sao Paulo (Brazil)

Background and Goal of Study: Cesarean section is one of the most commonly performed surgical procedures in the world, and has great potential for postoperative pain, especially in the first 24 hours. Severe pain in the early postoperative period is a risk factor for chronic pain. However, chronic pain following cesarean section is still the subject of a relatively recent study, with variable incidence depending on the study, from 1% to 18%. Over the past decade, new adjuvant forms of postoperative analgesia have become more popular, such as regional blocks, for instance the Transverse Abdomen Plane Block (TAP) and the Quadratus Lumborum Block (QL), having as benefits the prolonged analgesia they provide and the low incidence of side effects. Our goal is to test if QL block may offer postoperative analgesia equivalent to intrathecal morphine, with lower incidence of side effects.
Materials and Methods: Randomized, prospective, clinical, analytical study with blinded distribution for evaluators. It includes 75 patients scheduled for cesarean section under spinal anesthesia to be divided into 3 groups. The first group receives spinal anesthesia with intrathecal morphine, the second group receives morphine-free spinal anesthesia plus quadratus lumborum block, and the third group receives spinal anesthesia with intrathecal morphine plus quadratus lumborum block. The primary variable to be evaluated will be pain, through the numerical pain scale, and opioid consumption in the first 24 hours of the postoperative period.
Results and Discussion: To date, 43 patients have been included in the study. Partial analysis of the data shows that there was no statistical difference between anthropometric data, morphine consumption and pain scores in the first 24 hours. There was a statistical difference in higher urinary retention in the intrathecal morphine group. There was no difference between the groups in the incidence of chronic pain.

QUALICS TRIAL – PARTIAL ANALYSIS

VARIABLES	GROUPS			p	TEST
	INTRATHECAL MORPHINE (n=13)	QUADRATUS LUMBORUM PLUS INTRATHECAL MORPHINE (n=15)	QUADRATUS LUMBORUM WITHOUT INTRATHECAL MORPHINE (n=15)		
AGE (YEARS)	30.85 +- 5.8	32.47 +- 6.85	33.0 +- 6.51	0.662	ANOVA
BMI (KG/M²)	31.11 +- 5.31	31.31 +- 4.23	29.18 +- 4.89	0.422	ANOVA
TOTAL OF IV MORPHINE REQUESTED IN THE FIRST 24H (MG)	4.92 +- 7.45	2.00 +- 3.38	3.47 +- 3.02	0.298	ANOVA
PAIN AT REST AFTER 24H (0-100)	13.68 +- 23.82	4.00 +- 15.49	19.67 +- 17.16	0.085	ANOVA
TIME TO HOSPITAL DISCHARGE (DAYS)	3.00 +- 0.71	3.13 +- 1.51	3.07 +- 1.03	0.954	ANOVA
URINARY RETENTION IN THE FIRST 24H (N° OF PATIENTS)	3 (25%)	0 (0%)	0 (0%)	0.019	CHI SQUARE

AFTER 3 MONTH EVALUATION

VARIABLES	GROUPS			p	TEST
	INTRATHECAL MORPHINE (n=11)	QUADRATUS LUMBORUM PLUS INTRATHECAL MORPHINE (n=8)	QUADRATUS LUMBORUM WITHOUT INTRATHECAL MORPHINE (n=7)		
PAIN AROUND SURGICAL SITE (N° OF PATIENTS)	2 (18.2%)	1 (12.5%)	1 (14.3%)	1.00	CHI SQUARE
NUMBNESS AROUND SURGICAL SITE (N° OF PATIENTS)	5 (45.5%)	2 (25%)	1 (14.3%)	0.437	CHI SQUARE
ITCHING AROUND SURGICAL SITE (N° OF PATIENTS)	1 (9.1%)	0 (0%)	0 (0%)	1.00	CHI SQUARE
BURNING AROUND SURGICAL SITE (N° OF PATIENTS)	1 (9.1%)	0 (0%)	0 (0%)	1.00	CHI SQUARE

Conclusion: QL block compared to intrathecal morphine showed the same analgesic effect when analyzed within the first 24 hours, it did not change the incidence of chronic pain but had a lower incidence of urinary retention.

5561

The efficacy of Spinal anesthesia versus combined spinal-epidural anesthesia in vaginal hysterectomy surgeries

Matolinets N.[1]
[1]LNMU - Lviv (Ukraine)

Background and Goal of Study: The use of neuraxial anesthesia methods in transvaginal hysterectomy surgeries has several advantages thanks to reliable protection against surgical stress with minimal systemic impact on the body [1]. The goal of this study is to compare Spinal anesthesia and combined spinal-epidural anesthesia for vaginal hysterectomy surgeries in terms of anesthesia, hemodynamic stability and postoperative analgesia.
Materials and Methods: 40 female patients were examined in the gynecology department of the «Lviv emergency hospital» who underwent a planned transvaginal hysterectomy for incomplete uterine prolapse of IInd and IIIrd degrees. Group 1 (n = 18) included patients who received a combined spinal-epidural anesthesia (CSE); the 2nd group (n = 22) received a classical spinal anesthesia. Cardiac output (CO) and cardiac index (CI) were monitored using an esCCO module (Life Scope Monitor by Nihon Kohden, Japan). In addition, blood pressure (BP), mean arterial pressure (MAP) and heart rate (HR) were measured. The postoperative pain intensity was evaluated using the VAS-scale.
Results and Discussion: In contrast to group 1, we observed a significant decrease in CO and CI after 30 minutes as well as a decreased MAP - after 60 minutes from the onset of anesthesia in group 2. A tendency towards hypotension and bradycardia was observed until the end of surgery in both groups. The total volume of infusion for the prevention of hypotension in group 1 was 1543.75 ± 55.45 ml, which equaled 21.36 ± 1.12 ml / kg body weight; in group 2, 1835.0 ± 70.7 ml, ie 26.17 ± 1.51 ml / kg (p = 0.006), the difference was 18.4%. Immediately after surgery, the pain levels in both groups were equal (VAS 0), but within 2 hours postoperatively, the pain level of the second group exceeded with a VAS 4 the one of the first group (VAS 2) by more than 2 points on the VAS-scale. This difference remained similar till 4 hours postoperatively.
Conclusion: The CSE group needed smaller volumes of infusion, indicating a more stable and safe hemodynamic response. This is as well confirmed in the study of indicators such as the BP, MAP, CO, CI and HR during surgery. Postoperative analgesia was more effective with the possibility of prolonged epidural analgesia through the epidural catheter in the CSE group.
References:
1. Thakar R, Stanton S. Management of genital prolapse. British Medical Journal. 2012;324:1258-1262.

6324

Caudal Epidural in adults: an “old school” technique with a fresh prespective – case series

Pedrosa E.[1], Novo J.[1], Oliveira F.[1], Abreu F.[1]
[1]Centro Hospitalar São João, EPE - Porto (Portugal)

Background: Caudal epidural anesthesia/analgesia is a technique frequently used in pediatric surgery for treatment of perioperative pain, due to its ease of performance and high rate of effectiveness of the procedure. However, in experienced hands, this technique can be used in older children and even adults, with success rates of over 75%. We present a series of cases of caudal epidural analgesia in the adult population that proved to be an important alternative to other anesthetic/analgesic techniques, and to analyze possibilities for the future.
Materials and Methods: A total of thirty-four caudal epidural blocks were performed using anatomical references. The mean age of patients was 33 years old (ranging from 10 to 85 years old). Ten cases were female and 24 were male. 50% of patients were classified as ASA physical status classification I, 29% ASA II, 18% ASA III and 3% ASA IV. All patients weighted more than 30 kg. Surgeries in which this technique was used included circumcision (7 cases), testicular torsion/scrotal exploration (7 cases), perianal abscesses/ fistula (5 cases), lower limbs orthopedic surgery (10 cases) and 5 cases included vulvoplasty, sciatic ulcer, inguinal hernia, incarcerated inguinal hernia and appendectomy. In all cases, the technique was performed under deep sedation/general anesthesia. In 6 patients, an epidural catheter was placed due to the need to reach superior dermatomes or for postoperative analgesia. In the remaining cases, the block was single-shot. The local anesthetic used was ropivacaine (concentrations from 0,375% to 0,5%). The administered volume ranged from 15 to 20 mL.
Results and Discussion: In the intraoperative period, intravenous opioids were required in 3 cases (8%). In the immediate postoperative pain assessment, 4 patients (11%) required supplemental systemic analgesia. The caudal epidural can be an analgesic alternative for many of the surgeries involving the sacred and/ or lower lumbar dermatomes. The placement of a catheter for repeated doses or an infusion is possible and may also be an alternative for patients with prior instrumented lumbar spine or severe kyphoscoliosis (as some of the cases in these series), and in opioid-free strategies.
Conclusion: Caudal epidural analgesia in the adult population may be an alternative to other anesthetic/ analgesic techniques. The use of ultrasound to identify the sacred hiatus can be a tool for the future, to broaden the use of this technique successfully.

4721

Does documented interspinal level correlate appropriately to actual level in epidural for labour analgesia?: a pilot study

Sardana R.[1], Tanwar S.[1], Sudha T.[1], Ahmad A.[1], Saran A.[1], Bhardwaj M.[1]
[1]Wexham Park Hospital - Slough (United Kingdom)

Background and Goal of study: Tuffier’s (T) line is a transverse line connecting the top of iliac crests intersecting the spine at L4 spinous process. However, the vertebral level determined by palpatory method in sitting position may not be accurate. A pilot study was conducted to assess whether documented interspinal (IS) level correlates with actual IS level in epidural for labour analgesia as well as to assess deviation of T-line observed by palpation and by ultrasound (USG).
Materials and Methods: Patient’s consent and research department’s approval taken. Patients were divided into Gp A(BMI<35) & Gp B(BMI>40) who had single attempt for labour analgesia in sitting position. Documented IS levels of needle puncture marks were confirmed postnatally following normal delivery using Venue 50 GE USG machine with curvilinear probe. T-line palpated in sitting and lateral position postnatally & confirmed it’s intersecting IS level by USG.
Results and Discussion: 73%(16/22) patients of Gp B & 27%(6/22) of Gp A presented difficulties in palpating T-line in sitting position compared to 18%(4/22) and 0%(0/22) in lateral position respectively. Hence, 27%(6/22) patients of Gp B resulted in insertion of epidural inadvertently at L1-2 or above. USG confirmed T-line intersected at L3 spine in 45%(Gp A) compared to 54%(Gp B).

	BMI<35(Gp A)	BMI> 40(Gp B)
L3-4 IS level documented after epidural	22	22
L3-4 IS level needle mark observed by USG	12	10
L2-3 IS level needle mark observed by USG	08	06
L1-2 or above IS level needle mark observed by USG	02	06
Difficulty to palpate T-line in sitting position	06	16
Difficulty to palpate T-line in lateral position	00	04
T-line intersects at L4 spine in lateral position (USG)	12	10
T-line intersects at L3 spine in lateral position (USG)	10	12

Conclusion: We recommend USG should be the gold standard to identity IS level for epidural. However, in the absence of USG, we suggest that palpating T-line in lateral position is superior to sitting position for identification of IS level.

4788

Neostigmine-Atropine for Postdural Puncture Headache

Wu S.[1], Chen K.[1], Liao K. H.[1]
[1]*China Medical University Hospital - Taichung (Taiwan)*

Background: Postdural puncture headache(PDPH) is not a rare complication of spinal anesthesia. The management of PDPH can be conservative, pharmacological or even more invasive with epidural blood patch. A recent study indicated neostigmine-atropine as the addition of conservative treatment is effective to reduce the severity of PDPH. However, gastrointestinal(GI) side effects of this management could be quite bothersome.
Case Report: A healthy parturient (165cm,75kg) encountered PDPH after spinal anesthesia for cesarean section. Her headache occurred on the next day of dural puncture with VAS 8/10. We started her treatment by conservative strategies combined with the protocol based on neostigmine-atropine suggested in the reference. The first dose of neostigmine 1.5mg/atropine 0.75mg was given intravenously within 5 minutes (suggested in the reference). However, 20 minutes after the medication she developed severe vomiting and diarrhea followed by abdominal cramping pain and her symptoms lasted for an hour. The first dose of neostigmine-atropine decreased her PDPH to VAS 5/10. The second dose of neostigmine 1.5mg/atropine 0.75mg was scheduled after 12 hours of the first dose. We prolonged dripping time of intravenous neostigmine-atropine to 20 minutes. She tolerated the medication well with no more GI side effects. Six hours after the second dose her headache was improved to VAS 2/10. We ceased neostigmine-atropine and encouraged the patient to keep conservative treatment. Three days later she was discharged uneventfully.
Discussion: A recent study advocated neostigmine-atropine as an effective way to treat PDPH. In our case, neostigmine-atropine indeed decreased the severity of PDPH. Nevertheless, neostigmine is of quick onset, and usually induces GI symptoms. Since the effect of neostigmine-atropine for our patient was positive, we kept the treatment and prolonged the dripping duration of her second dose to minimize side effects. The second dose was as effective to improve PDPH in our case without previous GI discomfort. Therefore, we suggest slow infusion of this medicine to reduce undesirable GI side effects or even worse ones such as bradyarrhythmia or bronchospasm.
Reference:
1. Anesth Analg. 2018 Dec;127(6):1434-1439.
Learning points: Neostigmine-atropine can be an additional strategy for PDPH. However, drug induced side effects should be paid attention and slow infusion rather than iv. push of the medicine is recommended.

4934

Does warm intravenous fluid reduce shivering after spinal anaesthesia in elderly?

Cindea I.[1], Gherghina V.[2], Balcan A.[2], Samoila B.[3], Popescu R.[1], Costea D.[1]
[1]*Emergency Clinical Hospital Constanta - Constanta (Romania),* [2]*Ovidius University of Constanta - Constanta (Romania),* [3]*John Radcliffe Hospital Oxford - Oxford (United Kingdom)*

Background and Goal of Study: Postoperative shivering is a commonly reported occurrence that affects 10 to 65% of surgical patients recovering after general and spinal anaesthesia. Even the etiology of postoperative shivering is poorly understood, it is obviously noticed that it increases the likelihood of postoperative complications in risk populations, such as the elderly. The aim of our prospective randomized case-control trial is to evaluate the advantages of warm versus room temperature solutions infusion, in terms of maintenance of core temperature and prophylaxis of shivering after spinal anaesthesia in elderly.
Materials and Methods: After institutional Ethics Committee approval and written informed consent from all subjects, 76 patients (ASA I-III, aged >65 years), candidates for elective minor lower abdominal procedures under spinal anaesthesia were enrolled. They were randomly allocated to receive room temperature crystalloids (group C, n=38 subjects), respectively warm fluids, (group S, n=38 subjects) intravenously administered. All patients received standard spinal anaesthesia with 0,5% hyperbaric bupivacaine. Surgical procedures were performed in the same operating room at a constant temperature of 21-22°C. For 90 minutes after spinal anaesthesia, we evaluate hemodynamic parameters (noninvasive blood pressure, heart rate) oxygen saturation, core (tympanic) temperature every 5 minutes for the first 30 minutes, then every 15 minutes. We recorded for the same interval the incidence and severity of shivering graded by means of Bedside Shivering Scale Assessment. The collected data were analyzed with SPSS software considering the significance level for p<0,05.
Results and Discussion: The groups were similar concerning demographics, hemodynamic profile, oxygen saturation. Core temperature measurement showed significant lower levels for group C compared to group S (p<0,05). As regards the incidence and severity of post-spinal shivering, we recorded lower values in group S versus control, the difference between groups being statistically significant (p<0,001) in both situations.
Conclusion: Intravenous infusion of warm crystalloids succeeded to maintain core temperature and to reduce significantly the incidence and severity of post-spinal shivering in old surgical patients and could be used in the multimodal strategy for preventing hypothermia and post-spinal anaesthesia shivering.

5514

Liposomal bupivacaine plus bupivacaine for interscalene brachial plexus block decreases opioid consumption for up to two weeks compared to bupivacaine alone in patients undergoing total shoulder arthroplasty

Umeh U.[1], Cuevas R.[1], Virk M.[1], Kwon Y.[1], Cuff G.[1], Hertling A.[1]
[1]*NYU Langone Med. Ctr. - New York (United States)*

Background and Goal of Study: In the United States, the FDA approved liposomal bupivacaine (Exparel) for interscalene nerve blocks in 2018.1,2 Although it is considerably more expensive than plain bupivacaine, its main purported advantage is its extended duration, which might allow for sustained pain control and early discharge without using a perineural catheter.3 We examined whether Exparel reduces opioid consumption and pain in adult patients undergoing primary total shoulder arthroplasty surgery.
Materials and Methods: Fifty-nine adult patients were randomized to receive either 20mL of bupivacaine 5mg/mL (CTL; n = 30) or 10mL of bupivacaine 5mg/mL plus liposomal bupivacaine 133mg (EXP; n = 29) for an interscalene nerve block. All patients received IV sedation in addition to the regional anesthetic. The primary outcome was opioid consumption, measured in MME (Morphine Milligram Equivalents), from 24 to 96 hours post operatively. The secondary outcomes were cumulative opioid consumption on post-operative day 7, 14 and 30, pain scores using PROMIS Pain Intensity Scale, and length of stay.
Results and Discussion: Opioid consumption was significantly lower in the EXP group compared to CTL 24 to 96 hours post-surgery (28.79 ± 34.30 vs. 65.06 ± 33.71 MME; p < 0.001), during the first week after surgery, (45.99 ± 57.05 vs. 95.35 ± 57.96 MME; p < 0.001), and during the second post-operative week (7.59 ± 23.70 vs. 20.50 ± 35.38 MME; p = 0.01), but not during the third or fourth weeks. Additionally, patients in the EXP group reported significantly less pain intensity one week after surgery when compared to CTL (45.90 ± 8.95 vs. 52.40 ± 6.60; p = 0.01) but not thereafter. There was no significant difference in length of stay between groups.
Conclusion: The addition of liposomal bupivacaine for an ISB significantly reduces opioid consumption during the 24-96 hours post-operative period and for up to two weeks after surgery. Additionally, it leads to reduced pain intensity during the first week after undergoing total shoulder arthroplasty surgery. As the length of stay was unaffected, further studies are needed to determine whether liposomal bupivacaine can replace perineural catheters.
References:
1. Vandepitte C et al. Reg Anesth Pain Med 2017; 42: 334-41.
2. Hadzic A et al. Anesthesiology. 2016;124:1372–83.
3. Ilfeld BM et al. Anesth Analg. 2013;117:1248–56.

6383

Does perineural dexamethasone reduce rebound pain following interscalene block in patients undergoing arthroscopic shoulder surgery?

Woo J. H.[1], Lee H. J.[1], Lee J. W.[1], Oh H. W.[1], Park H. S.[1], Kim Y. J.[1]
[1]Ewha Womans University Hospital - Seoul (South Korea)

Background and Goal of Study: Rebound pain is a condition characterized by hyperalgesia after the peripheral nerve block wears off, which may reduce or even negative overall benefits of regional anesthesia. It is well known that dexamethasone added to local anesthetic prolongs the duration of a single-shot interscalene block (SSIB). However, whether perineural dexamethasone for the SSIB affects an occurrence of rebound pain is not clear. We aimed to investigate whether the use of low-dose dexamethasone as adjuvant for nerve block reduces rebound pain after arthroscopic shoulder surgery or not.
Materials and Methods: In a double-blinded trial utilizing SSIB, 23 patients who were diagnosed with rotator cuff tear and scheduled for arthroscopic shoulder surgery were randomized to either groups: Total 12 ml of 0.5% ropivacaine mixed with dexamethasone 5mg (DEX group, n=13) or normal saline (Control group, n=10). All patients underwent SSIB and followed by general anesthesia. The primary outcome was the incidence and severity of rebound pain. Rebound pain score (numeric rating scale; 0-10) was calculated as the lowest pain score during the first 12 h before the PNB wears off is subtracted from the highest pain score during the first 12 h after the PNB wears off.
Results and Discussion: Five of 13 patients (38.5%) in Dex group and 8 of 10 patients (80%) in control group had rebound pain with a significant difference (P=0.046) and overall incidence of 56.5%. It is observed 963.0 min (IQR 811.5-2055.0) in DEX group and 695.0 min (IQR 655.5-776.7) in control group after performing SSIB (P=0.006). Of patients experiencing rebound pain, rebound pain score was 8.0 (7.0-9.5) and 8.0 (7.0-8.0) (P=0.622) and its duration was 156.0±53.7 min and 107.5±85.6 min (P=0.284), respectively. The highest pain score after the time to first analgesic request was 4.62±3.33 in DEX group and 6.50±2.79 in control group (P=0.186). Overall, the time to first analgesic request from the time of performing SSIB was prolonged significantly in dexamethasone group 1130.0 min (IQR 842.0-2331.5) compared with control group 695.0 min (IQR 625.0-795.0) (P=0.004).
Conclusion: Perineural dexamethasone demonstrated significant beneficial effects on the incidence of rebound pain as well as duration to the first analgesic request after SSIB for arthroscopic shoulder surgery.

5013

Estimation of the ED95 of intrathecal isobaric 2-chloroprocaine based on the height of patients undergoing ambulatory knee arthroscopy: A dose-finding study using the continual reassessment method

Jeanne G.[1], Gouwy J.[2], Fils J. F.[3], Saxena S.[4], Kapessidou Y.[5], Guntz E.[1]
[1]Hopital Braine l'Alleud Waterloo - Braine lAlleud (Belgium), [2]Hôpital Braine l'Alleud - Braine l'Alleud (Belgium), [3]Ars Statistica SPRL - Nivelles (Belgium), [4]Hôpital Bordet - Brussels (Belgium), [5]CHU Saint Pierre - Brussels (Belgium)

Background and Goal of Study: 2-Chloroprocaine (2-CP) is a fast acting ester-type local anesthetic devoted to short ambulatory procedures under spinal anesthesia. Consequently, it must have a rapid onset and provide a predictable duration of sensory block with minimal side effects. Administered dose is directly related to the attainment of these characteristics, and must therefore be accurately defined. Moreover, different factors are involved in the choice of this dose, including the height of patients. In this context, the present study was designed to determine the ED95 of 2-CP for elective knee arthroscopy under spinal anesthesia, using the continual reassessment method (CRM) based on patients' heights.
Materials and Methods: After approval by the local Ethics Committee and signed informed consent, 120 patients were enrolled and divided into 3 groups of 40 depending on their height (Group 1: 150 to 165 cm; Group 2: 166 to 180 cm; Group 3: 181 to 195 cm). A dose-finding, prospective, observational study was performed in each group using the CRM (a Bayesian estimation of the ED95) with cohorts of 4 patients. Starting doses were 40 mg in group 1, 45 mg in group 2, 50 mg in group 3. Subsequent doses were determined by the previous cohort's responses and were allocated by the CRM. Anesthesia was considered a success when sensory blockade of the T12 dermatome level was achieved and when pain was inferior to two following inflation of the tourniquet and zero upon incision (pain was assessed using visual analogue scale). Groups were compared regarding covariates (height, BMI, age, gender) using Tukey's Multiple Comparisons for discrete (via logistic regression) and continuous (via ANOVA) covariates, as appropriate.
Results and Discussion: The ED95 of 2-CP is 40 mg for patients under 165 cm, 35 mg for patients ranging from 166 to 180 cm and 45 mg for patients between 181 and 195 cm. Groups were significantly different in terms of height and gender ($p<0.05$) but similar regarding age and BMI ($p>0.05$).
Conclusion: The present study defines the intrathecal doses of 2-CP between 35 and 45 mg as able to achieve an adequate anesthesia for day case knee arthroscopy. The dose of 2-CP is non-linearly related to the patient's height. Add to the height, the gender could be an additional factor involved in the calculation of the spinal 2-CP ED95.

5999

Comparison of bilateral transversus abdominis plane block with Exparel versus continuous epidural analgesia with bupivacaine: The EXPLANE randomized clinical trial

Turan A.[1], Cohen B.[2], Essber H.[1], Mao G.[1], Maheshwari K.[1], Sessler D.[1]
[1]Cleveland Clinic - Cleveland (United States), [2]Tel-Aviv Medical Center - Tel-Aviv (Israel)

Background: Pain after abdominal surgery is common and often severe. Epidural analgesia is effective but has substantial limitations. Transversus Abdominis Plane (TAP) block with bupivacaine liposome suspension (Exparel) can provide postoperative analgesia for 48-96 hours after single administration. We therefore tested the primary hypothesis that TAP blocks with Exparel are non-inferior to continuous epidural analgesia on postoperative analgesia in adults recovering from abdominal surgery. Secondarily, we tested whether bilateral TAP blocks with Exparel produce less postoperative hypotension than continuous epidural analgesia.
Methods: EXPLANE is a multicenter, randomized, open-label clinical trial. Adults having open or laparoscopic-assisted abdominal surgery were randomized to bilateral TAP blocks with a mixture of bupivacaine (100 mg) and Exparel (266 mg) or a continuous epidural infusion of bupivacaine (0.1%, without epidural opioids). The primary outcome was postoperative analgesia, defined as non-inferiority in both average pain scores (on a 0 to 10 scale, non-inferiority delta of 1 point) and of opioid consumption (non-inferiority delta 25%) during the initial 72 postoperative hours. The secondary outcome was postoperative hypotension, defined as time with mean arterial pressure (MAP)<75mmHg, as captured by a continuous noninvasive blood-pressure monitor (ViSi mobile, Sotera Wireless) during the same period.
Results: The study was concluded at the 3rd interim analysis after crossing a pre-defined futility boundary. We analyzed data from 477 participants in 7 sites. Estimated difference in average pain scores between the TAP and the epidural groups was 0.08 (CI: -0.22, 0.38; noninferiority P<0.001). But the opioid consumption in the TAP group was not noninferior to the epidural group (estimated ratio of geometric means 1.4, CI: 1.0, 1.96; noninferiority P=0.80). As many as 22% of patients in the epidural group had at least 10 minutes with MAP<75mmHg on average during every monitoring hour, compared with 15% of patients in the TAP group.
Conclusions: TAP blocks with Exparel did not produce noninferior analgesia compared to epidural in adults having abdominal surgery. Although they resulted in comparable pain level, patients required more opioids to achieve similar analgesia. In contrast, TAP blocks resulted in significantly less postoperative hypotension. Clinicians should choose between the harms of postoperative hypotension and those of excess opioids.

6039

Comparison of continuous infusion and intermediate bolus applications in patient controlled epidural analgesia

Araz C.[1], Kaya D.[1], Sivrioglu D.[1]
[1]*Baskent University - Ankara (Turkey)*

Background and Goal of Study: Postoperative pain control is important for patient comfort, wound healing and awareness of surgical complications. During this stage, many combinations of drugs in different ways are used for therapeutic purposes. Epidural space has an important role in reducing the dose of drug used and allowing for much more effective analgesia. In this study, we aimed to compare the efficacy of two different methods (continuous infusion + intermittent bolus vs high volume intermittent bolus) for postoperative epidural analgesia.
Materials and Methods: After the approval of University Research and Ethics Committees, records of patients who underwent elective orthopedic surgery under combined spinal-epidural anesthesia in Başkent University Ankara Hospital between January 2017 - November 2018, were reviewed from patient files and electronic medical record system and patient controlled analgesia forms of patients retrospectively. Patients were divided into two groups as continuous infusion + intermittent bolus (Group 1) and high volume intermittent bolus (Group 2) groups. Between two groups, patient pain scores, drug doses, and side effects were compared. Student's t-test was used to compare parametric values, and Pearson's chi-square test was used to compare quantitative data. P <0.05 was considered statistically significant.
Results and Discussion: The groups were similar in terms of age, ASA scores, and surgical type (p> 0.05), while the number of female patients were slightly higher in the infusion + bolus group (p = 0.041). The groups were similar in terms of nausea-vomiting, pruritus, hypotension and urinary retention. Ramsay sedation scale scores did not differ. Postoperative Bromage scores were lower in the bolus group at the 6th hour but were similar in the following hours. Pain scores of the patients in the first 48 hours were similar in all visits except for the 24-hour controls (significantly lower in infusion + bolus group, p <0.05), while the drug doses was significantly lower in the bolus group only.
Conclusion: When patient controlled analgesia is provided by postoperative epidural catheter, similar analgesic effect can be achieved by using less medication by giving only bolus at higher volume instead of infusion and bolus coexistence. Further prospective studies will be needed to draw definitive conclusions.

6130

Evaluation of the electrophysiological effects of the maximal concentration of ropivacaina after ultrasound-guided serratus intercostal fascial block. Study in a porcine experimental model

Fernandez-Lopez I.[1], García S.[1], Melone A.[1], Quintela O.[2], Varela O.[1], Zaballos M.[3]
[1]*Hospital General Universitario Gregorio Marañón - Madrid (Spain),*
[2]*Instituto Nacional de Toxicología y Ciencias Forenses - Madrid (Spain),*
[3]*Hospital General Universitario Gregorio Marañon - Madrid (Spain)*

Background: Breast surgery is one of the most common surgical procedures. The serratus-intercostal fascial block (SIFB) is an alternative to paravertebral block. This block requires large volumes of local anesthetics (LA), however, despite increasing interest in SIFB, the systemic concentration of LA after this block, and the potential cardiotoxicity associated with plasma LA levels achieved remains unkown. Our aim was to assess whether maximum levels of ropivacaine (R) following a SIFB are associated with cardiotoxic effects in a porcine model.
Materials and Methods: After approval of the Animal Research Committee of the hospital, 8 mini pigs were studied. After the anaesthesia and instrumentalization, Femoral vessels were canalized for invasive monitoring, analytical blood gas samples and ropivacaine determinations. 3 quadripolar catheters were used for stimulation and intracardiac recordings: right atrium, right ventricular-apex and His area. Surface electrocardiogram and intracardiac electrograms were continuously monitored and recorded in a polygraph. After a period of stabilization, a bilateral SIFB was realized, with a real-time and in plane needle insertion technique using a linear probe. 3 mg/kg of R was injected in a total volume of 30 mL (15 ml each side). Electrophysiological parameters were evaluated at different intervals. Arterial R concentration was measured at different intervals, up to 180 minutes after completion of the first SIFB. Statistical analysis: Wilcoxon test for comparison between electrophysiological parameters at baseline and during maximal ropivacaine concentration.
Results and Discussion: Maximum plasma concentration (Cmax) of ropivacaine occurred at 17±9.11 min post-injection and was 2.47±1.23 µg/ml-1 (median: 2.341, IQR: 1.40-3.74 µg.ml-1). The maximum concentration in any animal was 4.28 µg/ml-1 at 20 min post-injection. There were no significant changes in the electrophysiological parameters evaluated at baseline and during maximal R concentration. Sinus cycle length (620±113 vs 590±101ms, p= 0.19); PR (112±7 vs106±15ms, p=0.29); AH (77±15 vs 79±11ms, p=0.62); HV (41±7 vs 35±10ms, p=0.28);QRS (71±8 vs 75±9ms, p=0.21) and QTc (489±30 vs 507±24ms, p=0.054).
Conclusion: The concentration of ropivacaine after SIFB suggests a rapid absorption of LA, similar to that reported after blockades in large vascularization regions. However, no electrophysiological changes were associated with the maximal ropivacaine concentration.

4791

Bupivacaine-induced increase in cardiotoxicity in rats with left ventricular hypertrophy and impact of transient receptor potential canonical channels

Hino H.[1], Matsuura T.[2], Hori K.[2], Tsujikawa S.[2], Mori T.[2], Nishikawa K.[2]
[1]*Osaka City University Graduate School Of Medicine - Osaka (Japan),*
[2]*Osaka City University Graduate School of Medicine - Osaka city (Japan)*

Background and Goal of Study: Local anesthetics have the potential to cause cardiotoxicity by inhibiting sodium ion (Na+) channels; however, the impact of left ventricular hypertrophy (LVH) on local anesthetic-induced cardiotoxicity remains undetermined. Transient receptor potential canonical (TRPC) channels are upregulated in LVH, and some transient receptor potential channel subtypes have recently been reported to pass relatively large cations, including ion-formed local anesthetics; this is known as the "pore phenomenon". We hypothesized that local anesthetic-induced cardiotoxicity is more severe in LVH due to upregulated TRPC channels.
Materials and Methods: We used a modified transverse aortic constriction (mTAC) model as an LVH model. Cardiac toxicity caused by bupivacaine infusion was compared between sham and mTAC rats, and the underlying mechanisms were investigated by recording Na+ channel currents (INa) using patch clamp recordings and immunocytochemistry of TRPC protein in cardiomyocytes.
Results and Discussion: The time to cardiac arrest by bupivacaine was shorter in mTAC rats than in sham rats (mean ± SD, 1302 ± 324 vs. 1034 ± 211 s, P = 0.0303) regardless of its lower plasma concentration. The half-maximal inhibitory concentration of bupivacaine toward INa was 4.5 and 4.3 µM, which decreased to 3.9 and 2.6 µM in sham and mTAC rats, respectively, upon co-application of 1-oleoyl-2-acetyl-sn-glycerol (OAG), a TRPC3 activator. In both groups, INa were unaffected by a membrane-impermeable, positive charged lidocaine derivative (QX-314), but was significantly decreased with QX-314 and OAG co-application (sham: 78.6 ± 9.9 % of control, P = 0.0038, mTAC: 46.9 ± 27.3 % of control, P = 0.0202). Effects of OAG were antagonized by pyrazole compound 3, a specific TRPC3 channel inhibitor. TRPC3 expression on the plasma membrane was more dominant in mTAC rats than sham rats.
Conclusion: LVH rats were more vulnerable to bupivacaine, which was partly attributable to the "pore phenomenon" of TRPC3 channels upregulated in LVH.

5201

Evaluation of the effects of two antidotes: sodium bicarbonate or intralipid on reversing ropivacaine-induced cardiotoxicity in a swine model

Rodríguez Rodríguez L.[1], Melone A.[1], García Ramos S.[1], Fernández-López I.[1], Varela O.[1], Zaballos M.[1]
[1]*Hospital General Universitario Gregorio Marañon - Madrid (Spain)*

Background: Ropivacaine (R) has been described as a safer local anesthetic (LA), however, serious cardiac toxicity has been reported. Lipid-emulsion (LE) therapy during LA intoxication seem to act as an antidote. Sodium bicarbonate (B) is the standard treatment of toxicity by sodium channel blocking drugs. Recently B treatment appears to ameliorate bupivacaine electrophysiologic (EP) alterations effectively and faster than LE. We compared the effects of LE and B on the reversion of EP changes induced by R.
Methods: 24 pigs were anesthetized and instrumentalized. Three quadripolar catheters were used for stimulation and intracardiac recordings: right atrium, right ventricular-apex and His area. 5 mg/kg of R was them administered. Three minutes after R bolus, the animals received: LE: 1.5 mL/kg + 0.25 mL/kg/min (LE-group); B: 2 mEq/kg + 1 mEq/kg/hour (B-group) or saline solution, 50 ml + 1 ml/kg/hour, (control, C-group). Electrophysiological parameters were evaluated in sinus rhythm and during right ventricular pacing, given at different frequencies: 150 and 120 bpm,

at a variety of time intervals up to 30 minutes. Statistical: area under the curve (AUC) for the first 10 minutes (AUC-10) or the 30 minutes (AUC-30). Blood samples were taken for R determinations.
Results: R affected several parameters: PR interval by 17% (P=0.0001), HV by 56% (P=0.001), sinus QRS increased by 56% (P=0.0001), paced QRS at 150 bpm by 257% (P=0.0001), and at 120 ms by 143% (P=0.0001). The AUC-10 of the sinus rhythm QRS duration was significantly different among the 3 groups (P=0.003). The B group underwent a faster recovery than the C group (AUC-10: P=0.001) and with the LE group (AUC-10: P=0.015). During the first minute, 87% of the B group vs 25% in the LE or 0% of the C group had recovered more than 30% of the sinus rhythm QRS duration (P=0.001). In contrast, the trend towards a faster recovery in the LE vs the C group did not reach significance (AUC-10: P=0.16) There were not differences among groups on the recovery of paced QRS duration at 150 bpm and at 120 bpm.
Conclusions: In a closed-chest swine model, B was an effective treatment for the EP alterations due to established R toxicity. Restoration of most EP variables was faster in the B-group than in the C-group. B ameliorated R electrocardiographic toxicity faster than LE. Use-dependent effects of R as disclosed by ventricular pacing were prominent, however, no differences in its recovery were observed among groups.

5957

Does intraoperative administration of bupivacaine with adrenaline into the epidural space during major oncological surgery lead to more frequent incidence of circulatory insufficiency requiring noradrenaline infusion?

Rajpert K.[1], Korycińska-Krajmas O.[2], Symonides M.[2], Napiórkowski T.[2], Maj-Bryła I.[2]
[1]The Maria Sklodowska-Curie Memorial Cancer Centre and Institute of Oncology - Warsaw (Poland), [2]The Maria Sklodowska-Curie Memorial Cancer Centre and Institute of Oncology - Warsaw (Poland)

Background and goal of study: Epidural analgesia is routinely used in our institution to enhance both intra- and postoperative pain treatment during major oncological surgery. The goal of study was to investigate whether the intraoperative administration of 0,5% bupivacaine with adrenaline to epidural space relates to more frequent events of hypotension requiring noradrenaline infusion as compared with a different approach when the epidural drugs were administered only after the completion of surgery.
Materials and Methods: We conducted a retrospective analysis of 73 patients (27 women, 46 men, age 22-83; mean age 57 years; 63 ASA 2; 10 ASA 3) who underwent major oncological surgery between 1st March and 31th August 2019. During each operation anaesthesiological procedures included both general anaesthesia and epidural analgesia: 36 patients (49,3 %, group A) were given bupivacaine with adrenaline intraoperatively, 37 patients (50,7%, group B) received only test dose. During postoperative care all patients (excluding patients who required noradrenaline infusion) received continuous epidural analgesic solution infusion (bupivacaine 1 mg/ml, fentanyl 2 mcg/ml with adrenaline 2 mcg/ml) titrated to reach adequate analgesia.
Results and Discussion: Hypotension requiring noradrenaline administration occurred in 14 patients (19,2%). Among 4 patients from group A (11,1%) it was necessary to begin the noradrenaline infusion less than 30 minutes after bupivacaine with adrenaline injection. Ten patients required noradrenaline administration just after the induction of general anesthesia: 8 from group B (21,6%) and 2 patients from group A (5,6%). Two patients from group A received bolus of bupivacaine with adrenaline regardless of simultaneous noradrenaline infusion.
Conclusion: In our observational study we failed to find correlation between administration of bupivacaine with adrenaline to epidural space intraoperatively and more frequent circulatory insufficiency requiring noradrenaline infusion. Clinical problems of oncological surgery patients are multifaceted and it would be essential to consider them in further study regarding the topic.
References:
1. G. Niemi and H.Breivik «Adrenaline markedly improves thoracic epidural analgesia produced by a low-dose infusion of bupivacaine, fentanyl and adrenaline after major surgery» Acta Anaesthesiol Scand 1998.

6156

Clavipectoral fascia block: a true alternative

Camoes P.[1], Leite A. I. D. C. L.[1], Lugarinho Monteiro T.[1], Matias F.[1]
[1]Coimbra Hospital Center and University - Coimbra (Portugal)

Background: The most common technique used in clavicular fractures is the general anesthesia, with or without a plexus block(1)(2). The clavipectoral fascia is located under the clavicular head of the pectoralis major muscle, which occupies the space between the pectoralis minor muscle and the subclavian muscle, to shield the axillary vein, artery and nerve(2)(3). This is an unprecedented block, in which the dispersion of the local anesthetic reaches the clavicular periosteum to anesthetize the structures that are responsible for its enervation. This block provides an adequate anesthesia for clavicular surgeries and avoids the complications associated with other regional techniques(3).
Case Report: Male, 52 years-old, history of arterial hypertension, smoking habits with COPD moderate/severe and obesity, proposed for osteosynthesis of a clavicular fracture, under regional anesthesia with a mild sedation. The fascia block was performed perpendicularly to the clavicular plan. A quick scan was made to localize the fracture. An 80mm needle was placed in plane, first internally to the clavicular fracture and then externally. Local anesthetic was injected between the clavicular periosteum and the clavipectoral fascia, with an acute angle to facilitate the opening of the plan. The patient remained hemodynamically stable, without any anesthetic intercurrence. He remained painless until the night of the surgery, when 1g of paracetamol was administered.
Discussion: With this case report, we want to emphasize the clavipectoral fascia block as a true alternative to general anesthesia with plexus block, for patients undergoing clavicular surgery(3). This block allows a better post-operative pain management and a faster rehabilitation, since it´s not associated with motor blockade. The respiratory complications associated with phrenic nerve block, a common consequence of the interscalene block, are also avoided.
References:
1. Reg Anesth Pain Med. 2013; 38:539-43.
2. Indian J Anaesth. 2014 May-June;58(3):327-329.
3. Yoshimura M, Morimoto Y. ESRA19-0507 Use of clavipectoral fascial plane block for clavicle fracture: two case reports 2019.
Learning points: This block allowed an adequate anesthetic alternative to clavicular surgeries without the complications of a general anesthesia and interscalene block.

6164

Anesthetic management of a pregnant woman undergoing exploratory laparotomy surgery — a case report

Silva M.[1], Vaz I.[1], Romano C.[1], Oliveira N.[1]
[1]Centro Hospitalar Vila Nova de Gaia/ Espinho - Vila Nova de Gaia (Portugal)

Background: Non-obstetric surgery during pregnancy posts additional concerns to anaesthesiologists. The main goals are to preserve maternal safety and achieve the best possible fetal outcome.1 Regional anaesthesia is usually preferred in pregnancy when it is practical for the medical and surgical condition.2 A multidisciplinary team approach is recommended to ensure an adequate standard of care.
Case Report: We report a case of a 24 –year-old pregnant woman with 105 Kg, who presented with progressive abdominal pain at 15 weeks and 5 days gestational age. Nuclear magnetic resonance showed an abdominal mass with 18 cm from the uterus to the mesenteric root. She was schedule for an exploratory laparotomy and a loco- regional anesthesia was planned. Lombar subarachnoid block (SAB) followed by epidural catheter placement were performed. A mixture of 11mg of hyperbaric bupivacaine and 2 mcg of sufentanil was used for SAB, and bolus of 0.375% ropivacaine were administrated to extend the duration of neuraxial block. Besides antibiotic prophylaxis and occasional phenyleprine bolus no other drugs were used. Complete surgical excision of a 20x17x12 cm size tumor (desmoid type fibromatosis tumor) with a xifo-pubic incision was successfully done. She remained hemodynamically stable during the 4 hours of surgery. Fetal vitality assessment was performed and fetus showed no signs of distress. The postoperative period was uneventful, and she was discharged 6 days after surgery.
Discussion: When a pregnant patient requires abdominal surgery, the major issues are the optimal perioperative management and the best anesthetic/ surgical approach. Our case pretends to demonstrate a rare surgical condition in a pregnant woman performed under neuroaxial anesthesia and successfully managed for both the mother and the fetus, without conversion to general anesthesia.
References:
1. Indian J Anaesth. 2016 Apr; 60(4): 234–241; 2.British Journal of Anaesthesia. 2011 December; 107: 72–78.
Learning points: The choice of anaesthetic technique and the selection of appropriate anaesthetic drugs should be guided by indication for surgery, and site of the surgical procedure. Anaesthesia management should be well planned to preserve the pregnancy and to ensure the safety of the mother as well as the fetus.

6140

Effective Spinal Erector Plane Block at the Level of T5 for Lower Abdominal Surgery – A Case Report

Carmello R.[1], Pietroski Dos Santos N.[2], Midory Marques Monteiro R.[2], Lourenço D.[2], Moura Alho A. R.[2], Alessandra Rocha E.[2], CET FMABC
[1]Faculdade de Medicina do ABC - Santo Andre (Brazil), [2]Faculdade de Medicina do ABC - Santo André (Brazil)

Background: Spinal erector plane block (ESPB) has been used for analgesia in a growing number of thoracic and lumbar surgical procedures. However, there are few reports of abdominal surgeries, with considerably variable levels of anesthetic dispersion. We report a case of ESPB at the level of T5 for postoperative analgesia to a percutaneous nephrostomy.
Case Report: A 15 years-old male, with a past medical history of myelomeningocele and neurogenic bladder, was admitted to nephrectomy due to complicated pyelonephritis. Venous accesses were secured, followed by intravenous anesthetic induction with propofol, fentanyl, and atracurium. Ultrasound-guided ESPB was performed. A solution with 18mL of Ropivacaine 0.375% was administered through a 16G Tuohy needle at the level of T5, bilaterally. Next, both puncture sites were catheterized and successfully tested for local anesthetic dispersion. General anesthesia was maintained with 0.8 MAC of sevoflurane during 6 hours of surgery, which ended up being converted to bilateral nephrostomy. No additional local or venous anesthetics were required. The procedure was concluded without complications and the patient was extubated in the operating room. At PO1 the patient was asymptomatic, allowing both catheters to be removed.
Discussion: The literature on ESPB analgesia for abdominal surgeries is limited, however, an RCT of ESPB at L1 level in a pediatric population demonstrated effective lower abdominal analgesia. In a series of 11 cases of patients undergoing different abdominal surgeries, Navarro et al described that ESPB between T7-T9 levels enabled 09 patients to maintain minimum postoperative pain. A solution of Bupivacaine 0.5% and Ropivacaine 0.18% achieved analgesia extending up to 48 hours when a catheter was inserted. Thus, ESPB may be a viable anesthetic alternative for lower abdominal surgeries in patients where neuraxial anesthesia is potentially unsafe.
References:
1. Altinpulluk EY et al. Bilateral postoperative ultrasound-guided erector spinae plane block in open abdominal hysterectomy: A case series and cadaveric investigation. Rom J Anaesth Intensive Care. 2019;26(1):83–8.
Learning points: Review analgesia alternatives for lower abdomen surgeries. Describe Spinae erector plane block local anesthetic dispersion evidences for lower abdomen procedures. Recognize uses of continuous analgesia catheter in Spinae erector plane block.

6201

Distal sciatic combined with saphenous nerve block in a high risk patient with lower limb ischemia. A case report

Gkiouliava A.[1], Koraki E.[1], Mitos G.[1], Stachtari C.[1], Pistiolas G.[1], Trikoupi A.[1]
[1]Papanikolaou Hospital Thessaloniki - Thessaloniki (Greece)

Background: Patients with vascular disease pose a challenge for the anesthesiologist regardless of the type of intervention. Lower limb ischemia is a common presentation for vascular surgery. We report the case of an ASA V class patient undergoing emergent transmetatarsal amputation to highlight the potential benefits of peripheral nerve block (PNB) use.
Case Report: A 72 year old male presented in the emergency department with lower limb ischemia and indication for transmetatarsal amputation. The patient reported limited physical activity -NYHA III- for the past year, he was a heavy smoker and his medical history was significant for kidney failure under hemodialysis, untreated chronic obstructive pulmonary disease, hypertension and dilated cardiomyopathy. He had a permanent pacemaker and a recent echocardiography described an EF= 30% and mitral valve regurgitation. Furthermore, the patient was under therapeutic dose of Low Molecular Weight Heparin. Taking all these into consideration, we decided to perform a PNB. Because of extensive foot infection an ankle block was not feasible. After informed consent of the patient, a distal sciatic combined with a saphenous nerve block was implemented with success. Under ultrasound guidance, 15ml of Ropivacaine 0,5% were injected just before the bifurcation of the sciatic nerve and 10ml Ropivacaine 0,5% in the adductor canal to target the saphenous nerve. The patient recovered uneventfully and no postoperative complications occured.
Discussion: PNBs offer high risk patients fast track anesthesia and should be preferred for transmetatarsal surgery. However, performance on anticoagulated patients should be individualized1. The increasing use of ultrasound improves block safety and effectiveness. We also consider choosing distal blocks may provide another safety point in this group of patients.
References:
1. Horlocker, T. T., Vandermeuelen, E., Kopp, S. L., Gogarten, W., Leffert, L. R., & Benzon, H. T. (2019). Regional anesthesia in the patient receiving antithrombotic or thrombolytic therapy: American Society of Regional Anesthesia and Pain Medicine Evidence-Based Guidelines. Obstetric Anesthesia Digest, 39(1), 28-29.
Learning points: The combination of distal sciatic and saphenous nerve block can offer fast track anesthesia, increased patient satisfaction and cost limitation for patients undergoing metatarsal amputation and should thus be considered as a viable option in anticoagulated patients.

6312

Anaesthetic approach to a patient with McArdle syndrome — a rare metabolic disease

Duarte D.[1], Pinto A. M.[1], Gomes L.[1]
[1]Centro Hospitalar de Entre o Douro e Vouga - Santa Maria da Feira (Portugal)

Background: McArdle disease or glycogen storage disease type V is a rare metabolic myopathy (1:100,000) characterized by glycogen deficiency in skeletal muscles1. This disease has the potential for creating perioperative anaesthetic challenges, such as hypoglycaemia, rhabdomyolysis, myoglobinuria, acute renal failure and malignant hyperthermia2. This is a case report about a patient with McArdle disease and his anaesthetic management.
Case Report: A 63-year-old male, ASA II, BMI 30, with hypertension and diagnosed in 2017 with McArdle disease submitted to an umbilical hernia repair. The patient described severe muscular pain and lack of strength during light exercise preventing an accurate evaluation of functional capacity. Patient had a Mallampati IV, chronic hoarseness and no neurological or kidney damage. We performed spinal anaesthesia with a 27G needle, 2.5 mcg sufentanil and 12.5 mg levobupivacaine. Active heating was maintained during the surgery and in the recovery room. The motor block was completely reversed after 4 hours with no alterations in muscle strength. Myoglobin and CK testing in the postoperatively were similar to the preoperative period. ICU care was considered although this wasn´t necessary as no complications were recorded perioperatively.
Discussion: Patients with McArdle disease are rare and rise several anaesthetic concerns. Using regional techniques, we avoid complications such as malignant hyperthermia, metabolic alterations and hypermetabolism. In addition, it allows the patient to adapt his positioning decreasing the risk of rhabdomyolysis. We should avoid shivering in these patients since muscle damage and increase in oxygen consumption can lead to important metabolic changes. Monitoring temperature and active patient warming during the surgery are also important measures.
References:
1. Gurrieri et al. BMC Anesthesiology (2017) 17:134.
2. Bollig G et al. Acta Anaesthesiol Scand (2005) 49:1077–1083.
Learning points: Patients with rare muscular diseases like McArdle syndrome are an anaesthetic challenge and demand a tailored anaesthesia. Regional techniques is the main option when the procedure allows it. Adequate monitoring and postoperative follow up also prevent complications. Choosing a spinal anaesthesia, we guaranteed the safety of our intervention without aggravating disease and without prolonging hospital stay or recovery.

6092

Ultrasound-guided combined interscalene-cervical plexus block with low volume for clavicle surgery analgesia – safe and opioid sparing technique

Maldonado A. F.[1], Sales F.[2], Cruz A. R.[2], Cunha M.[2]
[1]Unidade Local de Saúde de Matosinhos - Hospital Pedro Hispano - Matosinhos (Portugal), [2]ULSM Hospital Pedro Hispano - Matosinhos (Portugal)

Background: Although peripheral nerve blocks are commonly used for a wide variety of surgical procedures on the upper extremity, there are very few reports regarding regional anaesthesia for surgery of the clavicle.1 The sensory innervation of the clavicle has been attributed to either the cervical or brachial plexus.2 We report the anaesthetic management of a case involving a clavicle surgery performed under ultrasound-guided superficial cervical plexus block (SCB) combined with an interscalene block (ISB), along with general anaesthesia.
Case Report: A 55 years-old-male, ASA III, required a surgery repair of an acromioclavicular joint dislocation. The patient had heart failure (NYHA II), ischemic cardiomyopathy with history of acute myocardial infarction, dyslipidaemia, smoking and obesity. Considering his comorbidities, we opted for a combined regional and general anaesthesia. After adequate sedation, an ultrasound guided ISB was performed, the approach was within-plane technique targeting the upper trunk, roots C5 and C6, with an injection of 8 ml of ropivacaine 0,375%. Then, with the same needle puncture, the SCB was performed with 2 ml of ropivacaine 0,375%. General anaesthesia was administered and intraoperative analgesia included only paracetamol 1 g. The surgery lasted for approximately 70 min. Surgery and anaesthesia were uneventful. In the Post-Anaesthesia Care Unit, the patient had no pain and therefore no other analgesia was required. In the postoperative period, up till hospital discharge (24 hour after), the patient had no pain at rest or movement with paracetamol 1 g 8-hourly, no motor, or sensitive blocks nor neurological complaints.
Discussion: Low volume and low local anaesthetic concentration ultrasound-guided upper trunk ISB and SCB provided effective analgesia in both intraoperative and postoperative periods with no side effects or complications. This method reduced the need for perioperative opioid analgesia without compromising the patient's comfort.
References:
1. Anesthesiol Res Pract. 2018 Jun 3;2018:7842128.
2. BJA, Vol 115, Issue eLetters Supplement, 22 Dec 2015.
Learning points:
Combined ultrasound-guided superficial cervical plexus block and interscalene block (C5 and C6 roots) was a successful analgesic technique for surgery of the clavicle. This method had no reported complications, with no need for rescue analgesia, allowing the reduction of opioid consumption.

6089

Opiod sparing anesthesia associated with continuous Quadratus Lumborum Block as an alternative to neuroaxial blockade for abdominal surgery

Menegat M.[1], Figueiredo K.[1], Erthal L.[1], Silveira C.[1], Rivoli A. L.[1], V. Lemos Neto S.[1]
[1]INCA - Rio de Janeiro (Brazil)

Background: Neuroaxial blockade is considered the gold standard for open abdominal surgery. When the patient presents contraindication or an anatomy difficulties, another regional anesthesia or improvement of intravenous analgesia may be performed. Interfacial blocks, such as quadratus lumborum (QL), has been gaining space in this scenario, due to its visceral and somatic analgesia.
Case Report: A 31-year-old woman, weighing 67 kg, with previous spine arthrodesis, presenting abdominal wall tumor was scheduled for an open resection. Anesthetic monitoring included non-invasive blood pressure, SpO2, ECG, EtCO2 monitoring, pulse and body warming. General anesthesia was induced with fentanyl 150µg, lidocaine 100mg, propofol 120mg e rocuronium 50mg and subsequent endotracheal intubation. Ketamine, MgSO4 and lidocaine were used as adjuvants; anesthesia was maintained with sevoflurane. Before the surgery, QL type 2 was performed, bilaterally, guided by ultrasound with linear transducer and patient in lateral decubitus position. A 17-G Tuohy needle was used and administered 20 ml of ropivacaíne 0,5% in each side and posterior insertion of catheter on the right side. The surgery lasted 4 hours, without complications and before extubation 10 ml de ropivacaíne 1% were injected on the catheter. On the first PO day, intermittent bolus of local anesthetic was executed (20 ml ropivacaine 0,2% 10/10 h). Patient didn't have any complaints nor experienced pain even after ambulation. The catheter was removed after 24 hours and the patient was followed for another 48 hours, without pain and no rescue opioids were needed.
Discussion: QL has an important role and has since been frequently used in multimodal anesthesia in abdominal procedures. QL block can be divided into 4 differents techniques and there is no superiority between then in the literature. Catheter insertion enables effective postoperative pain control. The association between this regional anesthesia technique and opioid sparing in a multimodal approach has demonstrate benefits in abdominal surgeries.
References:
1. Elsharkawy H, El-Boghdadly K, Barrington M. Quadratus Lumborum Block: Anatomical Concepts, Mechanisms, and Techniques. Anesthesiology. 2019 Feb;130(2):322-335.
Learning points: Cotinuous Quadradus Lomborum Block as an opioid sparing anaesthetic techinique alternative to neuroaxial anaesthesia.

6063

Quadradus Lomborum Block type 3 as a rescue technique for a converted urological surgery

Erthal L.[1], Figueiredo K.[1], Menegat M.[1], Soares S.[1], Rivoli A. L.[1], V. Lemos Neto S.[1]
[1]INCA - Rio de Janeiro (Brazil)

Background: Neuroaxial anesthesia is still the gold standard technique for Trasurethral resection. However, when a change during surgery is needed and the surgical time may increase, it may not be enough. In urological procedures requiring open abdominal surgery, robotic or videolaparoscopic resections, interfacial blocks are an adequate alternative due to its visceral and somatic analgesia.
Case Report: A 89 year-old male patient (60Kg, 1,65m), presenting a bladder cancer, scheduled for a transurethral resection (TURP) under spinal anesthesia. Medical history included gastric cancer operated in 2016 and traumatic leg amputation. After standard monitoring, spinal anesthesia was performed with 12mg of hyperbaric bupivacaine 0,5% by 25G Quinck needle. Sedation was made with 2mg midazolam and 40µg of fentanyl IV. It was necessary to convert the surgical procedure due to a bladder lesion. Facing a possibility of a long surgical time, we decided to convert our technique to general anesthesia. Induction was made with 60mg lidocaine, 150 µg fentanyl, 70mg propofol, 70mg rocuronium and subsequent endotracheal intubation. At the end of the procedure, Quadradus lomborum block type 3 (QL3) was performed, bilaterally, guided by US with linear transducer, 22G Quinck needle and patient in lateral decubitus position. After hydrodissection with 10mL saline 0,9%, 20mL 0,25% bupivacaine with 4mg Dexamethasone were injected each side. Surgical time was 240 minutes, 90 min under neuro-axial anesthesia and 150min under general. Patient was removed to the ICU. Numerical Rating Scale (0-10) was used to evaluate pain. NRS were 2, 0 and 0, in the immediate post-op, 12h and 24h after, respectively. After 24h, patient walked and was discharged to ward with good pain control and no rescue opioid needed.
Discussion: Interfacial blocks have been gaining space as an anesthetic technique, both as a tool of sparing opioids, and as an effective postoperative analgesia. Firstly described in 2007, QL can be divided into 4 different techniques currently. QL3 was chosen due its visceral and somatic analgesia.
References:
1. Elsharkawy H, El-Boghdadly K, Barrington M. Quadratus Lumborum Block: Anatomical Concepts, Mechanisms, and Techniques. Anesthesiology. 2019 Feb;130(2):322-335.
Learning points: This work aims to show that interfatial blocks can be a good techinique for post-operative analgesia.

6409

Unilateral erector spinae plane block combined with multimodal analgesia for treatment of chronic pain after open inguinal hernia repair: a case report

Toleska M.[1], Naumovski F.[1], Dimitrovski A.[1], Trposka A.[1], Nedelkova I.[1], Lleshi A.[1]
[1]University Clinic for TOARILUC-KARIL, University Ss Cyril and Methodius - Skopje (Republic of North Macedonia)

Background: The erector spinae plane block (ESPB) is interfascial plane block which is successfully used for treatment of acute and chronic neuropathic pain in thoracoabdominal region.1 Chronic pain after inguinal hernia repair surgery is major clinical problem and can influence in patients' quality of life. The rate of chronic pain in this type of surgery is 51.6% of the cases.
Case Report: We report one case of single-shot unilateral ESPB for management of chronic pain after open inguinal hernia repair surgery. A 68-year old male patient (weight 76 kg, height 167 cm) was admitted to the Post Anesthesia Care Unit (PACU). His comorbidities included hypertension which was well treated with enalapril, and insulin-depended diabetes mellitus. In past three years he had three open right-sided inguinal hernia repair. One year ago pain was treated with right-sided transversus abdominis plane block (TAPB), which was uneffective. In past two years he received analgesic drugs every day (Doreta, Tramadol, Ketoprofen and Paracetamol) and all the time pain on numeric rating scale (NRS) was ranged from 8 to 10. After giving premedication with midazolam (2 mg intravenously), we gave dexamethasone 0.1 mg/kg i.v. and performed ultrasound guided right-sided ESPB with 20 ml 0.5% bupivacaine at level of Th11. After the block, we gave i.v. continuous infusion of lidocaine 2 mg/kg, magnesium sulfate 40 mg/kg and ketamine 0.2 mg/kg for one hour. After 2 hours patient was discharge home and the pain score from 8-10 fell to 2-3 on NRS. Follow check up after three and six months showed no persistence of the pain and pain score of 2-3 on NRS.
Discussion: Erector spinae plane block can be successfully used in treatment of chronic neuropathic pain after an open one-sided inguinal hernia repair. Also, multimodal treatment of giving single dose of dexamethasone, lidocaine, magnesium sulfate and ketamine has been shown effective in treatment of chronic pain.
References:
1. Tulgar S, Selvi O, Senturk O, Serifsoy TE, Thomas DT. Ultrasound-guided erector spinae plane block: Indications, complications and effects on acute and chronic pain based on a single-center experience. Cureus. 2019 Jan; 11(1): e3815. doi: 10.7759/cureus.3815.
Learning points: Chronic neuropathic pain after open inguinal hernia repair, which lasted for three years can be successfully treated with ESPB in a combination with single dose of dexamethasone, lidocaine, magnesium sulfate and ketamine.

6322

Atypical complicated post-dural headache syndrome

Jover Pinillos J. L.[1]
[1]Hospital Verge dels Lliris - Alcoi - Alcoy (Spain)

Background: Post-dural headache (PDH) is a possible complication after spinal anesthesia with a typical clinical syndrome. It´s diagnosis is commonly based on the clinical findings after a neuroaxial anesthesia technique. Although considered benign and self-limited, it can be very life limiting, prolonged and followed by serious complications.
Case Report: 85-year-old man with clinical history of ocular myasthenia well treated and controlled who underwent an inguinal hernia repair on an outpatient basis. Anesthesia was accomplished with a subarachnoid puncture administering 10 mg of hyperbaric bupivacaine and 10 micrograms of fentanyl. Puncture and procedure was uneventful and the patient was dispatched 6 hours later with no complications (Aldrette 10 points, Bromage I). 21 days after, the patient was referred to our unit for evaluation because of persistent headache. The headache appeared two days after discharge. It was bilateral and front-occipital. Worsening along the day, with supine position and with efforts. There was also, occasional night wake up because of cephalalgia. There was no past medical history of cephalalgia. Neurological exploration only evidenced mild walking instability. No other general exploration abnormalities or lab test were found. With no clear diagnosis, the patient was given a symptomatic treatment and transferred to neurologic unit for further investigation. The magnetic resonance imaging (MRI) showed signs of intracranial hypotension syndrome and a laminar chronic subdural haematoma. Symptomatic treatment failed and a blood epidural patch was performed with success. Three months later, the patient was asymptomatic and no pathological signs were found on the control MRI.
Discussion: PDH syndrome is a commonly easy diagnosis based on its clinical presentation after central neuroaxial anesthesia techniques. The main symptom is headache with decubitus position improvement. Many other companion symptoms can also appear. No clinical past cephalalgia is suggestive and an uneventful technique cannot discard it. Atypical presentations can occur, especially if followed by related complications. This diagnosis must be strongly considered and investigated in the presence of cephalalgia after spinal anesthesia. MRI can be helpful in no clear cases for differential diagnosis purposes. It can also discard other complications
Learning points: Atypical headache doesn´t discard PDH syndrome. MRI Imaging can help in its diagnosis.

6038

Why did it turn out yellow? - Incidental finding of xanthochromic cerebral spinal fluid during spinal anesthesia

Cortez M.[1], Almeida C.[1], Fernandes A.[1], Cadilha S.[1]
[1]Centro Hospitalar Lisboa Central - Lisbon (Portugal)

Background: Spinal anesthesia provides excellent operating conditions for surgery below the umbilicous. Usually, after placing our spinal needle in the desired interspace and reaching the subarachnoid space, a flow of clear-transparent Cerebral Spinal Fluid (CSF) is usually observed. Xanthochromia is caused by pigment in CSF and it is classically associated with subarachnoid haemorrhage.
Case Report: A 59-year-old woman, victim of a run over accident, presented with fracture of the tibia and minor cranial subarachnoid haemorrhage and was proposed for intramedullary nailing of the tibia. All routine investigations were within normal limits. Spinal anesthesia was the chosen anesthetic plan. After spinal tap and stylet removed, we observed a clear light-yellow CSF flow and chose not to inject the local anesthetic, converting into general anesthesia. Both intra and postoperative periods occurred without incidents and the patient never developed any neurological nor meningeal signs.
Discussion: Xanthochromia is classically associated with subarachnoid haemorrhage within 12 hours and it was the probable cause in this case. Following haemorrhage into the CSF, red blood cells undergo lysis and phagocytosis; the liberated oxyhaemoglobin is converted in bilirubin. Bilirubin may be detected in CSF by spectrophotometry or by visual inspection for the yellow discoloration of CSF. Other causes include a blood traumatic tap, jaundice, high CSF protein concentration. In case of detecting abnormal CSF appearance in the course of lumbar puncture done for spinal anesthesia, CSF samples should be sent to biochemistry and microbiology laboratories. However, no samples were collected at the time.
References:
1. Cruickshank, A., Auld, P., Beetham, R., Burrows, G., Egner, W., Holbrook, I., White, P. (2008). Revised national guidelines for analysis of cerebrospinal fluid for bilirubin in suspected subarachnoid haemorrhage. Annals of Clinical Biochemistry, 45(3), 238–244.
Learning points: In a trauma patient, even with minor subarachnoid haemorrhage, xanthochromia can be found during spinal anesthesia without the development of neurological signs.

5134

Perioperative management os an acute ischemia in pluripatological patient with multiple medication allergy

Martínez-Galán Fernández L.[1], Villanueva Carpintero M. D. G.[1], Lopez Olid A.[1], Valbuena Maldonado M.[1], Baladrón González V.[1], Villazala González R.[1]
[1]Hospital General Universitario de Ciudad Real - Ciudad Real (Spain)

Background: Decide the type of anesthesia in acute ischemia in a pluripathological patient, performing ilioinguinal block.
Case Report: A 86-year-old woman is allergic to NSAIDs, penicillin, aminoglycosides, AAS, pyrazolones, acetaminophen and omeprazole with a history of obesity, AHT, anticoagulated AF, ischemic ACVA without sequelae, OSA in treatment with CPAP, global respiratory failure with home oxygen, bilateral glaucoma, congestive heart failure with preserved LVEF, pulmonary HT, IIIB chronic kidney disease and stable angina pectoris. The patient goes to the emergency department with coldness and pain in right leg being diagnosed with acute ischemia there. This situation was evaluated by vascular surgery, and an urgent surgical intervention is decided to perform a right iliofemoropopliteal embolectomy.
Discussion: Different options for anesthetic management are presented to us in the preoperative period. The drug allergies described to analgesics could be a problem to establish a correct plan of postoperative care, the global respiratory

failure complicates the use of general anesthesia, at last, the anticoagulation of patient contraindicates the intradural puncture as a method of loco-regional anesthesia. It was discussed and we decided to perform the surgical intervention by doing an ultrasound-guided ilioinguinal block 0.25% levobupivacaine, and sedation with midazolam and infiltration with local anesthesia. During the intervention, the patient was monitored according to the recommendations of the SEDAR, awake, spontaneous breathing, and stable clinically and hemodynamically without presenting pain during the entire surgical intervention. During her stay in the post-anesthetic recovery unit, the patient continued at almost asymptomatic at all times, showing no pain although slight discomfort, which implied the need for tramadol boluses (drug allowed according to the Allergology Service report).
Learning points: The use of loco-regional anesthesia in situations that the patient's personal history contraindicates differents managements, is shown as a preferred option, minimizing risks when use ultrasound as a guide. The clinical outcome presented by the patient was optimal, during the surgical intervention and the postoperative period. All of these could make us consider this type of loco-regional technique as a valid and useful alternative when the characteristics of the patient contraindicate us or difficult the classic methods of perioperative management of patients in emergencies.

4883

Asymptomatic subcutaneous abscess at epidural catheter insertion site - Clinical Report

Portela I.[1], Pereira T.[2], Paulino A.[2], Xavier C.[2]
[1]Centro Hospitalar Universitário do Algarve - Faro (Portugal), [2]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: Skin and subcutaneous abscess after epidural catheterization are extremely rare events(1). The length of epidural analgesia may increase the risk for local infection(2).
Case Report: A 29-year-old female presented with fractures of the left 4th-12th ribs, left hemopneumothorax and left pulmonary contusion following high kinematics trauma. On arrival at the local hospital, an epidural catheter was placed in T5-T6 for thoracic wall analgesia. The patient was transferred to our hospital four days after the trauma and in the 6th day following epidural catheter placement was referred to the Acute Pain team due to analgesia inefficacy. After attempting to optimize analgesia without success, it was decided to perform a new epidural block. While removing the catheter, a subcutaneous abscess was detected in the puncture site. No symptoms or neurological deficits were identified and the abscess was promptly drained. The following day MRI revealed subcutaneous inflammation at the level of T5-T6 with left paravertebral spreading without neuraxial spread. There was suspicion for concomitant respiratory infection and intravenous antibiotics, which covered the bacteria identified on the swab collected from the abscess, were prescribed. With informed consent, a continuous left BRILMA (Block of the branches of intercostal nerves in the midaxillary line) at the level of the 7th rib was performed with effective pain control. On follow-up the patient remained asymptomatic
Discussion: Infection following epidural puncture presents with possibility for significant complications. As it may present without symptoms, frequent observation of the insertion site is key for diagnosis. Meningeal signs should be looked for frequently and the catheter should be removed immediately if inflammatory signs are present as there is the risk of spreading to the epidural space. Abscess drainage is indicated and antibiotics should not be prescribed unless there are meningeal signs, increasing inflammatory markers or fever.
References:
1. Maitra, S., Aftab, S., Agarwal, A. (2015) Journal of Clinical Anesthesia, 27(8), 694.
2. Simons, R., Dinner, L., Lappin, S. (2007) Anaesthesia, 62, 418.
Learning points: Even though local infectious processes following epidural techniques are rare, frequent examination of the insertion site of the catheter is key in identifying complications as they can present asymptomatically.

4827

Convulsion after combined spinal-epidural (CSE) anaesthesia: First manifestation of a brain tumour

Windels A.[1], Moralejo J.[1], Fernandes P.[1], Pinheiro A.[1], Morais L.[1]
[1]Hospital do Espírito Santo - EPE Évora - Evora (Portugal)

Background: Meningioma may present with headaches, seizures, behaviour changes or focal neurologic deficit depending on location and size or may remain asymptomatic for a patient's lifetime. Neuraxial anaesthesia is contraindicated in cases of known space-occupying lesion or raised intracranial pressure since it increases the pressure gradient between supratentorial and infratentorial compartments, risking herniation and other neurologic deterioration.1 There are few cases in the literature describing neurologic manifestations after neuraxial anaesthetic techniques in patients with brain tumours.1,2
Case Report: A 69 years old female patient, with medical history of hypertension, varicose veins, hiatal hernia, dyslipidemia, obesity and arthrosis, without neurologic findings, classified as ASA III in the preanaesthetic evaluation, was admitted for total knee replacement. CSE was performed: an 18G Tuohy needle was used to identify the epidural space with loss-of-resistance to saline technique and 2mL levobupivacaine 0.5% plus 0.5mL sufentanil 0.0025mg were infused intratecally through a 27G Whitacre needle. The epidural catheter was placed. Immediately after finishing the technique, the patient suffered a convulsion. The patient was sent to the emergency department for work-up. CT-scan showed an extra-axial lesion on the left high frontal convexity, consistent with a meningioma. The patient was transferred to the reference hospital. Neurosurgery was performed for removal of the tumour under general anaesthesia, without complications. Histologic examination revealed a transitional grade I meningioma, without invasion of the adjacent brain tissue. Postoperative evolution was favourable, with maintained GCS of 15 and control CT-scan showed no complications allowing discharge from the hospital 5 days after surgery.
Discussion: The patient had an occult meningioma that manifested with convulsion after a CSE, raising suspicion of an underlying neurological disease. Thereafter, quick investigation, diagnosis and curative surgical treatment contributed to the favourable outcome of this case.
References:
1. BJA 2007, Vol.98, 694-695.
2. Anesthesiology 2002, Vol.96, 508-509.
Learning points: Anaesthetic procedures can set the conditions for the manifestation of an underlying unknown condition, leading to its diagnosis and enabling prompt treatment. This showcases the role of Anaesthesiology as the perioperative medicine specialty.

5591

Tracheal diverticulum on a patient refusing neuroaxial anaesthesia - An analysis of viable alternatives

Cruz A. R.[1], Tenreiro G.[1], Maldonado F.[1], Sales F.[1], Carneiro S.[1]
[1]Unidade Local de Saúde de Matosinhos - Hospital Pedro Hispano - Matosinhos (Portugal)

Background: Tracheal diverticulum is often asymptomatic, being usually detected incidentally through thoracic CT. It has been associated with difficulties during intubation or ventilation as the endotracheal tube may enter the false passage of the diverticulum(1,2) and the positive pressure may increase its size. Additionally, one case reported an iatrogenic pneumomediastinum secondary to accidental perforation during intubation(3). We report the case of a patient with a tracheal diverticulum, submitted to bilateral hallux arthrodesis, who refused neuraxial anaesthesia.
Case Report: A 58 year old female, ASA III, was submitted to bilateral hallux arthrodesis. The patient had a history of alpha-1 antitrypsin deficit. Preoperative evaluation was normal, but thoracic CT revealed bilateral emphysema and tracheal diverticulum in the right posterolateral portion of the upper trachea with 16 mm of diameter. The anaesthetic plan was discussed with the patient, who refused neuraxial anaesthesia. Considering the risks of general anaesthesia in that situation, surgery was performed under peripheral nerve blocks. Monitoring was done according to ASA standards. The patient was premedicated with midazolam 2mg and fentanyl 0.05mg. A bilateral ultrasonography-guided sciatic nerve block with popliteal approach was performed with 10mL of mepivacaine 1.5% and 10mL of ropivacaine 0.75%. A bilateral hallux troncular block was performed under anatomic references with 6mL of ropivacaine 0.75%. Surgery progressed uneventfully.
Discussion: Tracheal diverticulum can be challenging for anaesthetic management. In this case, regional anaesthesia was considered the best option for the patient, as it avoids the need to instrument the likely difficult airway and possible consequences related to the tracheal diverticulum. As the patient refused neuraxial anaesthesia, peripheric nerve blocks were used as an alternative. These blocks

were also useful as a means for providing a more prolonged postoperative pain relief. Finally, considering the possibility of regional anaesthesia failure, intubation under bronchoscopic surveillance was selected as an alternative plan.
References:
1. DOI: 10.1002/lary.21840.
2. PMID: 7925920.
3. DOI: 10.1111/anae.12193.
Learning points: The case reported is interesting, not only because the challenging anaesthetic management of a tracheal diverticulum but also because of the patient refusal of a considered safer alternative technique.

5169

Make it easy: using Fascia Iliaca Compartment Block in the fascia lata autograft surgery

Villanueva Carpintero M. D. G.[1], Martinez- Galán Fernández L.[1], Valbuena Maldonado M.[1], López Olid A.[1], Baladrón González V.[1], Villazala González R.[1]
[1]Hospital General Universitario de Ciudad Real - Ciudad Real (Spain)

Background: The fascia iliaca compartment block provides analgesia for patients undergoing lower limb surgery(1). This provides anesthesia to the femoral nerve, the lateral femoral cutaneous nerve, and in a variable percentage of cases the anterior branch of the obturator nerve(2). We report a rare indication of this peripherical nerve block, as a part of multimodal analgesia in a patient who underwent fascia lata autograft.
Case Report: A 65 years-old male patient with Rheumatic Arthritis and multiple lumbar column surgeries was scheduled for pseudomyelomeningocele repair surgery, caused by a postoperative cerebrospinal fluid leak. The patient was subjected to surgical treatment of this complication. In the first instance a ventriculoperitoneal shunt was placed, and then an autograft with fascia lata had to be made to close it. In our experience the patients with fascia lata autograft have a high score at the visual analogue scale (VAS) in the postoperative period. For this reason, we tried to decrease the postoperative pain. Since the incision was made on the lateral face of the thigh, as in hip surgery, we made a multimodal analgesic plan combining general anaesthesia with ultrasound-guided fascia iliaca compartment block. In the postoperative period the patient had a low score at the VAS.
Discussion: Many reviews discuss about fascia iliaca block effectiveness focusing on the hip and knee surgery(1). However, there are not many papers that describe other indications. Our case report presents how this block could be useful for pain control during and after graft extraction.
References:
1. O'Reilly N, Desmet M, Kearns R. Fascia iliaca compartment block. BJA Educ. 2019 Jun;19(6):191–7.
2. Desmet M, Balocco AL, Van Belleghem V. Fascia iliaca compartment blocks: Different techniques and review of the literature. Best Pract Res Clin Anaesthesiol. 2019 Mar;33(1):57–66.
Learning points: Multimodal analgesia combined with peripheral nerve block has been recommended and considered as the gold standard for pain management. In this particular case, the fascia iliaca compartment block seems to be a good option. Fascia iliaca block is technically safe and reproducible, provides good quality analgesia pre and postoperative.

6010

Ultrasound-guided blockade of the superior laryngeal nerve for larynx biopsy in spontaneous ventilation in a patient with severe pulmonary hypertension

García I. M.[1], Gómez-López L.[1], Berge R.[1], Gràcia J. A.[1], Vilaseca I.[1], Sala-Blanch X.[1], Department of Anaesthesiology, Hospital Clinic, Barcelona. Spain
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background: Pulmonary arterial hypertension (PAH) is a high-risk pathology in which mild cardiorespiratory perturbations, such as laryngoscopy and anesthetic induction, can lead to dangerous situations. Therefore, alternatives to general anaesthesia (GA) should be considered. We present the case of a patient with severe PAH who underwent epiglottis biopsy with a bilateral superior laryngeal nerve (SLN) blockade and mild sedation in order to avoid GA.
Case Report: A 70-year-old male was scheduled for epiglottis biopsies. Medical history of COPD, chronic liver disease, auricular flutter and severe idiopathic PAH (domiciliary oxygen, macitentan-tadalafil therapy, severe right ventricle dilatation, estimated PAP of 83 ± 5 mmHg, and normal left ventricle function). He presented NYHA type II. At the operating room the patient was hemodynamically stable, with basal SpO2 86% rising up to 91% with 2L/min oxygen. We performed an ultrasound(US)-guided SLN block with a 23G Quincke needle, in direction to the virtual space between the thyro-hioid muscle and membrane by an out-of-plane approach. A total of 1.5 ml of 1% lidocaine was injected each side. The bilateral block was performed in less than 10 minutes. Oral lidocaine was sprayed to inhibit gag reflex. Biopsies were obtained by laryngoscopy access lasting a total of 20 min. Only one event of hypotension and desaturation to 70% happened when a higher remifentanil dose was needed, recovering after phenylephrine bolus administration and discontinuing sedation. Two hours after finishing the surgery, a proof for liquid swallowing was successfully performed. The patient reported no discomfort during the procedure.
Discussion: SLN block offers greater comfort by decreasing the nociceptive response and achieving great hemodynamic stability. US provides security for facilitating the right deposition of a minimum dose of local anesthetic and minimizing complications, allowing for a safe, easy and quick blockade.
References:
1. Acta Anaesthesiol Scand. 2000 May;44(5):511-6.
2. Am J Otolaryngol. 2019 Jan-Feb;40(1):30-35.
Learning points: The US-guided block of the SLN is simple to perform, quick and safe. It should be considered as an alternative or as a complement to GA. It provides good anesthesia from tongue-base to the vocal cords, and associated with topical anesthesia and/or mild sedation allows certain ENT procedures in spontaneous ventilation with less hemodynamic alterations, good tolerance and rapid recovery.

6016

Melkersson Rosenthal Syndrome: an unknown potential anaesthetic challenge

Cruz A. R.[1], Sales F.[1], Costa J.[1], Chaves J.[1]
[1]Unidade Local de Saúde de Matosinhos - Hospital Pedro Hispano - Matosinhos (Portugal)

Background: Melkersson-Rosenthal Syndrome (MRS) is a rare disorder, whose manifestations, namely angioedema can compromise the airway, thus being a problem for Anaesthesiologist(1). We report the successful case of a patient submitted to surgical correction of hallux valgus under combined regional anaesthesia.
Case Report: 63 year-old, female patient, ASA III, with a history of arterial hypertension, mitral valvuloplasty and MRS proposed for surgical correction of a right hallux valgus as an outpatient. On admission, both a mild degree of lip edema and fissured tongue were perceptible. The patient was actively warmed before entering to the operating room. Monitoring was done according to the ASA standards. She was premedicated with midazolam 1mg and fentanyl 0.05mg. An uneventful subarachnoid block was performed with 60mg of prilocaine; for postoperative analgesia an ankle block was performed with 20mL of ropivacaine 0.375%. During the procedure both the operating room and body temperature were kept constant. The surgery progressed unventfully. Throughout the stay at the Post Anaesthesia Care Unit and the general ward she remained stable, and was discharged home on the day after.
Discussion: MRS is a rare disorder originally described as a triad of facial nerve palsy, recurrent orofacial edema, and fissured tongue(2); our patient only featured the latter two. The main goal in the anaesthetic management of these patients is to avoid triggers, namely drugs or temperature changes that can aggravate the disease's natural features, mainly larynx edema which poses a potential problem for the anaesthesiologist, due to the risk of a difficult airway. In this case, body temperature was monitored and kept constant by using warm blankets. Moreover,drugs associated with histamine release, like succinylcholine or rocuronium, should be avoided. This favours the use of regional anaesthesia as an alternative anaesthetic technique. Due to the rareness of this disease and lack of studies about these patients more reports are required in order for their ideal anaesthetic management to be established.
References:
1. J Investig Allergol Clin Immunol. 2018 Aug;28(4):265-267.
2. Indian J Pediatr. 2016;83:1188–1190.
Learning points:
MRS is a rare disorder, whose patients airway management can be challenging to the Anaesthesiologist. Due to the scarce number of reports, the best anaesthetich technique was not yet established, but regional anaesthesia could be a safer alternative.

5908

Incidence of iatrogenic pneumothorax after ultrasound guided supraclavicular nerve block for upper limb surgery: a single centre experience of 3641 blocks

Vandemoortele O.[1], Helsloot D.[1], Van Belleghem V.[1], Desmet M.[1], Missant C.[1]
[1]AZ Groeninge - Kortrijk (Belgium)

Background and Goal of Study: An ultrasound guided supraclavicular nerve block is one of several anaesthesia techniques to perform anaesthesia and postoperative analgesia for upper limb surgery. However, the presence of the subclavian artery and pleural cavity in the vicinity of the brachial plexus results in a possible risk for hematoma and pneumothorax. The incidence of iatrogenic pneumothorax after a supraclavicular nerve block without ultrasound is reported to vary between 0.5 and 6 percent. However, the overall incidence of pneumothorax diminishes with increasing experience and is further reduced with the use of ultrasound to an overall incidence of 0.05%. This audit aims to demonstrate the incidence of iatrogenic pneumothorax after ultrasound guided supraclavicular nerve block in a high volume centre.
Materials and Methods: A retrospective analysis was performed on all supraclavicular nerve blocks for upper limb surgery in our hospital between January 1, 2016 and November 31, 2019. All supraclavicular nerve blocks were performed at the discretion of the attending anaesthesiologist. The overall incidence of clinically significant pneumothorax (suspected by symptoms of dyspnea or chest pain following the performance of the block and confirmed by chest X-ray) was documented.
Results and Discussion: Between 01-01-2016 and 31-11-2019, 3641 supraclavicular nerve blocks were performed for upper limb surgery. All blocks were performed using ultrasound. 2870 blocks were performed by graduated anaesthesiologists with a variable expertise in regional anaesthesia. 771 were performed by residents. No cases of a clinically significant pneumothorax could be identified in our database. Supraclavicular nerve blocks provide excellent analgesia for upper limb surgery and are frequently used for day case surgery. Accidental pleural puncture and pneumothorax could however delay hospital discharge and increase hospital costs. The overall incidence of pneumothorax has been reported in recent years to be decreased by the use of ultrasound. Incidences lower than 0.05% have been reported (1). Our data indicate that real incidence could be even lower.
Conclusion: Retrospective analysis of 3641 ultrasound guided supraclavicular nerve blocks indicate that this is a safe procedure and confirm previous studies indicating that the overall incidence of pneumothorax is very low (< 0.05 %).
References:
1. Anaesthesia 2014;69(4):327-36.

5864

Analysis of Closed Claims Concerning Hematoma, Abscess or Meningitis after Neuraxial Anesthesia in the United States and The Netherlands

Bos E.[1], Posner K.[2], Domino K.[2], Kalkman C.[3], Hollmann M.[4], Lirk P.[5], Epidurale Veiligheid (Epidural Safety)
[1]Academic Medical Center Amsterdam - Amsterdam (Netherlands), [2]University of Washington - Seattle (United States), [3]UMC Utrecht - Utrecht (Netherlands), [4]Amsterdam UMC - Amsterdam (Netherlands), [5]Brigham and Women's Hospital - Boston (United States)

Background and Goal of Study: Severe complications after neuraxial anesthesia are rare but potentially devastating. We aimed to identify characteristics and preventable causes of hematoma, abscess or meningitis after neuraxial anesthesia. Materials and Methods: We investigated characteristics and preventable causes of hematoma, abscess or meningitis by examining closed anesthesia malpractice claims from the United States (US) and the Netherlands from 2007 till 2017. We analyzed potential preventable causes in patient-, neuraxial procedure-, treatment- and legal characteristics of these complications.
Results and Discussion: Patients experiencing spinal hematoma (n=41) were predominantly older and using anti-hemostatic medication, while patients with abscess (n=18) or meningitis (n=14) were middle-aged, relatively healthy and more often involved in emergency interventions. Potential preventable causes of unfavorable sequelae comprised errors in timing/prescription of anti-hemostatic medication (10 claims, 14%), unsterile procedures (n=10, 14%) and delay in diagnosis/treatment of the complication (n=18, 25%). The number of claims resulting in payment was similar between countries (US: n=15, 38% versus the Netherlands: n=17, 52%; p=0.25). The median indemnity payment the patient received varied widely between the US (€285 488, n=14) and the Netherlands (€31 031, n=17) (p= 0.004), however, discrepancy in legal systems and administration of expenses between countries may lead to inadequate comparison of indemnity payments.
Conclusion: Claims of spinal hematoma were often related to errors in anti-hemostatic medication and delay in diagnosis and/or treatment. Spinal abscess claims were related to emergency interventions and lack of sterility. We wish to highlight these potential preventable causes, both when performing the neuraxial procedure and during post-procedural care of patients.
Acknowledgements: The authors thank Sandra Mulder, former health care inspector/anesthesiologist, for her contribution in the initiation of this study, and Alice Hamersma (A.H.), Centramed, Bart Jongbloed and Onno Dijt (O.D.), MediRisk, for their cooperation during this study and providing the required research data.

6198

Diaphragmatic paralysis and horner syndrome by supraclavicular nerve block

Atmosoerodjo S. D.[1], Kuizenga K.[2], Olthof K.[2]
[1]Universitair Medisch Centrum Groningen - Groningen (Netherlands), [2]Isala Zwolle - Zwolle (Netherlands)

Background and Goal of Study: Supraclavicular nerve block (SNB) is a commonly used technique for surgery on the upper extremities. Complications of SNB are pneumothorax, temporary ipsilateral diaphragmatic paralysis (by blockade of the phrenic nerve) and Horner syndrome (by blockade of the stellate ganglion). Research in partial and complete diaphragmatic paralysis and Horner's syndrome report a variance in incidence (0-44%). This observational study was conducted to assess the incidence and influence of local anaesthetic volume in daily practice.
Materials and Methods: 75 patients undergoing upper extremity surgery with SNB were approached and included in the study. Exclusion criteria were pre-existent dysfunction of the diaphragm, dyspnea and ptosis of the ipsilateral eye. The executing anaesthesiologist or resident decided on injecting location, needle movements and local anaesthetic volume. Functionality of diaphragm was assessed pre- and post SNB by echography with a 2-5 Mhz curved probe, transversally between the mid-axillary and mid-clavicular line. Diaphragm movement of less than 2 cm movement caudally or paradoxical movement with deep inspiration was considered paralytic. Pulse-oximetry, dyspnea and Horner syndrome pre- and post SNB were also registered.
Results and Discussion: The volume of local anesthetic used ranged between 13-35 ml. 13 patients (17%) had an ipsilateral diaphragmatic paralysis. 8 of these patients had a desaturation of more than 3%. 2 of these patients had dyspnea. None of the patients had severe hypoxemia which required supplemental oxygen. 22 patients (29%) had Horner syndrome, of which 13 without diaphragmatic paralysis. 9 patiënts had horner and diaphragmatic paralysis. The proportion of diaphragm paralysis increased with increasing volumes of local anesthetic. No diaphragm paralysis was present with local anesthetic volumes below 20 ml.
Conclusion: Horner syndrome seems more frequent than diaphragmatic paralysis (29 vs. 17%), and Horner syndrome and diaphragm paralysis can concur independently. Paralysis rarely causes dyspnea (15%). The incidence of paralysis seems to increase with greater volumes of local anaesthetic.

5813

Effect of tourniquet use on optic nerve sheath diameter in patients undergoing total knee arthroplasty under spinal anesthesia

Cebeci Z.[1], Basaran B.[2]
[1]Ordu University, School of Medicine - Ordu (Turkey), [2]Konya Training and Research Hst. - Konya (Turkey)

Background and Goal of Study: The use of a tourniquet provides an appropriate blood-free environment in extremity surgery. On the other hand, after the tourniquet is deflated, ischemic products are released into circulation that may lead to increased intracranial pressure (ICP). This study aimed to evaluate the ICP changes in the perioperative period in patients who underwent total knee arthroplasty with spinal anesthesia by optic nerve sheath diameter (ONSD).
Materials and Methods: Thirty ASA I-II patients undergoing total knee arthroplasty under spinal anesthesia were included in the study. ONSD values of the patients were measured at five different time points before spinal anesthesia (T0), 10 minutes after spinal anesthesia (T1), 10 and 30 minutes after tourniquet inflation (T2, T3) and 5 minutes after tourniquet deflation (T4).
Results and Discussion: ONSD values measured at T4 (5.9 ± 0.4 mm) were significantly higher than other measurement times (p <0.001) ONSD values increased progressively compared to baseline values, and ONSD values at T1,

T2, T3 measurement times were significantly higher compared to T0. (p <0.001). Studies investigating the effect of tourniquet on ICP were included the patients operated under general anesthesia. The end-tidal CO2 can be easily managed under general anesthesia; so that the effect of carbon dioxide which is thought to be a principal factor for an increase in ICP in tourniquet used surgeries, can be attenuated. Regional anesthetic techniques are most widely used for lower extremity surgeries. Knowing the fact that ICP increases in a progressive manner in patients operated under spinal anesthesia may lead to general anesthesia as a first choice in patients with low cerebral perfusion pressure.
Conclusion: The ultrasonographic measurement of ONSD increased progressively after tourniquet inflation reaches maximum level following tourniquet deflation. Therefore, we think that this increase may contribute to postoperative cognitive and neurological dysfunctions in elderly patients undergoing total knee arthroplasty.

5899

Implementation of regional anesthesia guidelines in clinical practice, does it happen in real life?

Van Loo M.[1], Desmet M.[1], Missant C.[1], Plasschaert S.[1], Reynvoet M.[1], Lamote S.[1]
[1]Az Groeninge - Kortrijk (Belgium)

Background and Goal of Study: Clinical practice often lags behind evidence presented in the literature. Current guidelines advocate the use of low volumes of local anesthetics during peripheral nerve blocks (PNB), accept the safety of PNB performance under general anesthesia (GA) and recommend the use of combining ultrasound (US) and nerve stimulation (NS) during PNB. This audit aims to evaluate if clinical practice has changed according to guidelines.
Materials and Methods: An audit was performed on all supraclavicular (SCB) and interscalene blocks (ISB) for upper limb surgery executed in a single centre in 2016 and 2019. All blocks were performed at the discretion of the attending anesthesist. Statistical analysis using Student's t tests and Chi square tests was performed on the volume used, the combined use of US and NS and the performance of PNB under sedation or GA.
Results and Discussion: In 2016 and 2019, 828 and 886 SCB were performed. There was a significant reduction of the mean volume used from 35 to 26mL (p<0.05). In 2016 both US and NS was used in 76% of cases where in 2019 this was only 37% (p<0.05). Only a small minority of patients received a PNB under GA (4 in 2016, 5 in 2019), there was a significant reduction in the use of sedatives from 2016 to 2019 (90% in 2016 vs 15% in 2019, p<0.05). In 2016 and 2019, 576 and 645 ISB were performed. There was no difference in the volume used (19.4mL vs 18.6mL). The use of NS and US increased from 2016 to 2019 (20% vs 50%, p<0.05). ISBs were performed under general anesthesia in 46 patients in 2016 and 7 in 2019 (p<0.05), there was a significant reduction in the use of sedatives (45% vs 12%, p<0.05). Acceptance of guidelines in clinical practice is diverse. There was an increase in the use of NS combined with US for ISB but not for SCB. The fear of unexpected movement with the needle in close proximity to the pleura was the main reason for anesthesiologists not to use NS in SCB. In contrast to SCB, the volume used for ISB was already low preventing a further reduction. The logistic organization with the presence of a block room explaines the unchanged and low proportion of patients receiving a PNB under GA.
Conclusion: Our audit demonstrates that in a high volume centre adoption of clinical guidelines is slow or even non existent. Further research is necessary to detect the barriers that prevent implementation of clinical guidelines.

6328

Assessment Of Main Complications Of Regional Anesthesia

Campos M.[1], Peixoto A. R.[2], Fonseca S.[2], Santos F.[2], Pinho C.[2]
[1]Centro Hospitalar São João - Porto (Portugal), [2]Centro Hospitalar de São João - Porto (Portugal)

Background and Goal of Study: Regional anesthesia, due to the scientific evidence of its advantages, has been increasingly used. Although this is a technique with a low number of complications described, some are associated with devastating morbidity. The aim of the study is to evaluate the incidence of postoperative complications associated with the use of regional techniques, such as neuraxial block (NB) and peripheral nerve block (PNB).
Materials and Methods: After approval by the São João Hospital Health Ethics Committee, the clinical data of patients referred to the Acute Pain Functional Unit (APFU) were retrospectively collected from 1st January, 2011 to 31th December 31, 2017.
Results and Discussion: Out of a total of 10838 patients referred to APFU, 1093 had side effects or complications. 1039 (11.4%) underwent NB and the most common side effects were: sensory (39.7%) or motor deficits (11.6%), nausea or vomiting (21.8%) and pruritus (6,4%). There were 3 cases (0.03%) of subcutaneous tissue hematoma, 3 (0.03%) of epidural abscess and 1 (0.01%) of arachnoiditis. 204 of these patients maintained need for follow-up through telephone and/or external consultation due to persistent sensory or motor deficits after hospital discharge. 54 (5.2%) patients underwent PNB, and sensory deficits were also the main complaints of these patients (51.9%). 21 of them maintained the deficits after hospital discharge, requiring also follow-up in consultation.
Conclusion: Side effects of regional anesthesia are common, but the most serious complications, such as epidural abscess or hematoma and permanent peripheral nerve damage, are rare, as found in this study. All candidates for regional anesthesia should therefore be rigorously evaluated and informed of possible complications, making a high index of suspicion essential for their diagnosis and timely treatment.

5672

Comparison The Prophylactic Administration Of Pregabalin And Acetaminophen On Post-Dural Puncture Headache After Spinal Anesthesia - a randomised double-blind, placebo controlled study

Gherghina V.[1], Cindea I.[1], Balcan A.[1], Costea D.[1], Popescu R.[1]
[1]Facultatea de Medicina Universitatea Ovidius Constanta - Constanta (Romania)

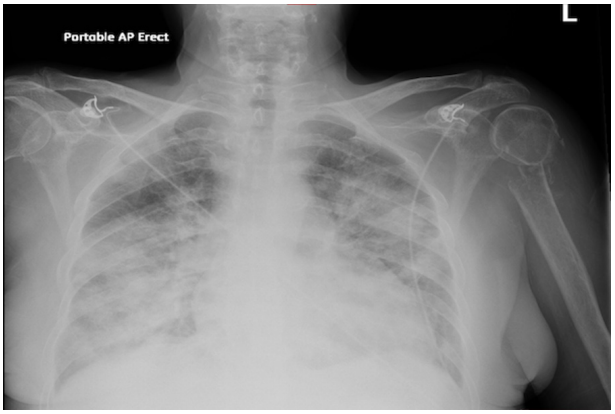
Background and Goal of Study: Post-dural puncture headache (PDPH) is a known complication of neuroaxial anesthesia and may be associated with significant morbidity. To avoid the need for invasive methods of treating PDPH such as blood patch, the search for novel pharmacological agents to manage PDPH continues. Our prospective, randomized, double-blind, placebo-controlled study was planned to compare the preventive effect of pregabalin, acetaminophen and placebo on relative frequency and intensity of PDPH after spinal anesthesia.
Materials and Methods: After obtaining Ethics Committee approval and written informed consent, 84 patients (ASA I-II) aged between 18 and 50 years, admitted for the lower extremities orthopedic elective operation under spinal anaesthesia, were included in the study. The patients were randomly divided into three groups (n=28, in each group) to receive an hour before spinal blocking, either 500 mg acetaminophen (group A), 100 mg oral pregabalin (group B) or pacebo tablets (the control group, group C). Headache was evaluated using visual analog scale (VAS), at the time which PDPH symptoms began and was followed 6,12, 24, 48 and 72 h after it. The pain scale consisted of a 10 cm horizontal line marked from 0 (denoting no pain) to 10 (denoting worst possible imaginable pain). Student's t-test and Chi-square test were used for analysis.
Results and Discussion: Patients in group B had lower incidence of PDPH (3,57% vs. 14,28% for group A and 17.85 % for group C with P < 0.05), the highest incidence of complete response, and also, less analgesic requirement compared with groups A and C, throughout 6-72 h (1.2 ± 0.4 vs. 2.3 ± 0.75 for group A and 3.3 ± 1 for placebo group with P < 0.05).
Conclusion: A single pre-operative dose of 100 mg of pregabalin reduced PDPH better than using acetaminophen in patients who underwent lower extremity surgery under spinal anesthesia.

4916

Damage control regional anaesthesia

Al-Ani T.[1], Livingstone K.[1], Grant S.[1]
[1]Hairmyres Hospital - East Kilbride (United Kingdom)

Background: The desirable respiratory and cardiovascular effects of regional anaesthesia makes it suitable technique in patients who are unfit for general anaesthesia due to severe physiological derangements. This can facilitate interim surgery to save life and improve physiology prior to definitive surgical intervention under general anaesthesia.
Case Report: A 58 years old patient presented with Takotsubo cardiomyopathy with left ventricular ejection fraction of 14%. This type of cardiomyopathy was developed as a result of septicaemia from infected collection at humeral fracture site, which was sustained by a mechanical fall prior to hospital admission. She was in decompensated cardiorespiratory state with pulmonary oedema, bilateral septic emboli and atrial fibrillation. She was on 5L/min oxygen via facemask with respiratory rate of 35 cycles/minute and SPO2 of 96%, Blood pressure of 93/50 mmHg and atrial fibrillation rate of 92bpm on amiordarone infusion. She was on broad-spectrum antibiotics with a CRP of 300 mg/L and WCC of 13 x 109/L. Under ultrasound guided interscalene and infraclaviulcar brachial plexus with intermediate cervical plexus block a deltopectoral and inferolateral surgical approach of humerus was performed for abscess washout and debridement, Vancomycin loaded beads insertion at fracture site and into humeral shaft, surgical drain placement, tissue biopsy and glenohumeral joint aspiration for microscopy, culture and sensitivity. The patient vital signs remained unchanged throughout the procedure, which lasted for 70 minutes from knife to skin.



Discussion: Within one week after surgery there was marked clinical improvement. Vital signs stabilised and left ventricular ejection fraction improved to 40% on repeated ECHO. CRP dropped down to 39 mg/L and WCC to 6.2 x 109/L. The patient is currently awaiting ORIF of humeral fracture once infection is completely cleared.
Learning points: Damage control regional anaesthesia is valid anaesthetic option for damage control surgery

4858

What is the impact of unilateral diaphragm paralysis on obstructive sleep apnea? A scoping review

Mejía Kattah J. M.[1], Li C.[2], Englesakis M.[3], Brull R.[3], Abdallah F.[4], Singh M.[3]
[1]Hospital Rey Juan Carlos I - Mostoles (Madrid) (Spain), [2]St Michaels Hospital - Toronto (Canada), [3]Toronto Western Hospital - Toronto (Canada), [4]University of Ottawa - Ottawa (Canada)

Background and Goal of Study: Unilateral diaphragm paralysis (UDP) occurs in all patients undergoing interscalene brachial plexus block (ISB), and may result in worsening of obstructive sleep apnea (OSA). Current guidelines recommend ISB for shoulder surgery in patients with OSA, but the impact of UDP in this population is unknown. This review aims to evaluate the effects of UDP on OSA severity as measured by the apnea-hypopnea index (AHI) or respiratory disturbance index (RDI). We hypothesized that UDP worsens the severity of OSA.
Materials and Methods: We searched the US National Library of Medicine (MEDLINE), Embase and Cochrane Database of Systematic Reviews for studies evaluating OSA severity in adults with UDP. Our primary outcome was OSA severity as measured by the apnea-hypopnea index (AHI) or respiratory disturbance index (RDI). Secondary outcomes included nocturnal mean oxygen saturation (mean SpO2%), CT90 (percentage of total sleep time with an oxygen saturation of <90%) and pulmonary function tests (PFTs). A qualitative synthesis of literature was also performed.
Results and Discussion: Six studies with a total of 100 patients with UDP were included. Compared to controls (no DP), UDP was associated with increased RDI. Moreover, compared to controls, UDP was associated with a higher rapid eye movement (REM) sleep and supine sleep RDI, and lower mean SpO2% during all sleep stages and body positions. Compared to controls, UDP was associated with a restrictive pattern on the PFTs.
Conclusion: The available evidence suggests that OSA severity and nocturnal oxygenation is worse in patients with UDP, particularly during REM sleep and while sleeping in the supine position. Our findings should help to inform the risk-benefit discussions when considering ISB for patients with OSA.

4868

Practice of Regional Anaesthesia in Belgium – A National Survey

Goffin P.[1], Lecoq J. P.[2], Sermeus L.[3]
[1]CHC de Liège - Liège (Belgium), [2]University Hospital of Liège - Liège (Belgium), [3]University Hospital Saint-Luc - Brussels (Belgium)

Background: National surveys are useful to assess the state of regional anaesthesia (RA). They can serve as a basis to implement new guidelines. Given that such information is lacking in Belgium, we conducted a survey to evaluate our practice of peripheral nerve block performance (PNB), with a particular focus on safety aspects.
Methods: A survey was sent by email to Belgian anaesthesiologists using national society and university mailing lists. Respondents completed the survey anonymously through the SurveyMonkey® platform. Data were collected between September 2019 and October 2019.
Results: Among the 1600 anaesthesiologists to whom the survey was sent, 324 responded. Among the 278 questionnaires which could be used for analysis, 30% were completed by practitioners working in a university hospital and 70% working in a non-university hospital. 85% of responders said that they perform a PNB more than once a week. Almost all anaesthesiologists (99%) placed a venous access before performing the block. More than 90% of patient were monitored with peripheral pulse oximetry and 55% with NIBP, ECG and peripheral pulse oximetry. The huge majority of patients remained monitored for at least 30min after injection. However, 8% remained under visual observation in the vicinity of the surgical room. Ultrasound-guided RA was performed in 89%. The neurostimulator was totally abandoned in 20%. For those who used a neurostimulator, 44% seeked for a motor response and 56% kept it as sentinel (with mean minimal intensity 0.46mA (95% CI 0.40-0.44)). Monitoring of the injection pressure was considered in 21%. More than 50% of responder use complete sterile measures (combining sterile gloves, surgical drapes, mask). Concerning local anaesthetics (LA), 52% never mixed LAs and the adjuvant use varied between 10% (never) and 15% (always) with dexamethasone being the most popular one (IV and in LA-solution). Most practitioners (97%) knew where intralipid was located in case of local anaesthetic systemic toxicity and a flash card was attached (83%) nearby. 93% of the responders stated that this medication can be found in the operating room or in its vicinity.
Conclusions: This survey suggests a correct level of safety in the practice of PNB in Belgium according to recent French guidelines[1]. This survey can serve as a benchmark for future comparisons and evaluation of RA techniques.
References:
1. Anesthésie loco-régionale périnerveuse – RFE. Anesth Reanim. 2019; 5: 208–217.

5756

Effects of ultrasound-guided bilateral suprazygomatic maxillary nerve block on postoperative pain after elective orthognathic monomaxillary osteotomy in adult patients

Molins G.[1], Valls-Ontañón A.[2], Masiá J.[2], De Nadal M.[3], Hernández-Alfaro F.[4]
[1]Centroédico Medico Teknon - Barcelona (Spain), [2]Centro Médico Teknon - Barcelona (Spain), [3]Hospital Valle de Hebrón - Barcelona (Spain), [4]Centro Medico Teknon - Barcelona (Spain)

Background and Goal of Study: Maxillary osteotomy is a surgery procedure of the orthognathic surgery field for correction of dental and facial abnormalities. The anesthetic management of these patients is a challenge because of the difficult airway management and the perioperative pain control. Multimodal approach for pain control is a fact, and the use of local and regional anaesthesia techniques (LRA) is mandatory. The researchers propose ultrasound-guided bilateral suprazigomatic maxillary nerve block (USMNB) for a proper control of postoperative pain after orthognathic maxillary osteotomy (OMO).
Materials and Methods: In this clinical trial, after ethical committee approval patients were randomly assigned to 2groups to receive (study group) or not (control group) the USMNB (4ml Ropivacaine0.5%) together with local infiltration with Lidocaine (10ml Lidocaine2%) and general anesthesia. The main objective was the consumption of opioids. Pain, postoperative nausea-vomiting (PONV) and complications derived from USMNB were also recorded.
Results and Discussion: The researchers present the preliminary results of 8patients. Patients who received USMNB presented better results in terms of: lower intraoperative opiods consumption (p=0,029), lower rate of patients who demanded methadone (100% control vs 0% study, p=0.029) and lower dose of methadone administered (4mg control vs 0mg study, p=0.029) at 2hours postoperatively, lower level of pain at any time of the first 8hours postoperatively (p=0.029), and lower incidence of PONV (75% control vs 0% study, p=0.048). No complications derived from the USMNB were reported.
Conclusion: The results obtained suggest that the USMNB is a promising LRA technique to decrease opioid consumption and greater patient comfort for OMO. The small size of the sample prevents generalization, and may involve risks of overinterpretation and publication bias. Larger studies need to be conducted to corroborate the efficacy of this LRA.
References:
1. Chiono J, Raux O, Bringuier S, Pharm D, Sola C, Bigorre M, Capdevila X, Dadure C. Bilateral Suprazygomatic Maxillary Nerve Block for Cleft Palate Repair in Children. Anesthesiology 2014;120:1362-9.

5307

New strategy for locoregional anesthesia for bi-maxillary osteotomy: mandibular nerve block and sub orbital block. Retrospective and comparative study

Kamga Totouom H.[1], Boutros M.[1], Hanouz J. L.[1]
[1]CHU de Caen - Caen (France)

Background and Goal of Study: Locoregional anesthesia may reduce postoperative pain and vomiting after Bi-maxillary osteotomy (BMO)(1). The technique for mandibular (MNB) and maxillary (MXB) nerves blocks is well described. We made the hypothesis that MNB may be sufficient for all the nerves travelling in the pterygopalatine fossa. Yet, we adopted a new locoregional strategy based on a MNB and a sub orbital block (SOB) for pain management after BMO. The aim of this study is to compare the result of this approach with the conventional one.
Materials and Methods: This is a retrospective monocentric study. We selected all the patients who had BMO from January 2012 to December 2018. Three groups were set Groupe 0: analgesia with morphine, Groupe 1 MXB with anatomical landmarks and MNB with neurostimulation and Groupe 2 MNB with neurostimulation and SOB with ultrasonography. The main outcome was the amount of morphine consumed in recovery room. The secondary outcomes were the time to extubation, the length of stay (LOS) in recovery room and in the hospital. The kuskal wallis test was used for quantitative data and the Fischer exact test for qualitatives. The p value was 0.05.
Results and Discussion: The time to extubation was 63 +/- 43 min in group 0; 20 +/- 22 min in group 1 and 15 +/- 14 in the last group, P < 0.001. The LOS in recovery room was 169 +/- 49; 118 +/- 44 and 105 +/- 56 min in group 0, 1, 2; p< 0,001. The LOS in the hospital was 4 +/- 1 days, 3 +/- 1 and 3 +/- 1 in the 0; 1 and 2 group, p=0.008.

	Group 0	Group 1	Group 2	P
Number of patients	21	31	20	
Age (years)	20 +/- 6®	22 +/- 9	25 +/- 12	0.407
Male sex (%)	52	45	40	0.727
ASA status I/II (%)	81 /19	91 / 9	75/25	1.000
Length of surgery (min)	270 +/- 61	225 +/- 50	199 +/- 58	0.001

Table 1: Characteristics of patients

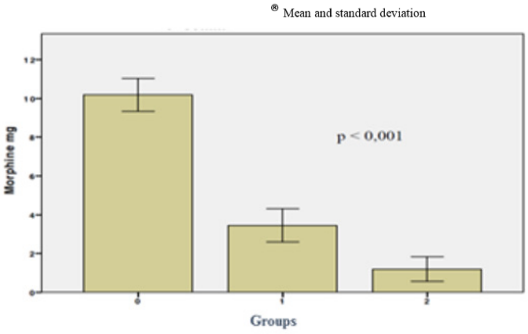


Figure 1 morphine consumption in recovery room

Conclusion: Morphine consumption was reduced in recovery room after MNB and MXB for BMO. Locoregional anesthesia may fasten extubation and reduces LOS in the recovery room and at the hospital. The two strategies seem similar regarding these ends points. The new one, with ultrasonography may facilitate the procedure and enhance patient security.
References:
1. Rev Stomatol Chir Maxillofac (2012) 113 : 417 - 422.

4407

Risk factors for postoperative hypothermia in urologic surgery using large-volume irrigation fluids

Yoshinuma H.[1], Tsubaki N.[1]
[1]Kameda Medical Center - Kamogawa, Chiba (Japan)

Background and Goal of Study: Inadvertent hypothermia can lead to multiple complications postoperatively. Several factors known to be associated with the development of perioperative hypothermia include age, BMI, irrigation fluid temperature, and duration of surgery. The Holmium Laser Enucleation of the Prostate (HoLEP), one type of transurethral surgery, requires large volume irrigation fluids during surgery and, thus, may increase the incidence of postoperative hypothermia. We noted hypothermia even when forced heated air and warm irrigation fluids were used during HoLEP. We undertook this study to determine the incidence and risks of hypothermia in patients who underwent HoLEP.
Materials and Methods: Data from the perioperative period of patients who underwent elective HoLEP under spinal anesthesia were retrospectively collected from June 2016 to June 2018. A sensor to measure core body temperature (Spoton™ Temperature Monitoring System) was placed on the patient's forehead before initiation of spinal anesthesia. Distilled water for irrigation was kept warmed at 38℃ using a heated cabinet in the operation room (OR). Core temperature, noninvasive blood pressure, heart rate, oxygen saturation and electrocardiogram were monitored continuously. Additionally, the anesthesiologist noted the core temperature during surgery and amount of irrigation fluid used. Hypothermia was considered if the postoperative temperature decreased to below 36.0℃. The independent variables were patient demographics, Body mass index (BMI), preoperative core temperature, irrigation fluid amount, and anesthesia or surgery duration: the primary outcome was incidence of hypothermia after surgery. R (version 3.4.1) performed univariate analysis and chi-squared test. A two-tailed p<0.05 indicated statistically significance.
Results and Discussion: Seventy-six patients met the inclusion criteria. Of these, 18 (24.3%) patients experienced hypothermia after surgery. We compared this group with patients who did not experience hypothermia, and found the following: preoperative temperature (36.2℃ vs 36.6℃)and BMI (21.7 kg/m-2 vs 24.0 kg/m-2) were both statistically significantly different (p<0.001 and p=0.02, respectively).
Conclusion: Our study suggests that preoperative core temperature and BMI are associated with postoperative hypothermia. Warming before surgery might prevent postoperative hypothermia in patients undergoing HoLEP.

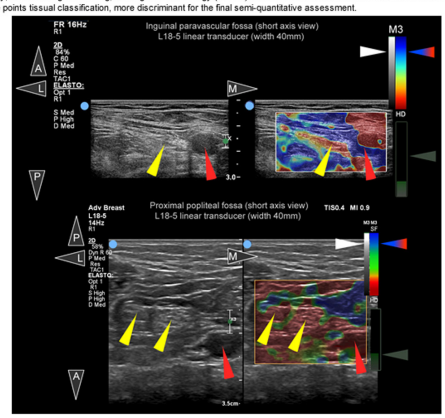
5027

Peripheral nerves localization using strain elastography: a pilot study

Parvais M.[1], Pandin P. C. A.[1], Estruch I.[1], Truong H. N.[1], Van Hecke D.[1], Van Obbergh L.[1]
[1]CUB Erasmus Hospital - Brussels (Belgium)

Background and Goal of Study: Ultrasound elastography (UE) tends to improve the ultrasound diagnosis accuracy. The strain elastography (SE) depicts the pathological tissual loss of elasticity in response to an external pressure applied by the operator (pure color code-based visual assessment) It is now recommended for benign/malignant parenchymal process differentiation and for muscle and nervous rigidness assessment & follow-up. We postulated, the SE was able to differentiate the normal nerves from their musculo-vascular environment based on their different own elasticity tofacilitate the preliminary nerve location.
Materials and Methods: 30 healthy ASAI-II adult patients (lower limb surgery) were included into this prospective observational study. The femoral (F) and the popliteal sciatic (PS) nerves were studied using B&W 2D sonography (S) and SE (Fig.1). About the SE, first, the colorimetric scale (CS) goes from red (stiffer) to blue (softer) differentiating 6 main colors at the visual assessment (Fig.1). Second, the CS was transformed into a 3 points tissual classification related to F & PS stifness for easier reading (Fig.1). Results are presented as percentages (Fig.2).
Results and Discussion: F & PS S was normal in all the patients confirming the different morphology of each kind of nerve with a high level of patient-to-patient reproductibility. SE detected as «stiff» the F & PS in respectively 87 and 83% of the patients (Fig.2). Finally, a superposition between sonogram and elastogram grearter than 50% was observed in 54 & 70% of the patients.
Conclusion: SE represents a promising technique that may complement S to try to improve the quality of nerve localization. Further studies are needed for a better understanding

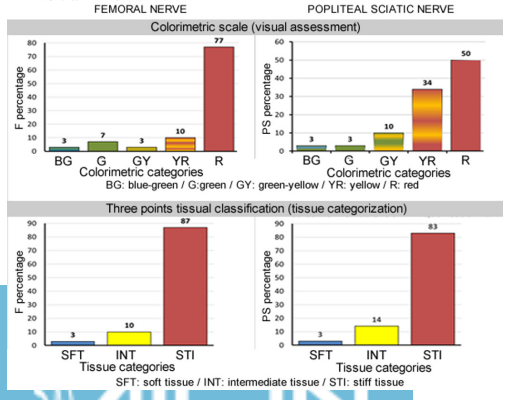
Fig.1. US & SE examination and methodology of the elastogram reading
The F (upwards) and the PS (below) are sequentially studied. First, on left, the respective nerve is highlighted under B&W 2D US in short axis view (yellow arrows) close to arteries (red arrows). The nerve morphology is assessed by measuring successively the great and the small diameters, the circumference and the crossectional surface. Second, on right, the SE imaging modality illustrates (pure visual assessment) the stiffness of the different tissual compounds of each considered area of interest (elastogram). The colorimetric scale (on right, blue and red arrows) goes from blue (softer) to red (stiffer) differentiating 6 colors. In these conditions, the F and the PS appears stiffer surrounded by softer vascular or muscular miscellaneous structures.To avoid any false positive reading, the level of the external pressure applied to the area of interest by the operator with the transducer may be controlled with the dark green strain gauge, on the right.
Finally, for facilitating the reading, the original methodology (bottom) transforms the six colors Colorimetric Scale into a three points tissual classification, more discriminant for the final semi-quantitative assessment.



Methodology to transform SE colorimetric Scale into 3 points tissual classification

Step 1 - SE Colorimetric Scale	Step 2 – 3 points tissual classification
Blue	Type 1 – « Soft Tissue »
Blue-green	
Green	Type 2 – « Intermediote tissue »
Green-yellow	
Yellow-red	Type 3 – « Stiff tissue »
Red	

Fig.2. Final results regarding the SE colorimetric scale transformed into the the tissual classification (on left, femoral nerve and on right, popliteal sciatic nerve)
Regarding the visual assessment during the SE examination of the respective regions of interest (upwards), only five colors have been retreived. In fact the nerves were never colorized in blue excluding a possible extreme softness of these structures. On the contrary, the majority of the nerves have been colorized as a physically stiff structure (yellow-red and red colors) in 87% (F) and 84% (PS) including a significant majority of extreme stiffness (only pure red color) especially for the F. Nevertheless, concerning the F, these results are more contrasted (larger majority of pure stiff tissue only in red) than the PS one. Is this aspect related to the difference of histological and sonographical structure between the two investigated nerves?
The methodological conversion of the colorimetric scale (upwards) into the tissual classification (below) confirms these results by summarizing them in three categories of tissues (soft, intermediate and stiff). Logically 87% of F and 83% of PS have been described as a stiff tissue. Alternatively, only 3% of each investigated nerve have been retreived as a soft tissue.
In these results, it is possible to see emerging an alternative means of nervous localization (additional to the usual B&W 2D sonography) with a high level of tissual discrimination



5915

Combined Regional Anaesthesia Techique for Clavicle Fracture Surgery is Safe, Effective and Efficient

Iofin N.[1], Ryan D.[1], Egol K.[1]
[1]NYU Langone Medical Center HJD - New York (United States)

Background and Goal of Study: Historically, clavicle fracture repairs have been performed under general anesthesia alone or combined with interscalene brachial plexus block. In our institution in the last few years, the combination of an interscalene brachial plexus block and a modified superficial cervical plexus block has been described to provide adequate anesthesia for clavicle fracture surgery, with the added benefit of postoperative analgesia. Safety, efficacy and effectivity of the combined regional technique was compared to traditional approach of general anesthesia with interscalene nerve block.
Materials and Methods: This study is a retrospective review of patients who underwent clavicle fracture repair. The patients were randomly assigned by a blinded person to anesthesiologists who were familiar with a new technique and those who were not. Patients were devided in two grous based on anesthesia technique: 1) general anesthesia with intescalene block (GA group) and 2) interscalene block with modified cervical plexus block (RA group). The brachial plexus block was performed with 20 cc 0.5% Bupivacaine utilizing ultrasound guidance. The modified superficial cervical block was performed using anatomical landmarks, with injection of 10 cc 0.5% Bupivacaine along the posterior border of the sternal head of the sternocleidomastoid muscle. For general anesthesia we used inhalation anesthesia with LMA. Several perioperative times were recorded: anesthesia start time, surgical time, emergence, total case time and recovery time in the post-anesthesia care unit. Intraoperative pain medication consumption was also recorded. Student's t-tests and chi-squared tests were used for statistical analysis.
Results and Discussion: A total of 110 patients were included. 52 patients received regional anesthesia only, while 58 patients received general anesthesia with a brachial plexus block. Anesthesia start time was significantly longer in the GA group (28 vs. 19 minutes, p=0.022), as was total case time (164 vs. 130 minutes, p<0.001). Patients in the GA group required significantly more intraoperative fentanyl administration (207 vs. 140 mcg, p=0.002).
Conclusion: Regional anesthesia using a combined brachial plexus and modified superficial cervical plexus is a reliable and efficacious technique. The combined block compared favorably to general anesthesia in terms of anesthesia start time and total case time.

5655

Peripheral nerve catheter placement under direct vision of surgeon in patient after above knee amputation

Masoodi A.[1], Dziuba D.[2], Melnyk O.[3], Zlochevskiy O.[3]
[1]Kiev Regional Clihic Hospital - Kyiv (Ukraine), [2]Shupyk National Medical Academy of Postgraduate Educationl - Kyiv (Ukraine), [3]Kyiv Regional Clihic Hospital - Kyiv (Ukraine)

Background: Pain after above knee amputation for patients with peripheral arterial disease is a huge problem. Peripheral arterial disease (PAD) estimated to affect 10-20% of individuals aged 60 years or more. The main risk factors for PAD are cigarette smoking, diabetes, high blood pressure, kidney problems and high blood cholesterol. Amputees suffer with different types of pain: postoperative pain, chronic stump pain and phantom limb pain.
Aim: Most of patients require opioid analgesics after surgery, which are associated with opioid-related side-effects as nausea, respiratory depression, itching, urinary retention.One of the way to solve this problem is perineural catheter use. Goal of our work is to estimate safety and effectiveness of this method.
Methods: A retrospective review involved twelve patients who had undergone a major lower limb amputation (above the knee) for PAD. During operation for 5 patients (Group1) were placed perineural stump catheter (PC) by which we supplied a continuous infusion of bupivacaine (0.25%, 4 mL/hour).Postoperatively, (Group1) with perineural stump catheter for the first 3 postoperative days were compared to 7 patients (Group 2) who did have PC. 7 patients who did not receive infusion of bupivacaine required opioid analgesics after surgery.
Results: A total of 12 lower-limb amputations were selected for analyses. PC use led to a 90% reduction in opioids during the first 72 hours postoperatively. Postoperative opioids consumption at Group 2 equals to 100% on the first day after surgery, 85,7% on the second day,42,9% on the third day. VAS score for Group1=8, 9+-1, 2 before infusion of bupivacaine. After medication VAS=2, 3+-0, 9. VAS score for Group2=8, 2+-2, 0 before opioids use. After opioids use VAS=4, 5+-1, 1.4 patients from Group 2 noted opioid-related side-effects as nausea and an itching. One patient from Group 2 had respiratory arrest and was admitted to ICU. One patient from Group 1 had nausea.Analyses indicated that PC was associated

with low opioids usage and decrease of side-effects.
Conclusions: Continuous perineural infusions of local anesthetic are a safe and effective method for reducing post-amputation opioid analgesic medications after major lower limp amputation.

5740

Ultrasound-guided thoracolumbar interfascial plane (TLIP) block and intrathecal fentanil: A feasible choise for Enhaced Recovery After Spine Surgery(ERAS) and early deambulation

Juanola Galceran A.[1], Morgenstern C.[1], Morgenstern R.[1], Silva L.[1], Rodiera J.[1], Ramirez Paesano C.[1]
[1]Centro Medico Teknon - Barcelona (Spain)

Background and Goal of Study: ERAS pathway is a multidisciplinary, multimodal approach to improve expedited funtional recovery and early postoperative mobilization. There is a paucity of literature regarding the implementation of ERAS in spine surgery with the use of regional anesthesia. We present a case series of 15 patients undergoing minimally invasive (endoscopic) lumbar spinal surgery in which TLIP block and fentanil intrathecal were performed as a part of the multimodal analgesia into the ERAS protocol. The aim was to determine the percentage of patients who mobilized at 6 hours of P.O, hospital-length of stay (LOS) and readmission at 30-90 days.
Materials and Methods: A retrospective study included 15 patients (60 to 85 y.o) undergoing lumbar spine surgery following ERAS protocol. Premedication: Midazolam 2mg, dexketoprofeno 50 mg, paracetamol 1 gr, ondansetron 8 mrs , MgSO4: 1.5gr i.v. Intrathecal Fentanil 25 mcg (sitting position) and US-guided bilateral TLIP were performed in all patients (prono position) with bupivacaine 0.25% and dexamethasone 8mgrs (20ml each side). General anesthesia : fentanil 2.0 mcg/kg i.v, propofol 2.0-3.0 mcg/ml (TCI) following BIS, ketamine 0.15 mg/Kg/h, rocuronio 0.4 mg/Kg. Normotermia and euvolemia were mantained. Foley catheter and drains were avoid.
Results and Discussion: No i.v. fentanil was needed during surgery.Time of surgery 3.5±0.5 hrs. Rescue of methadone P.O : 2±1mg/12 hrs. Average of VAS score at rest (0-6-12 hrs P.O) : 0/10-1/10 -1/10. VAS at movement (6-12 P.O. hrs):3/10-2/10. 100% of the patients started deambulation at 6 hrs without complications. 90% of the patients began oral intake at 4 hrs P.O. Nauseas : 1 patient . Hospital-LOS:15±6 hrs. All cases were dischaged at 24 hrs. No readmision at 30-90 days.
Conclusion: The combination of fentanil intratecal and TLIP block for minimally invasive lumbar spine surgery seems to be safe and feasible as a part of multimodal analgesia into ERAS pathway. Regional analgesia can improve the quality of perioperative analgesia, and helps rapid mobilization and discharge.

5850

Quadratus lumborum block for postoperative analgesia after abdominal surgery: a systematic review and meta-analysis

Xu M.[1], Yang J.[1], Tang Y.[1]
[1]West China Hospital, Sichuan University - Chengdu (China)

Background and Goal of Study: Adequate postoperative analgesia is important for postoperative recovery after abdominal surgery. Previous clinical studies have shown that quadratus lumborum block (QLB) could not only stop somatic pain but also inhibit visceral pain. This systematic review was conducted to assess the analgesic utility of QLB following abdominal surgery.
Materials and Methods: PubMed, Embase, the Cochrane Library were searched from inception until October 2019. Trials were eligible if comparisons of QLB were made against no block and placebo. Pain scores at 24 h was primary outcome. Postoperative opioid consumption and side-effects were secondary outcomes. Where possible, meta-analytic techniques were used to synthesize data, presented as mean difference (MD) with 95% confidence interval (CI).
Results and Discussion: Eleven studies with a total population of 672 patients were identified. QLB significantly reduced 24-h pain scores during movement (MD, -1.27; 95% CI, -2.51 to -0.03), but no at rest (MD, -0.52; 95% CI, -1.43 to 0.4). Morphine consumption was significantly reduced with QLB during the first 24 h (MD, -8.23 mg; 95% CI, -15.03 to -1.43) after abdominal surgery.
Conclusion: QLB can improve postoperative pain control, reduce opioid consumption for abdominal surgery.

5110

Comparison between crystalloid coload with ondansetron administration and crystalloid coload to prevent spinal anesthesia induced hypotension, a randomized controlled trial

Rattanakosonsri T.[1], Sirarat S.[1], Panichakul K.[1], Poomsawat S.[1]
[1]Srinagrarind Hospital, Khonkaen University - Khon Kaen (Thailand)

Background and Goal of Study: Spinal anesthesia-induced hypotension is the most common cardiovascular complication after performing spinal anesthesia. Many studies suggested crystalloid coload to have lower incidence of spinal anesthesia induced hypotension than preload in non-obstetric surgery. There are studies suggested efficacy of ondansetron administration before performing spinal anesthesia to reduced incidence of hypotension but lack of evidence in non-obstetric surgery and with coload administration. The purpose of this study was to compare the efficacy of prevention of spinal anesthesia-induced hypotension in non-obstetric surgery between ondansetron with coload administration and coload administration.
Materials and Methods: 94 patients (ASA classification I-II, aged 18 – 50 years) undergoing orthopaedics surgery, general surgery, gynecologic surgery, receiving spinal anesthesia were randomized to receive ondansetron 4 mg and coload with lactate Ringer's solution 10 ml/kg (O group, n=47) or NSS 2 ml and coload with lactate Ringer's solution 10 ml/kg (N group, n=47). SBP, DBP, MAP, heart rate, oxygen saturation and nausea and vomiting symptoms were measured at baseline (T0) and 3, 6, 9, 12, 15, 20, 25, 30, 35, 40,45 minutes (T3, T6, T9, T12, T15, T20, T25, T30, T35, T40, T45) after performing spinal anesthesia. The incidence of hypotension, rescue drugs, nausea and vomiting were measured.
Results and Discussion: There was no statistically significant difference between two groups in demographic data, and operation. The incidence of hypotension in ondansetron group (O group) was 34.04% and normal saline group (N group) was 29.79% with no statistically significant (p = 0.658). There was also no statistically significant difference in SBP, DBP, MAP, heart rate, nausea vomiting symptoms, and adverse effects along the time of observation between two groups. Although stimulation of serotonin receptor (5HT-3 receptor) may be associated with stimulation of Bezold-Jarisch reflex (BJR) that can cause spinal anesthesia-induced hypotension, the effect of level of sympathetectomy by spinal anesthesia may be dominant.
Conclusion: Ondansetron administration before spinal anesthesia with lactate Ringer's solution coload was not superior than coload in prevention of spinal anesthesia-induced hypotension.

4943

Ultrasound assessment of diaphragmatic function after VATS for pulmonary biopsy in interstitial lung disease: a single center preliminary study

Steinberg I.[1], Bisciaio A.[1], Ceraolo E.[2], Rosboch G. L.[2], Guerrera F.[1], Brazzi L.[1]
[1]University of Turin - Torino (Italy), [2]A.O.U. Città della Salute e della Scienza di Torino - Torino (Italy)

Background and Goal of Study: In patient with suspect of interstitial lung disease (ILD), non-intubated surgical biopsy has proven to be feasible (1). Despite physiopathological likelihood of increased risk for pulmonary complication after general anesthesia (GA), there is no evidence of superiority of locoregional techniques (LR). In our center, type of anesthesia is agreed with the patient according to clinical condition case-by-case. We decided to assess pulmonary and diaphragmatic function in patient undergoing VATS for pulmonary biopsy under GA or with LR anesthesia (usually thoracic epidural).
Materials and Methods: Our study was observational: patient scheduled for lung biopsy were prospectively enrolled and data regarding pre-op arterial blood gas analysis (ABG) and spirometry gathered. Diaphragm function was evaluated through ultrasound: both Thickening Fraction (TF%) and Diaphragmatic Inspiratory Amplitude (DIA) were measured. Data regarding anesthesia were recorded. 12h after surgery ABGs was checked and spirometry and diaphragm ultrasound repeated. NRS was also evaluated. According to type of anesthesia (GA or LR), patients were dived in two groups. Data were analyzed comparing the percentage decreased between pre and postop value. Analysis was conduct with STATA thought t-test comparison.
Results and Discussion: 26 patients were enrolled in a 11-month period. Of these, 4 were lost to follow up. Of the remaining 22, 16 were in the LR group and 6 in the GA group. We observed no statistical differences between groups in term of percentage decrease of FVC, FEV1 and FEV1/FVC. TF post was increased by 15% on the left in the LR group and decreased by 35% in the GA (p=0.02). On the right, site of the surgical incision, TF was decreased of 4% in LR and of 20% in GA. Concerning

DIA, on the left it was 80% of the preop in LR and 62% in GA. On the right it was 90% and 53% respectively (p=0.01). There was a trend towards a smaller reduction in P/F in the LR group (10% vs 23%) and better pain control (mean NRS 2 in LR and 3.8 in GA) but statistical significance was not reached. From these preliminary data, LR anesthesia preserves diaphragmatic function significantly better than GA. According to our results, ultrasound was more sensitive in assessing such benefit.
Conclusion: In ILD patients, LR anesthesia for VATS biopsy preserves diaphragmatic function in greater extent than GA.
References:
1. E.Pompeo, Interact Cardiovasc. Thorac. Surg. 28,744-750 (2019).

Obstetric Anaesthesiology

4398

Uterotonic drug usage in a tertiary hospital in Athens Greece

Skandalou V.[1], Kalopita K.[1], Pavlidis M.[1], Saiti A.[1], Athanasiou P.[1], Valsamidis D.[1]
[1]General Hospital of Athens «Alexandra» - Athens (Greece)

Background and Goal of Study: Postpartum hemorrhage continues to be one of the leading causes of maternal morbidity and mortality worldwide. Uterotonic drugs are used to prevent and treat postpartum hemorrhage. The aim of this study was to determine how doctors in our hospital, both obstetricians and anesthesiologist use uterotonic drugs for vaginal deliveries and cesarean sections and to investigate decision making process and prioritization when managing postpartum hemorrhage. Materials and Methods: 65 questionnaires where handed out to obstetricians and anesthesiologists in our hospital, both trainees and specialists. They were asked to answer anonymously about their preferences and use in practice of uterotonic drugs, dosages,way of administration and timing for cesarean sections and vaginal deliveries for women at low and high risk for postpartum hemorrhage. 44 completed anomynous questionnaires where collected and statistical analysis was performed using matlab toolbox.
Results and Discussion: 33 obstetricians and 9 anesthesiologist completed the questionner. The majority of the obstetricians had less than 5 years of clinical experience (70%), while most of the anesthesiologist were very experienced (78%). Oxytocin was reported as the first line uterotonic drug for vaginal delivery while the most commonly used dose was 5 IU intravenous bolus plus maintenance infusion 1% for 2 hours. Ergonovine was also used routinely as 0.2mg intravenously without any monitoring. For low risk for postpartum hemorrhage cesarean sections oxytocin was the first line uterotonic drug. Intravenous doses ranged from 3 to 10 IU followed by oxytocin infusions. For high risk for postpartum hemorrhage cesarean sections almost half of the participants (45%) use carbetocin usually as a bolus dose of 100mcg. Amongst the second line uterotonic drugs ergonovine was used by most of the doctors, 0,2mg given slowly or rapidly bolus, with variable timing intervals. Misoprostol was also used at 200-800mcg. Most of the participants use 400 mcg per rectum. The choice of second line uterotonic was mainly based on perceived efficacy.
Conclusion: There is lack of a unified approach to the use of uterotonic drugs for postpartum hemorrhage management in our hospital.To improve the management of postpartum hemorrhage due to uterine atony literature update is needed.

4780

A comparison of volatile anesthetics and propofol on hemorrhage during dilatation and curettage: A systematic review and meta-analysis

Lee H. A.[1], Kawakami H.[1], Hitoshi S.[2], Mihara T.[2], Goto T.[3]
[1]Yokohama City University Medical Center - Yokohama (Japan), [2]Yokohama City University Hospital - Yokohama (Japan), [3]Yokohama City University Graduate School of Medicine - Yokohama (Japan)

Background and Goal of Study: Volatile anesthetics are known to decrease contractility of uterine muscle. Thus it may induce more bleeding during gynecologic procedures. There have been several studies comparing volatile anesthetics to intravenous drugs such as propofol to clarify the effects on blood loss. Some of them suggests the possibility of less blood loss when maintained by propofol, but it still remains unclear. We conducted a meta-analysis to compare the effect of propofol and volatile anesthetics on the amount of hemorrhage during dilatation and curettage.
Materials and Methods: This study was a systematic review and meta-analysis. A search was conducted of published literature in MEDLINE, EMBASE, Web of Science, and Cochrane Central Register of Control Trials databases. Randomized control trials that compared volatile anesthetics with propofol for patients undergoing dilatation and curettage were included. Continuous data were summarized using mean difference with a 95% confidence interval (CI). If the 95% CI included a value of 0, we considered the difference not to be statistically significant. We used the random effect model (Dersimonian and Laird method) to combine the results. Heterogeneity was quantified with the I2 statistic. The primary outcome from the present meta-analysis was blood loss during procedure. The secondary outcome was the number of patients with excessive bleeding.
Results and Discussion: Four trials (343 patients) were included with 173 patients receiving volatile anesthetics. Use of volatile anesthetics was associated with increased blood loss compared with propofol (mean difference of 97.6 ml, 95% CI

2.8 to 192.3). However, this result should be interpreted with caution because of the extreme heterogeneity with I2 of 96%. The number of patients with excessive bleeding was evaluated in two trials (204 patients) and the number was significantly higher in patients receiving volatile anesthetics (risk ratio 2.42, 95% CI 1.04-5.63).
Conclusion: Use of volatile anesthetics during dilatation and curettage is associated with increased intraoperative bleeding.

5168

Carbetocin Myocardium Trial, results from a pilot RCT on cardiac effects after oxytocin 2.5U or carbetocin 100mg

Bekkenes M.[1], Fagerland M.[1], Solberg O. G.[1], Aaberge L.[1], Norseth J.[2], Rosseland L. A.[1]
[1]Oslo University Hospital Rikshospitalet - Oslo (Norway), [2]Vestre Viken Hospital - Drammen (Norway)

Background and Goal of Study: Oxytocin is known to prolong QT time corrected (QTc), induce ST-depression and stimulate release of myocardial biomarkers. We aim to investigate if carbetocin causes similar changes.
Materials and Methods: Forty, healthy, singleton pregnant women were randomized to a 1-minute i.v. injection of oxytocin 2.5U or carbetocin 100mg after C-section. QTc, ST-depression and heart rate was registered every minute until 10 minutes after delivery, by Holter monitor (Medilog AR4,Schiller). We measured Troponin I, Troponin T and CK-MB, at baseline, 4, 10 and 24 hours after delivery. QTc values were analyzed by linear mixed model, corrected for baseline differences. ST-depression was analyzed by Fisher´s exact test, relative change in heart rate from baseline until maximal heart rate was analyzed by T-test and myocardial markers were displayed by box-plots.
Results and Discussion: QTc increases significantly with time, reaching maximal values within 6-9 minutes after administration of study drug, P<0.001. No difference in QTc was found between treatment groups, P=0.13, Fig 1. A tendency of more pronounced ST-depression (OR 5.71) and tachycardia (67% vs 57%) was found in the carbetocin group, however group differences were not significant. The opposite is true for myocardial biomarkers, finding a tendency of increased values in the oxytocin group, Fig 2.
Conclusion: Oxytocin 2.5U and carbetocin 100mg causes similar increase in QTc. The pilot trial is underpowered to answer which drug causes more ST-depression and release of myocardial biomarkers. Change in Troponin I from baseline is most pronounced at 10 hours after administration of study drug. Based on this difference, power calculation was performed. CMT2-study, including 240 women, is now conducted to answer if there are group differences in release of Troponin I.

5177

Comparison of different dosage of oxytocin for initiating uterine contraction during cesarean delivery

Somjit M.[1], Surojananon J.[2], Kongwattanakul K.[2], Kasemsiri C.[2], Sirisom M.[2], Prawannoa K.[2]
[1]Srinagarind - khonkaen (Thailand), [2]Khon Kaen University - Khon Kaen (Thailand)

Background and Goal of Study: Oxytocin is used for initiating uterine contraction and preventing postpartum hemorrhage during cesarean delivery. Using the lower dosage of oxytocin may cause effective initial uterine contraction and lower adverse effects than the higher dosage. We evaluated the uterine contraction, additional uterotonic agents and adverse effects of a 5 IU bolus of oxytocin with a 10 IU standard bolus of oxytocin during Caesarean delivery.
Materials and Methods: We enrolled women in a randomized, double-blind, comparing intravenous injections of high-dose oxytocin (10 IU) with low-dose oxytocin (5 IU) administered after clamping of the umbilical cord. There were two primary outcomes: the proportion of women with adequate uterine contraction during the first 3 minutes and the use of additional uterotonic agents.
Results and Discussion: A total of 155 women underwent randomization, 78 women in the low-dose group and 77 women in the high-dose group. The proportion of women with adequate uterine contraction during the first 3 minutes was 84.6% in the low-dose and 77.9% in the high-dose group (relative risk, 1.09; 95%CI, 0.93 to 1.26). The frequency of use of additional uterotonic agents was 28.2% in the low-dose and 36.4% in the high-dose group (relative risk, 0.78; 95%CI, 0.49 to 1.23). The estimated blood loss ≥ 500 mL, interventions to stop bleeding, neonatal outcomes, and adverse effects did not differ significantly between the two groups.
Conclusion: The 5 IU bolus of oxytocin was comparable to the standard 10 IU bolus of oxytocin for the effectiveness of adequate uterine contraction and adverse effects did not differ significantly between the two groups.

6280

Management of a severe postpartum hemorrhage in a patient with Glanzmann's thrombasthenia

Makarem J.[1], Eftekhar N.[1], Ghotbizadeh F.[1], Amozadeh L.[1]
[1]TUMS - Tehran (Iran)

Background: Glanzmann Thromboasthenia(GT),is a rare autosomal recessive haemorrhagic disorder characterized by platelet aggregation dysfunction. In this disorder the main defect occurs in platelet's fibrinogen receptors(GpIIb/IIIa).During pregnancy,there is an increased risk for miscarriage and haemorrhage.
Case Report: A 28y/o primigravid mother, known case of GT, with 7 years history of infertility was reported. She was admitted with hematuria at 37 weeks of gestational age.Laboratory findings were acceptable, urinary tract ultrasonogeraphy was normal. Platelet & tranexamic acid and FVII were administered; however, because of fetal macrosomia and reduced amniotic fluid on ultrasonography, emergency cesarean section was planned. under general anesthesia a well being baby with apgar score:9/10 and 4200 gr weight was born. No extraordinary bleeding occurred intraoperatively. and she was transferred to PACU. Two hours later the obstetrician noticed a massive vaginal hemorrhage and uterine atonia. Because of massive hemorrhage despite medical interventions (platelet ,Factor VIIa, Tranexamic acid, Fibrinogen, PRBC & FFP transfusion),Hysterectomy was performed. Five days later she was discharged with good condition.
Discussion: There are not frequent reports about pregnancy in GT. In a report the outcome of 40 pregnancies in 35 women with GT shwed antenatal bleeding in 50% of cases, primary and secondary postpartum hemorrhage in 34% and 24% respectively(1). In previous researches different therapeutic agents were introduced to manage these patients such as platelet transfusions, recombinant factor VIIa, desmopressin, prednisolone, large doses of uterotonics as well as plasmapheresis. The efficacy of these treatments are only reported in a few series. In our case, although we try to minimize her postoperative bleeding, but it continued. We believed that the macrosomic baby in combination with to some extend coagulopathy and hematometra led to atonia, continuous bleeding and an emergency life-saving hysterectomy despite our aggressive medical treatment.
References:
1. S. Siddiq, A. Clark, and A. Mumford, "A systematic review of the management and outcomes of pregnancy in Glanzmann thrombasthenia," Haemophilia 2011, 17 (5): e858–e869.
Learning points: Risk factors for postpartum hemorrhage in GT may extraordinarily potentiate the risk of bleeding and result in severe situation. Prinatal considering the proper arrangement is essential.

6329

Is it neurogenic or hemorrhagic? – Shock management in a puerperal uterine inversion – Case report

Grenho B.[1], Furtado I.[1], Pereira V.[1], Miranda M.[1], Bettencourt A. R.[1]
[1]Hospital Garcia de Orta - Almada (Portugal)

Background: Uterine inversion (UI) is a rare, complex emergency. While a neurogenic shock can play a major role in the first stage, with placental delivery and increased blood loss the shock can become hemorrhagic.
Case Report: After an eutocic delivery, a healthy 38 year-old developed a complete UI; the placenta was in situ. Minutes after, the patient entered the OR hypotensive, bradycardic and unresponsive. Crystalloids, noradrenaline and general anesthesia induction with ketamine were initiated. An arterial line was placed. Manual uterine reinsertion was achieved under sevoflurane maintenance. After manual placental removal, there was a blood loss of 1000mL and an increase in pulse pressure variation (PPV). Anesthesia was then changed to a propofol infusion. Oxytocin, sulprostone and tranexamic acid were initiated. An intrauterine balloon was left in place. Blood transfusion was necessary. The patient was extubated at the end of the procedure and discharged after 5 days.
Discussion: Puerperal UI occurs in 1/20000 deliveries, with parse literature regarding its management. At first, a (neurogenic) shocked patient requires anesthesia and tocolysis for intrapelvic repositioning; then a major post-partum bleeding requests uterine contraction, hemodynamic, metabolic and coagulation management. Although the neurogenic component might be controversial, as the shock could just reflect underestimation of blood loss, in this case the hypotension and bradycardia appear to be indicators of parasympathetic stimulation. Later, however, there was an increase in the PPV, reflecting an hypovolemic shock. Although a continuous cardiac output monitoring might have been ideal, given its unavailability in our maternity ward, we had to rely on the clinical signs and minimally invasive pulse wave analysis to guide our anesthetic approach.
References:
1. Beringer,R,et al (2004). Puerperal uterine inversion and shock. BJA. 92(3):439-41.

2. Macones,G (2019). Puerperal uterine inversion. In TW Post (Ed.), UpToDate. Retrieved from www.uptodate.com.
3. Girard,T,et al (2014). New approaches to obstetric hemorrhage:the postpartum hemorrhage consensus algorithm. Curr Opin Anesthesiol. 27:267–274.
Learning Points: The anesthetic management of a UI should be based on minute to minute evaluation of clinical signs and preferably advanced hemodynamic monitoring, defining the best approach for the type of shock in each moment. In this case, both neurogenic and hemorrhagic shock were managed promptly.

5872

Use of Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) in management of Morbidly Adherent Placentation

Ioscovich A.[1], Greenman D.[1], Tevet A.[1], Goldin I.[1], Gozal Y.[1], Grisaro S.[1]
[1]Shaare Zedek Medical Center - Jerusalem (Israel)

Background and Goal of Study: Obstetric hemorrhage is the leading cause of maternal morbidity and mortality, at highest risk are women with Placenta Accreta Spectrum. The prevalent approach is cesarean hysterectomy with the placenta left in situ after delivery. Resuscitative endovascular balloon occlusion of the aorta (REBOA) is a minimally invasive procedure used as an alternative to surgical aortic cross clamping for temporary control of bleeding arising below the diaphragm. Used predominantly in the setting of trauma, recently it has been used during Cesarean Section to control obstetric hemorrhage and improve patient outcome. It can be deployed rapidly for use in smaller centers.
Materials and Methods: This retrospective study evaluates all patients underwent Cesarean Section with an antepartum diagnosis of Invasive Placentation from January 2018 to November 2019 at Shaare Zedek Medical Center. In March 2019 we've introduced REBOA as a new treatment modality in CS with a high suspicion of invasiveness which was diagnosed in US or MRI before surgery. Since then it was used in 5 cases, including one emergency CS. We compare patient outcome to Standard Approach (SA) in prior 11 cases. A vascular surgeon inserted REBOA under US, with balloon inflation after clamming of the cord. Inflation time mean was 15.2 minutes with Standard Deviation(SD) ±6.05. We've analyzed data such as blood loss, transfusion, urinary tract injury, hysterectomy rates, procedure duration and ICU admission in both groups. Descriptive statistics were performed.
Results and Discussion: Blood loss (ml) and transfusion rates were significantly higher with SA, mean ± SD: 640 ± 296.6 vs 4400 ± 2787.0, P =0.01. In the REBOA group no blood products were given while in SA, RBC units given median =4 with 6 patients (54.5%) receiving ≥4 units. FFP, Cryoprecipitate and PLT units (mean) given in the SA group were 3.63, 6 and 3.62 respectively. 10 patients (90.9%) in SA had hysterectomy and none in the REBOA group. 5(45%) patients in the SA group required post-surgical ICU admission vs none with REBOA. Bladder injury occurred in 5 cases (45%) of SA vs 1(20%) with REBOA. No significant difference in surgery time P =0.11, or anesthesia P =0.34.
Conclusion: Use of REBOA during CS with invasive placentation is an effective, uterus preserving treatment modality. It reduces bleeding, enables better operating conditions and improves patient outcome.

6050

A retrospective study of prophylactic arterial occlusion balloon catheter for abnormal attachment of the placenta

Kimizuka M.[1], Kii N.[1], Terada H.[1], Yamakage M.[1]
[1]Sapporo Medical University School of Med - Sapporo (Japan)

Background and Goal of Study: Placenta accreta and placenta previa may cause massive bleeding during delivery, leading to life threatening. In the case of massive bleeding, it is unavoidable to have a hysterectomy. Recently, in cases where massive bleeding is expected, balloon catheter is placed prophylactically. But there is no firm consensus on where to place the balloon (Internal iliac artery, common iliac artery or Abdominal aorta).
Materials and Methods: From April 2014 to March 2019, 11 women with placenta accreta or placenta previa were examined. Demographic data, preoperative diagnosis, anaesthetic induction, duration of anaesthesia/operation, position of balloon, blood loss, complication, with or without hysterectomy, pathological diagnosis were recorded.
Results and Discussion: The mean age of 11 patients is 34.5 years old. Preoperative diagnosis were placenta accrete (5 cases), placenta previa (5 cases), placenta accrete and previa (1 cases). Anesthetic techniques were 1 case of spinal anaesthesia and 10 cases of combined spinal-epidural (CSE). Of these patients, 4 patients added general anaesthesia. The average of blood loss was 2352 ml. All of the patients was received the occlusion balloon in internal iliac artery. There were 2 patients who had ischemia-reperfusion injury. Of the cases, 5 patients had massive obstetric hemorrhage and had to undergo a hysterectomy. In these 5 cases, the pathological diagnosis were placenta accrete. Preoperative internal iliac artery balloon occlusion (IIABO) has been widely performed to minimize blood loss for an abnormal attachment of the placenta. Pelvic organs blood flow is mainly from common iliac artery but partly from ovarian artery and inferior mesenteric artery. Also, the development of collateral circulation has large individual difference. In some cases, only preoperative internal iliac artery balloon occlusion cannot control massive bleeding. It should be considered Intra-aortic occlusion balloon or transcatheter arterial embolisation.
Conclusion: Prophylactic arterial occlusion catheter for placenta accrete may be insufficient for successful conservative management. It is needed propriate preparation for massive blood loss.

5031

Down-regulation of Cx43 expression on PIH-HUVEC cells attenuates monocyte–endothelial adhesion

Zhang Q.[1]
[1]The Third Affiliated Hospital of Sun Yat-sen University - Guangzhou (China)

Background and Goal of Study: Pregnancy-induced hypertension (PIH) is the most common serious complication of pregnancy, resulting in significant maternal and fetal morbidity and mortality. Vasospasm is the main pathogenesis of PIH, which leads to the hemodynamic changes and the injury of vascular endothelial cells. However, the underlying mechanism is still unclear. Monocyte–endothelial adhesion is always considered to be one of the most important indicators of vascular endothelial cell injury. Connexin43 (Cx43) plays an important part in monocyte–endothelial adhesion. Thus, we explored effects of Cx43 on cell adhesion in PIH-induced vascular endothelial cells injury.
Materials and Methods: We obtained human umbilical vein endothelial cells (HUVECs) from patients with or without PIH. Different methods, such as inhibitors: oleamide and Gap26, or specific siRNA were used to alter Cx43 channels function or protein expression in normal or PIH-HUVECs. U937-HUVECs adhesion, adhesion molecules expression,suchasVCAM-1andICAM-1,andtheactivityofPI3K/AKT/NF-κB signaling path way were determined.
Results and Discussion: Monocyte–endothelial adhesion on PIH-HUVECs was much more obvious than that on normal HUVECs. Inhibition of Cx43 protein expression could attenuate cell adhesion significantly, however, function of Cx43 channels had no effects on it. Alternation of Cx43 protein expression on PIH-HUVECs mediated VCAM-1 and ICAM-1 expression via regulating the activity of PI3K/AKT/NF-κB signaling pathway.
Conclusion: We firstly reported Cx43 protein expression on PIH-HUVECs was much higher than that on normal HUVECs. Elevation of Cx43 protein expression within the vasculature resulted in PI3K/AKT/NF-κB signaling pathway activation and VCAM-1 and ICAM-1 over-expression, which ultimately lead to monocyte–endothelial adhesion increase.

6071

An opioid free sedation approach for manual placental removal after vaginal delivery: Is Ketodex a viable option?

Melo W.[1], Lagreca E.[2], Cabral F.[3], Roesberg M.[4], Faria Lima L.[1], Lucas Passos R.[5]
[1]Centro Universitario UNINORTE - Rio Branco (Brazil), [2]Hospital de Base Ary Pinheiro - Porto Velho (Brazil), [3]Complexo Hospitalar Central - Porto Velho (Brazil), [4]Hospital Vila da Serra - Belo Horizonte (Brazil), [5]Hospital das Clinicas da Faculdade de Medicina da USP - Ribeirao Preto (Brazil)

Background: Retained placenta is the second leading cause of significant and even fatal bleeding in the obstetric population. Once the diagnosis is made, the placenta is usually extracted manually. Because this procedure is painful, adequate anaesthesia must be obtained prior to a manual extraction attempt.
Case Report: A 30-year-old female patient, 70kg, without comorbidities, was referred to the operating room for manual placental removal after vaginal delivery. Without previous fasting, arrived with heavy bleeding and hypotension. It was decided to perform sedation with Dexmedetomidine + Dextroketamine (1:1), 0,5mcg+0,5mg/kg intravenous bolus. When the procedure was about to start, it was decided to associate Propofol 0,5mg/kg (underdose) to assure hypnosis. Patient remained hemodynamically stable, in spontaneous ventilation without supplementary oxygen throughout the whole process, woke up 30min after sedation, VAS (Visual Analog Scale) 0/10, collaborative and without memory of the procedure.
Discussion: There is no evidence suggesting an ideal anesthetic regimen for this procedure. Considering the hypotension that most patients present, neuroaxial block seems not to be a good option for some cases. Among sedation processes, the most commonly used regimen in Brazil is the combination of propofol with fentanyl, however, high doses of propofol can only be used in patients with complete fasting due to the risk of bronchoaspiration, not to mention the fact that it is a powerful hypotensive agent, also the use of opioids during the procedure increases the incidence of complications such as urinary retention, nausea and vomiting. Thus, the association of Dexmedetomidine with Dextroketamine: called Ketodex, balances the sympatholytic effects of Dexmedetomidine, while concomitantly attenuates the undesirable effects caused by Dextroketamine on the central nervous system, seems to be a viable choice for manual placental removal in cases where hypotension is a significant morbidity factor.
References:
1. Adams L, Menon R, Dresner M, Anaesthetic protocol for manual removal of placenta. Anaesthesia. 2013 Jan;68(1):104-5.
Learning points: There is no evidence suggesting an ideal anesthetic regimen for manual placental removal, but opioid free sedation reduces morbidity. Ketodex seems to be an alternative and viable option specially in cases where hypotension is a significant morbidity factor.

5163

The effect of thromboembolism prophylaxis on prenatal and postnatal complications in patients with pregnancy-related hypertensive disorder

Cakar K.[1], Soysal S.[1], Saracoglu A.[1]
[1]Marmara University, School of Medicine - Pendik- Istanbul (Turkey)

Background and Goal of Study: Hypertension is the most common maternal complication in pregnancy and its incidence is 1/10. Hypertensive disorders during pregnancy include gestational hypertension and preeclampsia. They increase cardiovascular diseases, associated hemodynamic disturbances and also maternal and fetal morbidity and mortality. Especially in patients with preeclampsia, the risk of thromboembolism in pregnancy and puerperal period is higher compared to those without preeclampsia. Pulmonary embolism is still one of the leading causes of maternal mortality. Low molecular weight heparin (LMWH) has been proven to be effective and safe in prophylaxis and treatment of venous thromboembolism. The aim of this study is to determine the effect of thromboembolic prophylaxis on the occurrence of thromboembolic event in pregnant patients with hypertensive disorder.
Materials and Methods: This retrospective study included 386 patients with preeclampsia undergoing cesarean section between 2012 and 2018 at the Obstetrics Clinic of our hospital. The patients were divided into two groups as without (Group 1) and with thromboembolism prophylaxis (Group 2). Demographics, thromboembolic event rate, amount of blood transfusion, laboratory values, the length of hospital stay and mortality were recorded.
Results and Discussion: There was no statistically significant difference in demographics (p> 0.05). The duration of hospital stay was significantly lower in patients receiving anticoagulants (p <0.05). Pulmonary embolism was significantly lower in patients receiving anticoagulants compared to patients not using them (p <0.05). Eleven thromboembolic events were observed in 210 patients without thromboprophylaxis, whereas thromboembolic events were detected in only two (1%) of 176 patients with thromboprophylaxis. Although the rate of blood product use in patients with embolism was higher than in patients without embolism, no statistically significant difference was observed (p> 0.05). The length of hospital stay and arrhythmias were significantly higher in patients with embolism than those without embolism (p <0.05).
Conclusion: Hypertensive diseases of pregnancy increase the susceptibility to thromboembolism. We concluded that prophylaxis for thromboembolism significantly reduces morbidity.

4388

Labour analgesia in a patient with argininosuccinic aciduria: a case report

Ribeiro J.[1], Pires M.[2], Cavaco H.[1], Lança F.[1]
[1]Hospital de Santa Maria - Lisbon (Portugal), [2]Instituto Português de Oncologia de Lisboa Francisco Gentil - Lisbon (Portugal)

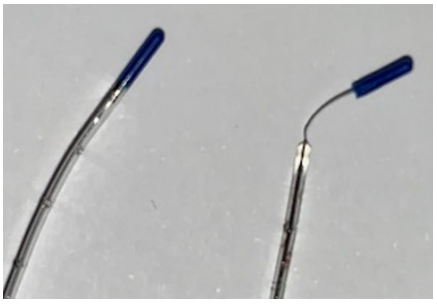
Background: Argininosuccinic aciduria (ASAuria) is an inborn metabolic disorder caused by deficiency of argininosuccinic acid lyase, an enzyme of the urea cycle, resulting in intermittent hyperammonemia postprandially or during catabolic states.1 Main symptoms of uncontrolled disease include anorexia, lethargy, vomiting and there is risk of cerebral edema. The authors present a case of successful combined spinal-epidural analgesia for labour in a patient with ASAuria.
Case Report: A 27-year-old woman, diagnosed with ASAuria at age 15, was on her first pregnancy. She had regular following by obstetrics, metabolic disorders and nutrition teams and was controlled with low-protein diet, arginine and sodium benzoate. She was thoroughly assessed by an anesthesiologist at 38 weeks and neuraxial analgesia techniques were discussed. At 40 weeks, she presented in spontaneous labour with 5 cm dilation and a combined spinal-epidural technique for analgesia was safely performed and maintained with patient controlled epidural analgesia and mandatory intermittent boluses of ropivacaine and sufentanil. Her blood screen at admission revealed hyperammonemia (199 µmol/L). She was asymptomatic, with no signs of metabolic encephalopathy, and started hydration with normal saline and 10% dextrose infusion at 2 mL/kg/h per protocol. 8 hours after admission, shortly before delivery, ammonium levels were 62 µmol/L and dextrose infusion rate was increased to 4 mL/kg/h. The delivery required vacuum extraction and the infant weighted 3325g with Apgar scores of 8 and 9 at 1 and 5 minutes, respectively. The postpartum period went uneventfully with close monitoring of plasma ammonium. She was discharged 4 days after delivery.
Discussion: Successful therapy and genetic counseling has allowed women with ASAuria to consider pregnancy. There are 3 case reports in the literature of uneventful pregnancies and deliveries in such patients. However, none of them refer to any kind of intervention by the anesthesiologist.1,2,3
References:
1. J Inherit Metab Dis 19.5 (1996): 621-623.
2. J Inherit Metab Dis 32 (2009): 191-195.
3. J Inherit Metab Dis 22.2 (1999): 102-106.
Learning points: Early preanesthetic evaluation along with careful multidisciplinary management are important factors in the prevention of perinatal metabolic decompensation. Good metabolic control allows for effective epidural labour analgesia.

4660

I'm stuck! – how to manage an entrapped epidural

Costa J.[1], Barbosa C.[1], Carvalho J.[1], Pinto C.[1], Seabra M.[1]
[1]*ULSM- Hospital Pedro Hispano - Matosinhos (Portugal)*

Background: Entrapped epidural catheters are a rare but worrisome complication due to uncertainty surrounding its management. We present a case where removal of a catheter during labour was not possible.
Case Report: A 38-year-old multiparous woman, with a BMI of 40 kg/m2, requested epidural analgesia for labour. Loss of resistance was felt at 8cm and the catheter was introduced until the 11cm mark, when blood started flowing through it. When trying to remove it, resistance to traction was felt at the 8cm mark. Several attempts of removal were performed after lumbar flexion, injection of saline and positioning in left lateral decubitus, all with no success; the catheter was taped in place. There were no neurological symptoms. A final attempt was performed 1 h after delivery in left lateral decubitus with extreme lumbar flexion and removal was possible. As seen in Figure 1, the catheter's tip was only attached through the embedded wire (on top, normal catheter on the bottom). The patient was discharged after 3 days of an otherwise uneventful stay.



Discussion: The mechanism underlying this complication is often the formation of knots or aberrant trajectories. This didn't seem to be the case, as resistance to traction was felt at approximately the same distance as the epidural space was found. We hypothesize that the catheter was stuck in the ligament or surrounding bony structures. Whether the catheter's defect was a cause or consequence is unclear. A recent article proposed an algorithm for management of entrapped catheters.1 In retrospect, the recommendations were followed and a plan for CT scan was underway. A particularity of this case was the fact that the complication arose during labour, and our success highlights the need to considerer repeating lumbar flexion manoeuvres after delivery, as the reduction in uterine size may allow optimal flexion.
References:
1. Hijazi D, Osse L, Staquet H, Keita H. Removal of entrapped epidural catheter: role of muscle relaxation. European journal of anaesthesiology. Oct 2018;35(10):799-801.
Learning points: Entrapped epidural catheters have an uncertain management. During labour, removal should be tried after delivery.

4448

Changes in intraocular pressure after central nervous blocks: Comparison between epidural and spinal anesthesia in caesarean section

Chloropoulou P. P.[1], Ioannidis R.[1], Tzelepi V.[1], Lampiris G.[1], Vogiatzaki T.[1]
[1]*University General Hospital of Alexandroupoli - Alexandroupoli (Greece)*

Background and Goal of Study: Epidural and spinal anesthesia are well-known anesthetic techniques for caesarean section (CS). The aim of this study is to compare the changes in intraocular pressure after the conduction of both techniques.
Materials and Methods: We studied 36 parturients between 38 and 40 week of gestation who were admitted for CS in our hospital. Their age was between 18 and 42 years old (mean age: 30.3). Exclusion criteria were: Arterial hypertension in gestation (preeclampsia-eclampsia), diabetes mellitus, refractive disorders of the eye, neurological diseases, such as multiple sclerosis, cardiac diseases, therapy with corticosteroids and pulmonary infections. We divided the parturients in 2 groups: Group A, which consisted of 18 women who underwent CS under spinal anesthesia with ropivacaine 10mg and fentanyl 20γ and Group B, which consisted of 18 women who underwent CS under epidural anesthesia with ropivacaine 120mg and fentanyl 50γ. All CSs started at the same time of the day, at 10.00 AM. We calculated the intraocular pressure before the induction of anesthesia and after 48 hours postoperatively. We used the method of tonometry with the help of Goldmann tonometer. During the study period we evaluated the vital signs of the parturients ,the volume of the fluids been given and possible complications, such as cough, vomiting or headache.
Results and Discussion: From the 36 parturients, we excluded one from Group A, because she suffered from headache after the first 24 hours. We conducted a statistical analysis and we found no statistical significance in the changes of intraocular pressure in both eyes between spinal and epidural anesthesia (p=0.45). Conclusion: Intraocular pressure is not affected by significant changes after the conduction of either spinal or epidural anesthesia in parturients who will undertake CS.

4352

Management of accidental spinal administration of high-dose morphine

Afonso Queijo J. C. D.[1], Lavado J.[1], Alves R.[1], Moleirinho C.[1], Valente E.[1]
[1]*Centro Hospitalar de Leiria - Leiria (Portugal)*

Background: Spinal morphine (SM) analgesia is common in c-section patients. Generally the dose used is 50-200mcg added to local anaesthetic. Larger doses result in higher incidence of side effects with minimal analgesia benefit.1 We described a case of accidental injection of 2mg of SM.
Case Report: A healthy 32 year old patient underwent an elective c-section procedure. The anaesthetic plan was to perform a spinal block with levobupivacaine 8.5mg and morphine 200mcg. Surgery went uneventful. Newborn's Apgar score was 10/10/10. Patient was taken to post anaesthesia care unit (PACU). During her stay, a review of the drugs administered detected an error in morphine's dilution: instead of 200mcg the anaesthetist administered 2mg of SM. Immediately, the team decided to keep the patient in the PACU for at least 24h for surveillance and added capnography and capnometry to the standard II ASA monitoring. No supplemental oxygen was given. Prophylactic ondansetron 4mg was administered. Patient already had a urinary catheter. When patient reported pruritus a bolus of naloxone 0,2mg was given, followed by an infusion at a rate of 0.2-0.3mg/h maintained during 36h. Patient remained a total of 48h in the PACU. Her vital signs were stable and conscious state fluctuated between fully awake and sleepy but easily arousable. She reported pain 21h after the spinal injection.
Discussion: Morphine was a slow onset but longer duration of action with greater risk of delayed respiratory depression (RD). Other side effects include pruritus, nausea/vomiting and urinary retention. SM doses >300mcg pose greater risk of RD.1 Other cases of accidental SM overdose have been described resulting from drug/ampoules swaps or wrong route administration. Management include vigilance, cerebrospinal aspiration and naloxone infusion.2,3
References:
1. 1- ATOTW 347 2017. 2- Anesthesiology 2008; 108:1147-9. 3- Anesthesia and analgesia 1987; 66: 475-7.
Learning points: Avoiding mistakes completely is virtually impossible. Therefore it´s crucial to report and discuss error with colleagues so that everyone can learn from them and improve clinical practice. The discussion of this sentinel case report in the department led us to the creation of the SM administration protocol.

4711

Confirmation of epidural catheter location by epidural pressure waveform recordings by the CompuFlo Epidural instrument

Capogna G.[1], Camorcia M.[2], Berritta C.[2], Hochman M.[3], Velardo M.[4]
[1]EESOA Maternal Neonatal Simulation Center - Roma (Italy), [2]Città di Roma Hospital - Roma (Italy), [3] Milestone Inc - Livingston (United States), [4] EESOA - Rome (Italy)

Background and Goal of Study: Pulsatile waveforms originating from the spinal cord and transmitted through the dura in synchrony with heart rate have been used to confirm the epidural location of the catheter1. Objective lumbar epidural space identification using the CompuFlo epidural computer controlled instrument have been reported and validated2,3. The aim of this preliminary study was to evaluate the new CompuFlo instrument which allows pulsatile waveform recordings.
Materials and Methods: We tested 30 epidural catheters previously successfully used for obstetric anesthesia or analgesia and about to be removed. All patients were given 5 mL 2% lidocaine to test the catheter before its removal. After priming with 5 mL saline, the catheter was connected to CompuFlo to record the occurrence of pulsatile waveforms and/or their disappearance during its removal. The epidural catheter was marked at the skin level to record the distance between the skin at the time of measurements. The power analysis required a sample of 30 observations to set 80% test power and 95% significance level.
Results and Discussion: Pulsatile waveforms were observed in all the catheters properly located in the epidural space (confirmed by the occurrence of L2-3 sensory block after the test dose) (28/28) and disappeared when the catheter was extracted from the epidural space (28/28). The mean length of epidural catheter withdrawal associated with its exit from epidural space was 3,56 cm (CI95% 3,12-4,01) and this can be considered as the cut-off value (P=1,27e-15). No waveforms were recorded in 2 cases in which no sensory block occurred after the test dose (catheter dislodgement). The pressure waveform analysis through the epidural catheter had a sensitivity of 100%, a positive predictive value of 100%, a specificity of 100% and a negative predictive value of 100%.
Conclusion: In this preliminary trial pulsatile pressure waveform recording with CompuFlo through the epidural catheter resulted in high sensitivity and positive predictive value. This adds further value to the CompuFlo epidural instrument which, in addition to accurately identifying the epidural space, has also now proved capable of identifying the correct positioning of the epidural catheter. Further and larger confirmatory studies should be performed at the time of catheter insertion to confirm this preliminary finding.
References:
1. Ghia J M,RAPM 2001;2Capogna G IJOA, 2108; 3Gebhard R, Anesth Analg 2018.

4725

Evaluation of labour epidural analgesia through ultrasound in Asian parturients: A pilot analysis

Liu J. H.[1], Chen Y. H.[1], Kao H. M.[1], Chang Y. W.[1], Tsai H. T.[1], Wu C. Y.[1]
[1]National Taiwan University Hospital - Taipei city (Taiwan)

Background and Goal of Study: Lumbar lordosis during pregnancy may interfere with surface estimation for epidural insertion. More than 40% of clinical estimations for epidural insertion in caesarean delivery are ≥1 vertebra higher than those determined using ultrasound for Caucasian parturients in a sitting position. However, differences between surface epidural insertion estimation and ultrasound localization among Asian populations, who often receive labour epidural analgesia in a lateral position, remain unclarified.
Materials and Methods: This was a single-centre prospective pilot observation study. Pregnant women who received labour epidural analgesia by clinical surface estimation for normal spontaneous delivery were enrolled after obtaining informed consent. Participants were asked to maintain a lateral decubitus position similar to that during labour epidural insertion during ultrasound examination, which was performed by a clinician who was blinded for clinical estimation of epidural site. The labour epidural involved patient-controlled epidural analgesia with a programmed intermittent bolus setting and a regimen of 0.66 mg/mL bupivacaine and 1.75 mcg/mL fentanyl.
Results and Discussion: Results for 48 parturients, including 37 with nulliparity, were analysed. The median (interquartile range) age and body mass index were 34 (31–37) years and 26.1 (24.3–28) kg/m2, respectively. Ultrasound measurements of the level of the intercristal line at L3, L3–4, and L4 were 31.6%, 26.3%, and 36.8%, respectively. Clinical estimates agreed with the ultrasound measurements 58.3% of the time (95% confidence interval: 51.2%, 65.4%) and were one vertebra lower than the ultrasound measurement 29.2% of the time. The concordance rate between clinical estimation and ultrasound localization was higher than that in previous reports among Caucasian women in the sitting position. This may be because of lower body mass index as well as the lateral position considered in this study. Furthermore, some anaesthetists in our institute considered the intercristal line to be L3. Mean (SD) dosage consumption during the first stage of labour for the two most common ultrasound-confirmed epidural levels, namely L3–4 and L4–5, were 11.8 (3.9) and 13.3 (5.7) mL/h (p = 0.35).
Conclusion: The accuracy of clinical estimates of labour epidural levels was approximately 60% among Asian parturients in the lateral position.

5632

Zikv and analgesia technique for labour

Rodriguez C.[1], Hernando Vela B.[2], Durán Luis Y.[2], Lloret I Villas B.[1], Pla Escriva G.[1], Lopez Fernandez J.[1]
[1]Hospital universitari de GironaDr Josep - Girona (Spain), [2]Hospital Universitario Miguel Servet - Zaragoza (Spain)

Background: Zika virus(ZIKV) is a Flaviviridae,RNA virus. It is transmitted through infected Aedes mosquito bites, producing significant alterations in multiple organs. In 2016, WHO declared Zika a public health emergency of International concern.
Case Report: A 36-year-old Brazilian, in the 39th week of pregnancy comes to our hospital due to labour dynamics. She has 4cm cervical dilation and regular uterine contractions. No controls during pregnancy. It is consulted to perform an analgesic technique. Patient's medical history: normal analysis and coagulation. HIV, HBV, HCV negative, positive ZIKV. We weren't able to know if it was a current or past infection. She had arrived in Spain just before pregnancy. Talking about risk/benefits, we finally decided to perform an intravenous remifentanil patient controlled analgesia(PCA).
Discussion: ZIKV can be transmitted mother- child (placenta, breastfeeding), sexual, blood transfusion. The worst effects can be Guillain Barre Syndrome(GBS) to the mother and microcephaly in the newborn(2). It is suggested that this virus, because of its nature, the iatrogenic brain-blood crossover during neuraxial anaesthesia(NA) is negligible. Each case must be individualized, since ZIKV has been associated with alterations in inflammatory states of the central nervous system (CNS). Literature indicates NA can be done when patient does not report any active symptoms: fever, maculopapillary rash, dehydration, headache, haematological anomalies. It is important blood, coagulation and liver tests prior to any puncture.ZIKV is associated with thrombocytopenia (TP), leukopenia and elevation of transaminases. TP may increase bleeding risk and neuraxial complications. There is an association between acute ZIKV and GBS. Therefore after NA placement surveillance should be maintained for signs of greater sensitivity to local anaesthetics, airway obstruction, fever and coagulopathies(3).
References:
1. Padilla C, Pan A, Geller A, Zakowski MI. Zika virus: review and obstetric anesthetic clinical considerations. J Clin Anesth. 2016 Dec;35:136-144.
2. Heller BJ, Weiner MM, Heller JA Impact of the Zika Virus for Anesthesiologists: A Review of Current Literature and Practices. J Cardiothorac Vasc Anesth. 2017 Dec;31(6):2245-2250.
3.Tutiven JL, Pruden BT, Banks JS, Stevenson M, Birnbach DJ.Zika Virus: Obstetric and Pediatric Anesthesia Considerations. Anesth Analg.2017 Jun;124(6):1918-1929.
Learning points: Global warming, ZIKV, labour analgesia.

5626

Combined spinal-epidural versus low-dose epidural for mobile regional analgesia during labour: efficacy, obstetric outcome and patient satisfaction

Caballero A.[1], Lopez A.[1], Crespo E.[2], Sureda B.[2], Tapias L.[2], Plaza A.[1]
[1]Anesthesiology Department. Hospital Clinic de Barcelona - Barcelona (Spain), [2]Division of Nursing and Midwifery. ICGON. Hospital Clinic de Barcelona. - Barcelona (Spain)

Background and Goal of Study: Mobile regional analgesia (MRA) could preserve motor function and reduce obstetric interventions. This observational study aims to analyse the efficacy, obstetric outcomes and patient satisfaction in MRA using low-dose combined spinal-epidural (CSE) technique and low-dose epidural (LDE) technique.
Materials and Methods: Collected data of women who requested MRA pain relief between 1 May 2019 and 1 Nov 2019. Evaluated pain (Visual Analogue Scale) before and 30 minutes after the procedure, time of mobilisation and mode of delivery. Surveyed patient satisfaction on labour pain relief within 1 month of MRA based on a scale of 0% "not satisfied" to 100% "very satisfied".
Results and Discussion: The study was based on 46 instances of MRA (76% LDE,

24% CSE) administered to women. In Group LDE, 64% reduction in immediate pain (VAS score from 7.2 to 2.6) was observed and in the Group CSE, the reduction was 78% (VAS score from 7.9 to 1.72), p=0.03. Total length of mobility was 240±132 minutes in Group LDE and 202±84 minutes in group CSE (p=0.49). Normal vaginal, instrumented and caesarean delivery rate was 69%, 11% and 20% in Group LDE and 73%, 9% and 18% in Group CSE respectively. Patient satisfaction with LDE and CSE was 78% and 79% respectively. Type of delivery and patient satisfaction showed no significant differences between both techniques.
Conclusions: High patient satisfaction was achieved with MRA. While CSE gives significantly less immediate pain scores compared with LDE, the study found no statistical differences in the length of mobility, mode of delivery and patient satisfaction between both techniques.

6325

Rare but Deadly: Management of a Parturient with Guillain-Barre Syndrome

Shatil B.[1], Forkner I.[1]
[1]Emory University Hospital Midtown - Atlanta (United States)

Case Report: 33yo G5P4 parturient at 32 weeks presents with progressive upper and lower extremity weakness following Epstein-Barr virus (EBV) mononucleosis. CSF revealed elevated protein content, and nerve conduction showed a demyelinating polyneuropathy. The results along with history of EBV lead to a diagnosis of Guillain-Barre Syndrome (GBS). Over 10 days, she developed SVT episodes that were treated with labetalol. She progressed to bulbar weakness and was intubated for respiratory failure. She was treated with intravenous immunoglobulins (IVIG) 400mg/kg and plasmapheresis. At 33+5 weeks gestation, preterm contractions began, quickly progressed to 10cm cervical dilation, and was brought to the OR for vaginal delivery. She had 4 previous vaginal deliveries without neuraxial analgesia. Standard ASA monitors were placed and she was connected to a ventilator. IV fentanyl 25mcg was given intermittently. Esmolol and nitroglycerine were readily available for dysautonomia episodes. Vacuum-assisted vaginal delivery was successful with APGAR scores 7 and 9.
Discussion: GBS is a progressive peripheral demyelinating disease, beginning in the lower extremities and advancing proximally. Rarely occurs in pregnancy with 1.2 incidences per 100,000 in the US, but 6-24 per 100,000 in poorly developed countries. There is high maternal mortality (3%) secondary to respiratory failure due to increased metabolic demands and reduced lung capacity during pregnancy.1 It is often associated with gastroenteritis (Campylobacter jejuni), mononucleosis (EBV), or respiratory infection (Cytomegalovirus) 2-4 weeks prior to development of symptoms.2Treatment is IVIG or plasmapheresis, along with supportive care. Continuous fetal tracing is required as plasmapheresis can lead to placental hypoperfusion. Dysautonomia presents as SVT and hypertension. Thromboprophylaxis is critical due to the hypercoagulability of pregnancy and immobility of GBS. Anesthetic management goals are primarily respiratory support. Succinylcholine should be avoided due to postsynaptic receptor upregulation and hyperkalemia. There are no contraindications to neuraxial anesthesia.3
References:
1. Kasaven LS. Guillain-Barre syndrome in pregnancy. Eur J Obstet Gynecol 2018.
2. Pacheco LD. Guillain-Barre Syndrome in Pregnancy. Obstet Gynecol 2016.
3.Chan LY-S. Guillain–Barré syndrome in pregnancy. Acta Obstetricia et Gynecologica Scandinavica 2004.

5992

Risk factors associated with difficult epidural placement: a retrospective study

Saraiva R.[1], Moreira J.[2], Nunes C. S.[3], Lemos P.[2], Costa J.[2]
[1]Centro Hospitalar Universitário do Porto - Porto (Portugal), [2]Centro Hospitalar Universitário do Porto - Porto (Portugal), [3]Universidade Aberta, Departamento de Ciências e Tecnologia, Delegação do Porto, Serviço de Anestesiologia, CHUP - Porto (Portugal)

Background and Goal of Study: Neuroaxial block is used by anaesthesiologists to provide labour analgesia. Multiple attempts at needle placement are associated with patient dissatisfaction, higher incidence of spinal haematoma, postdural puncture headache and trauma to neural structures. We designed this retrospective study to determine if there is any patient or technique factors that could be associated with difficult epidural placement (DEP). DEP is defined as more than one attempt to identify the epidural space.
Materials and Methods: 10970 patients were included in the study, consisting of all pregnant women submitted to epidural block, in a tertiary hospital, from January 2013 to December 2017. 6080 of those patients were excluded due to missing data. From the final 4890 enrolled population, we collected age, body mass index (BMI), gestational age, gravidity, cervix dilation and attended/missed labour analgesia appointment status. Regarding the technique, we studied the patient position during the procedure (lateral decubitus vs sitting), the spinal level (L2-L3, L3-L4, or L4-L5), the loss of resistance approach (with saline or air), the performer´s experience (resident/consultant physician) and time of the day the technique was performed (morning vs afternoon/night shift).
Results and Discussion: The characteristics that we found to be independent risks factors for DEP were BMI (odds ratio (OR) of 1,06), gestacional age (OR 0,968), sitting position of the pregnant woman (OR 0,776), and L2-L3 level of puncture (OR 2,498). A higher patient´s BMI was found to be associated with multiple epidural punctures to accomplish success. On the other hand, the advanced gestational age correlates with less epidural attempts. Interestingly, an upper level of epidural puncture (L2-L3) and pregnant lateral position during the technique were found to be association with DEP. It is important to note that analgesia records of the technique usually describe the successful last attempt. Therefore, interpreting these results accordingly, they suggest that the last attempt is performed in L2-L3 rather than lower spaces. Regarding the position, we don't have data to inform us if the position was altered during the attempts.
Conclusion: In our population, higher BMI and lower gestacional age are independent risk factors for DEP. Further study need to be done in order to confirm L2-L3 puncture and lateral position during the technique as risk factors.

5851

Does lunar phases influence number of births per day? A time series analysis

Figar Gutierrez A.[1], Burgos V.[1], Teijido C.[1], Bonofiglio F. C.[1], Risk M.[1]
[1]Hospital Italiano de Buenos Aires - Buenos Aires (Argentina)

Background and Goal of Study: Contradictory results regarding the influence of lunar phases have been found concerning the time of births. In general, the influence of the lunar cycle on deliveries is considered as a not evidence based myth. A Fourier Transform (FT) can show us what the frequencies of the seasonal components of our data are. In a retrospective study of 2480 births throughout 2014, we performed a time series analysis of the number of births per day, aiming to find out any lunar phase influence. This are preliminary results of a broader study gathering data over a decade.
Materials and Methods: We created a fully anonymized database registering number of births for each day of 2014 at our hospital. We used our latitude (-34.60) and longitude (-58.42) along with OCE (Analysis of Oceanographic Data) package for R commander utility, to obtain percentage of moon illumination for each day. We used the augmented Dickey-Fuller (ADF) test, which tests the null hypothesis that the series is non-stationary. For a visual exploratory analysis we formed four groups according to percentage range of lunar illumination (0 to 25%, >25% to 50%, >50% to 75%, >75% to 100%). We used decomposing methods in order to remove seasonal trends in our data. FT was applied to our data, so we were able to further decompose our dataset, eliminating the seasonal component of the frequency we've found. Then we plotted overlapped births per day series with moon illumination sinusoidal wave (Figure 1-b).

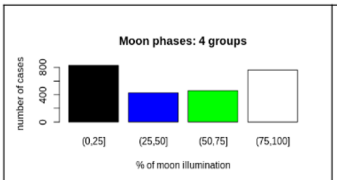


Figure 1-a

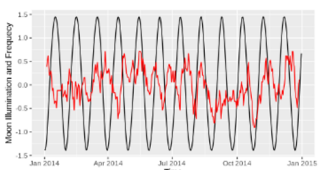


Figure 1-b

Results and Discussion: ADF test (p-value: 0.01) confirmed our data to be stationary (read: steady over time). A visual exploratory analysis suggested that number of births was approximately two fold higher at 0%-25% and 75%-100% moon illumination groups than the others (Figure 1-a). FT showed a relevant seasonal frequency at 3.5 days.
Conclusion: Lunar phases might have a relationship with the number of births per day at a maternity ward. Time series analysis methods might be further explored on this matter.

4379

Prevalence of Aspiration During General Anesthesia Induction for Cesarean Delivery: Is METOCLOPRAMIDE a Necessary Prophylaxis?

Frank D.[1], Yaish Reina Y.[1], Ioscovich A.[2], Zafarov A.[1], Brotfain E.[3], Zlotnik A.[3]
[1]Division of Anesthesia and Critical Care, Soroka Medical Center - Beer Sheva (Israel), [2]Shaarei Zedek Medical Center, Hebrew University - Jerusalem (Israel), [3]Division of Anesthesia and Critical Care, Soroka Medical Center - Beer Sheva (Israel)

Background and Goal of Study: Parturient was found to be a risk factor for aspiration during induction of GA and intubation due to numerous causes such as difficult airway, increased intra-abdominal pressure, and delayed gastric emptying time due to progesterone effect. Thus, there is a recommendation in the literature for aspiration prophylaxis with prokinetics and/or antacid for parturient prior to intubation with emphasis on close to term parturient before CS. In this research we want to question the necessary of prokinetics and/or antacid for the prophylaxis of aspiration in parturient.
Materials and Methods: We retrospectively investigated the use of pramine prophylaxis for aspiration in a cohort of 48,609 parturient undergoing cesarean section between November 2007 to December 2018 in Soroka and Shaare Zedek, two major medical centers in Israel.
Results and Discussion: The amount of cesarean deliveries in Soroka and Shaare Zedek was somewhat similar (26529 vs 22080 respectively). However, a significant difference in the percentage of general anesthesia was observed (5% vs 81.3% respectively). We found six cases of clinical aspiration with significant pulmonary sequelae in the cohort, out of them only three occurred during induction (1:10793). In the statistical analysis we found no significant benefit for routine use of prokinetic prophylaxis in parturient undergoing cesarean section.
Conclusion: The usage of routinely aspiration prophylaxis in parturient undergoing cesarean section is questionable. We found that clinical aspirations is linked to the type of anesthesia (general vs. neuroaxial) and urgency of the procedure, and not to the use of pramine prophylaxis.

4423

How to avoid perineal pain and pruritus following intravenous bolus of dexamethasone before Caesarean section?

Kendrisic M.[1], Marelj D.[1], Malobabic D.[1]
[1]General Hospital Sremska Mitrovica - Sremska Mitrovica (Serbia)

Background and Goal of Study: Dexamethasone becomes increasingly popular in obstetric anesthesia because of its anti-inflammatory and antiemetic properties. Single intravenous (IV) dose of 8 mg dexamethasone reduces antiemetic and analgesic requirements in the postoperative period. Preanestetic IV administration may cause excruciating pain, and/or pruritus in the perineal region. The aim was to investigate whether unpleasant effects could be avoided if intravenous bolus of dexamethasone was administered after spinal anesthesia.
Materials and Methods: After ethics committee approval and written consent, 60 pregnant women, aged 28±4.7 years, ASA II-III, scheduled for elective cesarean section under spinal anesthesia, were included in this prospective randomised study. Group A (30 patients) received 8mg of dexamethasone IV, 15 minutes before spinal anesthesia. Group B (30 patients) received 8mg of dexamethasone, immediately after performing spinal anesthesia. All patients received 2.2 ml of 0.5% hyperbaric bupivacaine with fentanyl 20µg and morphine 0.2 mg intrathecally. Presence of pain or pruritus, time of onset, quality and duration of pain were investigated, as well as incidence of nausea and vomiting and postoperative pain 4h, 12h and 24h postoperatively. Statistical analysis was conducted using Student's t test and Chi-squared test.
Results and Discussion: Results showed no significant difference regarding age and BMI between groups. Difference in incidence of nausea and vomiting and postoperative pain was not statistically significant 4h, 12h and 24h postoperatively. The onset of pain and pruritus in group A was after 23.4±7.7 sec and duration was 16.9±8.0 sec. Most of the patients felt mild pain 85%, while 15% had pruritus in perineal region.

	Group A (No 30)	Group B (No 30)	p value
Perineal pain or pruritus	29	0	p<0.001

Conclusion: Incidence of perineal pain and/or pruritus is significantly higher in pregnant women if IV bolus dose of dexamethason is administered before spinal injection. This side effect can be completely avoided, if dexamethasone is given following spinal anesthesia.

5451

Circadian effects on neural blockade of intrathecal administration of levobupivacaine and fentanyl for caesarean section

Nikouli E.[1], Kiamiloglou B.[1], Karras G.[1], Chloropoulou P.[2], Vogiatzaki T.[2]
[1]Sismanoglio General Hospital Komotini - Komotini (Greece), [2]Democritus University of Thrace - Alexandroupoli (Greece)

Background and Goal of Study: Circadian variation in biological rhythms has been identified as affecting the pharmacological properties of many anaesthetic agents such as local anesthetics. There is a growing body of evidence suggesting circadian patterns of LAs activity in the fields of local, dental anesthesia and labour pain analgesia with important differences among diurnal and nocturnal phases. Bupivacaine, ropivacaine and lidocaine were mostly investigated. The purpose of this study is to examine whether a rhythmic variation of the effect of intrathecal levobupivacaine exists throughout the day period.
Materials and Methods: 80 parturients presenting for urgent or elective caesarean section were assigned to 5 groups (16 patients in each group) according to the time of day of spinal drug administration. The same dose of levobupivacaine and fentanyl was given intrathecally in all patients at different times: group A (08:00am - 12:00am), group B (12:00am - 4:00pm), group C (4:00pm - 8:00pm), group D (8:00pm - 12:00pm), group E (12:00pm - 08:00am). Pinprick or cold, the four-point modified Bromage scale (0-3) and the numerical scale (NRS 0 - 10) were used respectively for the assessment of the sensory blockade, motor blockade and pain. The duration of sensory and motor blockade, analgesia duration and pain scores at first analgesic request were recorded.
Results and Discussion: Statistically significant differences were found among the studied groups in the duration of motor and sensory blockade and in the intensity of pain at first postoperative analgesic request. Prolonged duration of motor blockade in groups A, B and C (08:00am - 8:00pm) (p<0,001) and prolonged duration of sensory blockade and analgesia in groups A, B (08:00am - 4:00pm) (p<0,001) were observed. Higher pain scores at first postoperative analgesic requirement have been recorded in group E (12:00pm -08:00am) (p<0,001).
Conclusion: The time of day of intrathecal administration of levobupivacaine influences the duration of spinal anesthesia and the intensity of pain after anesthesia's regression.

4973

Fixed dose versus height - adjusted dose of intrathecal hyperbaric bupivacaine for caesarean delivery: a prospective, double-blinded randomized trial

Bialowolska K. A.[1], Horosz B.[1], Sękowska A.[1], Malec- Milewska M.[1]
[1]Medical Centre of Postgraduate Education - Warszawa (Poland)

Background and Goal of Study: Universal protocol of spinal anaesthesia with hyperbaric bupivacaine for caesarean section (CS) is still lacking. Despite effective intrathecal dose (ED95) of hyperbaric bupivacaine described as 11.5 - 12.5mg, a number of dosing regimens were proposed. We performed randomized, double–blinded study to compare effectiveness and safety of spinal anaesthesia using high dose of hyperbaric bupivacaine and dosing regimen of relatively high doses adjusted to parturient's height. We hypothesized that using fixed dose will result in better effectiveness and similar ratio of anaesthesia–related complications.
Materials and Methods: After ethics committee approval (65/PB/2017) and trial registration (ClinicalTrials no. NCT 03231436), 140 healthy (ASA <3), term singleton parturients scheduled for elective CS were enrolled between July 2017 and July 2019. Fixed-dose group (FD) received spinal block with 12.5mg of hyperbaric bupivacaine and 25mcg of fentanyl, whereas women randomized to adjusted-dose group (AD) received bupivacaine dose adjusted to their height (9-13mg) and 25mcg of fentanyl. Sensory block of at least T5 within 10 minutes following intrathecal injection and no need for supplementary analgesia during CS were set as composite primary outcome. Secondary outcomes were frequency of anaesthesia–related complications and postoperative opioid requirement.
Results and Discussion: 140 parturients were enrolled and final data were available for 134 cases. There was no difference in primary outcome measure. Spinal anaesthesia was successful in 64 out of 67 patients in FD group and 65 out of 67 in AD group (95.5% vs 97%, respectively, p>0.05). Five patients required analgesia during CS (3 in FD and 2 in AD group, p>0.05), of which 1 patient in FD group and 2 in AD group required i.v. analgesics despite sensory block of T5 or higher. Similarly, no differences were noted in terms of complications between FD and AD groups (all p>0.05): hypotension (59.7 vs 53.7%), bradycardia (3 vs 0%), nausea (28.4 vs 29%), vomiting (4.5 vs 0%), as well as in postoperative morphine requirement (median 20 vs 20mg).
Conclusion: Spinal block using 12.5mg of bupivacaine regardless of parturient's

height when compared to height - adjusted dose regimen based on relatively high doses of bupivacaine does not appear to increase the risk of complications, which may aid clinical decision–making process in elective, as well as non-elective cases.

5002

Incidence and determinants of failed epidural for emergency caesarean section: a retrospective analysis

Karlicka D.[1], Lal S.[2], Singh V.[2], Narayanan N.[2], Thomas J.[2]
[1]University Hospital Krakow - Krakow (Poland), [2]Our Lady of Lourdes Hospital - Drogheda (Ireland)

Background and Goal of Study: Epidural analgesia remains the most efficient pain relief for labour. Around 25% of parturients in the UK receive epidural catheter1. The epidural failure rate is reported to be as high as 21%2 while the conversion rate to general anaesthesia should not exceed 3%3 according to the Royal College of Anaesthetists. The main objective of this study was to find out the percentage of patients on epidural analgesia who required conversion to spinal or general anaesthesia for all but category I caesarean sections.
Materials and Methods: A retrospective study was performed in our hospital after approval from local audit committee. The data was collected over 18 months from May 2018 to November 2019 and included patients who underwent emergency caesarean section with epidural in situ.
Results and Discussion: A total number of patients who required caesarean section on epidural accounted for 319, whereas 22 cases were converted to general anaesthesia and 2 cases to spinal anaesthesia (overall conversion rate is 7.52%). The risk factors noted for failure were insufficient epidural analgesia in the ward and short time from dose administration to incision. Moreover the results showed the diversity in doses and volumes for epidural top-ups among anaesthetists (Table 1.). Of note, a significant number of cases were converted intraoperatively after baby delivery.

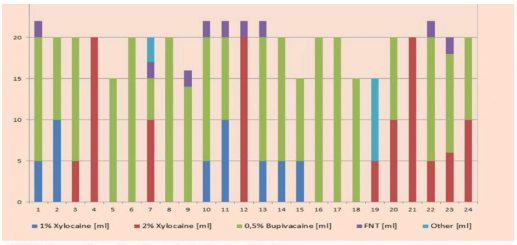


Table1. Type and dose of Local Anaesthetic given for epidural top-up.

Conclusion: The conversion to GA may increase both maternal and fetal risks. In our audit we found that the incidence of conversion is two times higher than recommended. Uniformity among clinician top-up and early recognition of inadequate analgesia remain crucial.
References:
1. Epidural analgesia in labour; McGrady E. Continuing Education in Anaesthesia Critical Care & Pain, 2004, 4:114–117.
2. Labor Epidural Analgesia to Cesarean Section Anesthetic Conversion Failure: A National Survey. Anesthesiol Res Pract. 2019: 6381792., Desai N.
3. Conversion of epidural labour analgesia to anaesthesia for Caesarean section: a prospective study of the incidence and determinants of failure. S.H. Halpern. BJA 2009; 102:240-243.

5535

Augmentation of Labour Epidural for emergency Caesarean Section

Lal S.[1], Ghulam R.[2]
[1]Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland), [2]Our Lady of Lourdes Hospital - DROGHEDA (Ireland)

Background: The Augmentation of epidural analgesia for caesarean section has clinical and legislation implications. The Audit performed to observe the current practice of augmentation of labour epidural for emergency caesarean sections in regional teaching hospital of Ireland.
Methods: A total of 60 patients were included in a period of 6 months. Data was collected on proforma immediately following surgery. Total of (53/60) 88% of patients received the full dose of the local anaesthetic mixture in the labour ward, while (07/60) 7% of patients were topped up in operation theater with simultaneous application of AAGBI monitoring.
Results: The average time for the transfer of the patient from labour ward to theatre was 11 mints following epidural top-up in the delivery suit. All Patients (53/60) who received epidural augmentation in labour ward were brought to the theater without AAGBI standard monitoring along with absent fetal monitoring (CTG). Total of (37/60) 62% of patients were reported having a drop-in blood pressure of more than 20% between NIBP reading taken before epidural top-up and first NIBP reading in the theater. Only of (03/60) 5% of patients were accompanied with emergency drugs. None of the patient was reported high blocks/local anaesthetic toxicity. Only (01/60)2% of total patient was converted to general anaesthesia due to inadequate sensory block after epidural top-up.
Conclusions: Epidural top-ups for emergency caesarean section are used frequently but routinely performed in the delivery suite. Drugs, doses, and volume used differ greatly among anaesthetits. During transport, available equipment and drugs were limited.
Recommendation: Lack of monitoring during transfer can lead to adverse maternal and fetal outcomes. We highly recommend epidural top-up and transfer under AAGBI monitoring accompanied with emergency drugs.

6161

Neuroaxial anaesthesia versus general anaesthesia for caesarean delivery in a patient with acute appendicitis, which is the best option?

Cuesta Cabezas T. C.[1], Baladrón González V.[1], Ruiz De Castañeda M. D.[1], Arroyo Rubio J. J.[1], Martinez-Galán Fernández L.[1], Villanueva Carpintero M. D. G.[1]
[1]Hospital General de Ciudad Real - Ciudad Real (Spain)

Background: Surgery can be indicated at any stage of pregnancy. The anaesthesiologist should take into account the maternal and foetal risks associated with each different anaesthetic technique.
Case Report: A 33 year old woman, in the 30th week of gestation, ASA II, asthmatic, 60 Kg, 160 cm, with acute appendicitis, who is operated at the same time of caesarean and appendectomy. For both interventions, we performed a combined neuroaxial anaesthesia, placing an epidural catheter at the level of L3-L4 and dispensing into the intradural space 10 mg of bupivacaine 0.5% hyperbaric and 10 micrograms fentanyl with a 27G needle. The surgery proceeds without incidences, first the caesarean and then the appendectomy. The analgesic level was optimal, and the patient remained comfortable throughout the intervention.
Discussion: Regarding to this clinical case, we consider what factors influence the anaesthesiologist when choosing the anaesthetic technique in the pregnant woman, as well as the benefits and consequences of each one of them. The American Society of Anesthesiologists and the Society for Obstetric Anesthesia and Perinatology recommended the use of neuroaxial anaesthesia over general anaesthesia for most caesarean deliveries. However, there is still a tendency to perform general anaesthesia in caesarean delivery without a justifiable cause. Factors that may influence choice include the presence of fetal emergencies, the anesthesiologist's specialization in obstetrics, or certain patient characteristics such as race. Acute appendicitis is the main non-obstetric surgical emergency in pregnant women. The appendectomy by open approach allows spinal anaesthesia to be performed, with a very low rate of conversion to general anaesthesia.
References:
1. Benjamin T.Cobb et all. Anesthesiologist Specialization and Use of General Anesthesia for Cesarean Delivery. Anesthesiology February 2019;130:237-46.
2. Marie-Pierre Bonnet. Sedation and anaesthesia for non-obstetric surgery. Anaesth Crit Care Pain 2016. 35S: S35-S41.
Learning points: Neuroaxial anaesthesia is the most widely recommended technique in pregnant women. If general anaesthesia is necessary, the anaesthesiologist must know the risks and possible teratogenic effects of the drugs to be used depending on the patient's gestational trimester.

5234

Anesthetic techniques for C-section in morbidily obese pregnant patients. A retrospective observational study in University Hospital

Carvalho V.[1], Jeha C.[1], Brandão M. J.[1], Klem F.[1], Braga A.[1], Drummond R.[1]
[1]State University Of Campinas - Campinas (Brazil)

Background and Goal of Study: Obesity represents a worldwide epidemic. Maternal overweight increases the risks of preeclampsia, gestational diabetes, labor induction, cesarean section, postpartum hemorrhage, puerperal infections and maternal death. General anesthesia is undesirable regarding the risks of difficult airway (obesity and pregnancy) and maternal mortality. Anesthetic management of obese parturient is challenging and requires adequate planning. We did a retrospective observational study describing the best neuraxial technique for woman with BMI > = 40 who underwent C-section in terms of lower complications, block failure and safety.
Methods: Ethical Committee approval (CAAE: 0454.0.146.000-08), we did a retrospective analysis (Jan 2016 - Dec 2017) , where 200 pregnant woman with BMI > = 40kg/m² had C-section with neuraxial techniques: single spinal, intermittent epidural with catheter and combined spinal-epidural (CSE). Complications evaluated: hemodynamic instability, use of vasopressors, total spinal block, block failure. Variables: Age, weight, height, BMI, anesthetic technique, technical difficulties, blockade failure, hemodynamic instability. Statistical analysis: Cathegorical variables: Chi-square or Fisher's Exact Test. Numerical variables: Mann-Whitney and Kruskal-Wallis. The level of significance adopted was 5%, p<0.05.
Results: 200 patients analysed with BMI >= 40 were submitted of C-section. 123 (61.5%) had BMI 40-45, 54 (27%) 45-50 and 23 (11.5%) >50. There was statistical significance between BMI for: anesthetic technique (more frequency for single spinal in BMI 40-50 and 45-50 (obesity class 3) and CSE in BMI > 50 (super obesity). The more frequent vasopressor utilized were metaraminol with BMI= 40-45 and >50. Overweight in woman with CSE and intermitent epidural. There was no statistical significance regarding hypotension and failure.
Discussion and Conclusion: Obesity is a multisystem disease with several associated comorbidities, significant maternal and fetal complications. It is of extremely importance to perform an anesthetic technique with great effectiveness, safeness and without complications. In our study, we showed that CSE for C-section in super obese woman was a good choice because of faster onset associated with maintenance of an epidural catheter to infuse LA in small increments, to complement or improve the block, avoiding hypotension, total spinal block and allowing better postoperative pain control.

5077

Spinal tumor and pregnant women: neurosurgery and caesarian delivery dilemma

Abdyli A.[1], Domi R.[1], Huti G.[1]
[1]American Hospital,Tirana,Albania - Tirana (Albania)

Background: Pregnant women has different pathophysiological changes, and often current diseases. We present a rare case of a pregnant women suffering from spinal tumor diagnosed during her second pregnancy. The progressive neurological deficit makes inevitable the tumor removal in the 29-th week of pregnancy.
Case Report: A 21 years old pregnant women was diagnosed in the 29-th week of pregnancy of spinal tumor based on her clinical signs (backache, and progressive neurological deficit of her legs) and on IMR examination. These examinations revealed a spinal tumor on TH10-L1 level. The progressive motor deficit of her legs makes the surgery inevitable. A multidimensional team (obstetrician, neonatologists, anesthetists, and neurosurgeons) consulted the patient, concluding of neurosurgical approach and strict fetal monitoring in perioperative period. This conclusion was appreciated by the women which did not permit to deliver the baby prior of term. Betamethasone, nifedipine, and magnesium sulfate) were started. Careful positioning of pregnant women in prone position was realized. Fetus monitoring was perioperatively realized taking care of maintaining fetal heart rate over 120. The procedure was uneventful, and the women discharged from hospital without deficits and normal pregnancy course.
Discussion: This rare case presents an unusual situation of a pregnant women undergoing non-obstetrical surgery. Being in 29-th week of pregnancy minimize the risk of anesthetic effects on organogenesis, and the anesthesiologist must take care about fetal monitoring, maternal hemodynamic, and tocolysis.

5958

The effects of preoxygenation with the application of high current nazal oxygen on newborn in the caesarean operations

Karaca H.[1], Yurt E.[1], Turan A. Z.[1], Karaca E.[1], Yilmaz M.[1], Saracoglu K. T.[2], Airway management
[1]Health and Science University Derince Training and Research Hospital - Derince (Turkey), [2]Health and Science University Kartal Training and Research Hospital - Istanbul (Turkey)

Background and Goal of Study: During the induction of anesthesia, pregnant patients have high risk of hypoxemia due to the physiological changes in the respiratory system and significant hypoxemia may directly affect the newborn. The effective preoxygenation is routinely recommended by Obstetric airway guidelines. High-Flow Nasal Oxygen (HFNO) administration is a new approach that is increasingly used for this purpose (1.2.3). In this study, we aimed to compare the effects of preoxygenation on mother and newborn following the use of traditional method with face mask or high-flow nasal oxygen treatment during induction of general anesthesia for cesarean section.
Materials and Methods: Following the Ethics Committee approval and written informed consents were taken from 100 patients who undergoing the elective surgery are included in the study.Patient were randomized into two groups: preoxygenations were performed with HFNO (Group 1, n=50) and face mask (Group 2, n=50).The newborn APGAR scores in first and fifth seconds,umbilical cord venous blood gas and pO2 and pCO2 values,time to clamp umbilical cord were recorded.
Results and Discussion: Demographics of the mother were similar in groups (Table 1).Although the umbilical cord clamping times and neonatal birth weight were similar between groups,the APGAR scores in first and fifth seconds in POINT group were statistically significant (Table 1).There was no statistically significant difference in umbilical cord blood gas values (Table 2).
Conclusion: We are in the opinion that, the application of preoxygenation with HFNO might be a preferable technique to improve the APGAR values of newborn in the cesarean operations.Clinical trial registiration:NCT03903003

5621

Anesthetic management in a spinal muscular atrophy type III parturient cesarian section: a case report

Sato Campana C.[1], Blasi Marques M. C.[1], Jung Docko A.[1], Morales Herrera E.[1], Souza Nani F.[1], Pires Chakkour H.[1]
[1]Hospital das Clinicas da Faculdade de Medicina da Universidade de Sao Paulo - Sao Paulo (Brazil)

Background: Anesthetic management in parturients with spinal muscular atrophy(SMA) is challenging and requires some strategies to deal with the anatomical and physiological alterations presented by this patients. We report a case of a successful technique, with satisfactory analgesia and safe delivery.
Case Report: A 22-years-old woman, 33 weeks pregnant with spinal muscular atrophy type III, hypothyroidism and pegnancy induced hypertension was schedule to undergo cesarian section due to hypertensive peaks . The patient, which was followed by the obgyn team, presented a severe lung restriction, a strong khypo-scolios, besides no neck extension and 2.3cm distance beetween incisives. Due to the dificulty to perform regional anesthesia and the impossibility of laringoscophy, it was planned a general anesthesia with awake intubation by optical fibroscopy. After explanation about the procedure, we provided analgesia with fentanyl 2mcg/kg and dexmedetomidine 0,3mg/kg/h intravenous and topical anaesthesia with lidocaíne 2% through the nose and month. A nasal intubation with optical fibroscope was performed with the patient colaboration, and after the correct placement of the tube, the induction was made with fentanyl 10mcg/kg and propofol 2mg/kg. After 2 minutes and 45 seconds, the baby was born alive with apgar score 2/3/10. The general anesthesia was mantained with propofol (TCI of 2.2-2.5) and dexmedetomidine 0,5mg/kg/h. At the end of surgery, the patient was stable, intubated and receiving an Dexmedetomidine infusion. Due to the long time waiting for an ICU room, after 2 hours and the full recovery of general anesthesia, the patient was extubated in the operating room, and did not present any sign of muscular weekness. proceeded to the UCI, awake and with no more complains.
Discussion: Parturients patients with SMA may present challenges to anesthesiologist due to severe scoliosis and difficult positioning of the patient on operation table that makes it difficult and unpredictable the realization of neuraxial anesthesia. General anesthesia also presents many challenges to be done because of the intubation anatomy unfavorably (fibroscopic IO is the most frequent described in case reports) and due to severe restrictive lung disease that is often present in SMA.
References:
1. Abati E., Corti S., Pregnancy outcomes in women with spinal muscular atrophy: A review.
Learning points: Special approach of parturients with SMA it´s challenges.

5529

Optimization with levosimendan prior to cesarean section in a patient with left heart failure and severe pulmonary hypertension

Joensen O.[1], Kollmann Camaiora A.[1], Alström U.[1], Cohen J.[1]
[1]*Akademiska Sjukhuset - Uppsala (Sweden)*

Background: Heart failure and pulmonary hypertension (PHT) in the pregnant population is associated with historically high morbidity and mortality for both mother and child (30-56% and 11-28% respectively). Women with known PHT are therefore recommended to avoid pregnancy but undiagnosed cardiopulmonary disease can debut during pregnancy due to the increasing cardiovascular stress of pregnancy1. Case Report: We report a 33y.o G3P1A1 woman. Past medical history of systemic lupus and antiphospholipid syndrome. The patient was asymptomatic until week 27 when she sought medical attention due to abdominal pain. Investigations revealed PHT (SPAP 100mmHg), severe mitral valve prolapse and atrial fibrillation. Due to clinical deterioration and rapidly increasing p-BNP at week 34 (max value of 10900ng/l) a multidisciplinary team recommended a sub-acute cesarean section. The patient received a levosinmendan infusion of 0,1mcg/kg/min over 24h prior to surgery with marked clinical and biochemical improvement (post p-BNP 5640ng/l). Surgery was performed under invasive blood pressure and a central venous catheter at an operating room with possibility for cardiopulmonary bypass. The patient received a combined spinal-epidural (5mg hyperbaric bupivacaine + 100mcg morphine + 10mcg fentanyl in the spinal room) and a slow epidural titration with ropivacaine for a total dose of 124mg over 30 minutes to achieve a T4 level. A phenylephrine infusion of 0,25mcg/kg/min was needed (total dose 2,28mg). Surgery went uneventful, with minimal blood loss (300ml) and spontaneous conversion from atrial fibrillation to sinus rhythm shortly after extraction of a healthy baby.
Discussion: Recent case series indicate a decrease in maternal mortality to 16%, specially during postpartum and directly related to the degree of PHT2. Pregnancy is still considered contraindicated, but if the pathology develops later, specific treatments should be promptly initiated. The use of levosimendan proved to be an excellent choice in optimizing the patient prior to surgery.
References:
1. Curr Opin Anaesthesiol 2016;29:273-81. 2. Obstet Gynecol 2017;129:511-520.
Learning points: A multidisciplinary approach to heart disease during pregnancy leads to a decrease in morbidity and mortality. Regardless of the anesthetic technique, the main aim is to avoid hypotension and acute volume overload. Preoperative levosimendan proved excellent in optimizing the patient prior to surgery.

4512

Onset of pulmonary arterial hypertension due to congenital heart disease (PHTN-CHD) after cesarean delivery

Sanz Iturbe M.[1], Blazquez E.[2], Fontanals M.[2], Sola E.[2]
[1]*Hospital Universitario de Bellvitge - L'Hospitalet de Llobregat (Spain),*
[2]*Hospital Sant Joan de Deu - Barcelona (Spain)*

Background: Acute respiratory failure (ARF) during the peripartum period is a possible situation due to different disorders related to pregnancy-specific conditions or an increased risk of other medical conditions due to changes of gestational maternal physiology. We report a case of an ARF, with a final diagnosis of PHTN due to a congenital defect occurring after cesarean delivery.
Case Report: We report a case of a 35 year old woman, who was admitted for an induced labor. An emergency c-section was indicated due to a fetal sustained bradycardia. At the recovery room she developed ARF. An angiotomography excluded pulmonary thromboembolism but showed chronic signs of PHTN confirmed with echocardiography. The patient was transferred to an Intensive Care Unit where an extended study was ruled out and showed precapillary PHTN due to a left-to-right shunt. The cardiac magnetic resonance imaging (MRI) showed persistence of the left-to-right shunt and an anomalous right superior pulmonary venous return (APVR) to vena cava instead of to the left atrium. Pulmonary vasodilators were initiated with clinical improvement, and the patient was discharged home 14 days after.
Discussion: The prevalence of CHD in adults is unspecific but it is estimated around 5-10% in the population in Europe (1). It is reported that 5-10% of adults with CHD develop PHTN. The continued exposure of a high pulmonary blood flow due to systemic to pulmonary shunts and high pressure, could cause an obstructive lung artery disease which results in high pulmonary vascular resistance. PHTN during pregnancy is a high risk situation and it is considered a contraindication of pregnancy due to high maternal mortality and morbidity (2). The goal of this article is to present an unusual cause of ARF during the peripartum period and rule out an interesting differential diagnosis, including PHTN-CHD.
References:
1. Galie N et al, ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension, 2015 Eur Heart J 2016;37: 67–119.
2. Sliwa K et al., Pulmonary hypertension and pregnancy outcomes (2016), Eur J Heart Fail. 18(9):1119-28.
Learning points: Onset of PHTN-CHD as ARF at peripartum period is an unusual situation and it should be taken into account in the differencial diagnosis. The mobidity and mortality is high so the need of interdisciplinary collaboration is key as well as the management in a tertiary multidisciplinary Hospital.

5051

Anesthetic patient management with congenite cardiopatia type «single ventricle» on a case

Salcedo M. L.[1], López V.[1], Echevarria C.[1], Tebar M. I.[1]
[1]*Hospital Universitario 12 de Octubre - Madrid (Spain)*

Background: Most patients with single ventricle (SV) congenital heart disease are expected to survive to adulthood, but they are habitually counseled against pregnancy.
Case Report: We present the case of a 31-year-old woman diagnosed at birth of congenital heart disease left ventricular type with double entry with normalized vessels,being intervened within a few months of life of pulmonary artery banding technique, at 6 years intracardiac Fontan surgery is performed using bicavopulmonary technique (De Leval) and closure of the banding area. Since then he has followed periodic controls by Cardiology presenting good functional class NHYA I, although it has presented some episode of «palpitations» self-limited. She is referred to our anesthesia service for assessment before the scheduled completion of a voluntary termination of pregnancy (10 weeks gestation) because it is considered a high-risk pregnancy, at that time she is undergoing treatment with LMWH 60mg/sc/12h (previously I was in treatment with Eliquis 5/12), as well as oral iron and alprazolam. After a multidisciplinary session, it was decided to enter the gyneco-obstetric resuscitation unit a few hours earlier to monitor PVC, Pulsiosimetry, continuous EGC and control of PAI, VVS, RSV with a non-invasive "Clearsight" system, being transferred to the operating room a few hours after administration of Misofar intrarectally.It is also monitored with external defibrillated blades. The anesthetic technique of choice was intradural A at the L3-L4 level with an N25 needle.AL medication, Bupi isobara 0.5% 7mg + Fentanyl 20migrograms and light sedation with midazolam. The patient remained hemodynamically stable at all times (requiring specific doses of «phenylephrine»), the procedure proceeded without incident, going to the resuscitation room to monitor its evolution, being discharged at the plant 24 hours.
Discussion: This type of patients require multidisciplinary approach from the pregestacional advice, clinical management, income in a thrid line hospital, and invasive monitoring in a obstetric intensive care unit for postoperative control.
References:
1. Kim,SY, Pregnancy and Delivery in Functional Single Ventricle Patient; Successful Long-Term Outcome after Right Ventricle Exclusion and Fontan Operation.Korean Circ J. 2016 Jan;46(1):111-4.
Learning points: If a multidisciplinar team takes care of patients and child and the functional class of the mother is good, pregnancy should not be discouraged in this patient.

5016

C-Section in Single Ventricle Patient. Case report, anesthetic considerations

Ferré M. S.[1], Bader A.[1], Teijido C.[1], Figar Gutierrez A.[1]
[1]Hospital Italiano de Buenos Aires - Buenos Aires (Argentina)

Background: In functional single ventricle (FSV) patients blood flow into the pulmonary arteries is passive with no intervening pump, resulting in systemic venous congestion and limited capacity to increase cardiac output. This abnormal condition might be further challenged by pregnancy, with its described increases in plasma volume and cardiac output. (1) Women with significant cardiac pathology are best cared during pregnancy by a multidisciplinary approach, in experienced specialised centres.(1) FSV patients are advised against becoming pregnant because of higher peripartum mortality or occurrence of persistent heart failure. Successful pregnancy and delivery in FSV patients have been reported in the United States, Japan and Korea, but none have been reported in Argentina.(2)
Case Report: A 37 y/o woman with 34 weeks' gestation with a single ventricle with pulmonary cerclage surgery at six month old, scheduled for c-section and tubal ligation. She'd had one at 31 weeks' gestation in, followed by postpartum hemorrhage, giving birth to a 1700 gr live child. She was advised not to get pregnant again. In 2013 she'd had a pacemaker placement due to a complete auriculoventricular block. She'd had also a breast implant surgery. In a cardiac catheterization at that time, right and left atrium pressure was 15 mmHg, unique ventricle pressure was 110 mmHg, pulmonary artery measured 29/14/20 mmHg and aortic systo diastolic pressures were 110/70 mmHg. At 2017 a new catheterization study along with angiocardiography stated that she had a single left ventricle with pulmonary cerclage and barely restrictive bulboventricular foramen, mild pulmonary hypertension and good ventricular function. SaO2 was between 85% to 88%. A combined spinal epidural anesthesia (CSE) was performed with hyperbaric bupivacaine (10mg) and fentanyl (25µcg) administered intrathecally. An epidural catheter was placed. Post operative care was provided at our hospital cardiac intensive care unit.
Discussion: Reports of single ventricle patients giving birth are scarce. This was an extremely rare and anesthesiologist challenging event, being her second child. CSE might be a good anesthetic technique for c-section in high cardiological risk patients. It allows lower spinal dose of anesthetics and using epidural catheter if needed.
References:
1. Moroney E.Obstet Med.2018 Mar;11(1):6–11.
2. Kim.Korean Circ J.2016 Jan;46(1):111–4.

6276

Can a pregnant woman with Hypertrophic Cardiomyopathy be a problem to the anaesthesiologist's coronary arteries?

Silva M.[1], Ribeiro C. R. R. D.[1], Vaz I.[1], Milheiro A. S.[1]
[1]Centro Hospitalar Vila Nova de Gaia/Espinho - Vila Nova de Gaia (Portugal)

Background: The number of pregnant women with cardiovascular disease is increasing.1 In fact, cardiovascular disease is the leading cause of maternal mortality in much of the developed world. Some cardiac diseases hold significant risk of mortality during pregnancy but there are strategies to reverse this trend. A multidisciplinary team must work together to manage these complex patients.
Case Report: A 36-year-old pregnant woman, ASA II, with severe Hypertrophic Cardiomyopathy (HCM) was admitted to an anaesthesiology appointment to assess the best strategy to her labor analgesia. During pregnancy, pharmacological measures consisted of Methyldopa, Bisoprolol and Enoxaparin. After consulting the cardiology specialist, was decided that her heart condition did not contraindicate vaginal deliver or either a neuraxial analgesia technique. At 38 weeks of gestation the patient was admitted due to preeclampsia and the labor was induced. Non reassuring fetal status led to an urgent C-section delivery with epidural anaesthesia. Attention was paid to the volemic status of the patient in order to performed a safe regional technique without worsening left ventricle outflow tract (LVOT) obstruction. There were no complications during the procedure.
Discussion: HCM is the most common genetic cardiovascular disorder transmitted as an autosomal dominant trait and is characterized by asymmetric hypertrophy of the interventricular septum, resulting in obstruction of the left ventricular outflow tract (LVOT). The risk of experiencing an adverse cardiac event appears to be proportional to the degree of symptoms and the degree of LVOT obstruction prior to pregnancy.1 Regarding obstetric management, for the majority of cardiac patients, vaginal delivery remains the safest option. It may be worth emphasizing that successful anaesthetic management of a patient with HCM requires thorough understanding of the hemodynamic changes, proper intraoperative vigilance, avoiding factors that may increase LVOT obstruction with suitable medication and intravascular fluid therapy. Our case report illustrates the importance of preparing complications to allow for an effective execution of care.
References:
1. P.G. Pieper et al. Pregnancy in women with hypertrophic cardiomyopathy. Neth Heart J.2013.Jan;21(1):14-18.
Learning points: Although women with cardiomyopathy have more risks, with an experienced multidisciplinary team, they can be successfully managed throughout pregnancy and delivery.

5064

Perioperative management of cesarean section in pregnant patients with pulmonary arterial hypertension

Shinya S.[1], Nishiwaki K.[2]
[1]Nagoya University Hospital - Nagoya (Japan), [2]Nagoya University Graduate School of Medicine - Nagoya (Japan)

Background and Goal of Study: Maternal mortality in pregnancy with pulmonary arterial hypertension (PAH) is high, and perioperative management during cesarean section (CS) in pregnant patients with PAH must be performed carefully. However, appropriate anesthesia or perioperative management is unknown yet. Concerning appropriate anesthesia and perioperative management is still controversial. Therefore, we investigated past CS cases in pregnant women with PAH at our hospital and examined anesthesia and perioperative management according to the patient's condition.
Materials and Methods: The study was approved by the ethics committee of our hospital. This is a retrospective observational study for pregnant patients with PAH or at risk of developing PAH among the CS cases performed at our hospital from January 2009 to March 2019. We investigated the causative diseases of PAH, preoperative PAH, anesthesia, perioperative management, hemodynamic changes, and maternal prognosis.
Results and Discussion: There were 2231 CS performed from January 2009 to March 2019, of which 2 cases were complicated with PAH and 4 were at risk of developing PAH during the perinatal period. Maternal mean age was 34.7 ± 6.7 years and gestational week was 29.7 ± 7.0 weeks. The causative diseases of PAH were 3 cases of mixed connective tissue disease (MCTD), 2 cases of congenital unilateral absence of a pulmonary artery (UAPA), and 1 of ventricular septal defect (VSD). In 3 MCTD patients, 2 patients had complicated with PAH, and 1 had hypoxemia without PAH. All 3 cases with MCTD were managed under general anesthesia during CS, and pulmonary artery catheters were inserted into 2 cases with PAH, in whom PAH worsened after CS. There was no perioperative maternal death, but one died within 5 years. 2 cases of UAPA and 1 of VSD, who were at risk of developing PAH, were managed under regional anesthesia. 2 patients of UAPA were inserted pulmonary artery catheters, there was no development of PAH during the perioperative period.
Conclusion: In CS of pregnant patients with PAH, a pulmonary artery catheter was useful for monitoring pulmonary artery pressure, and general anesthesia was selected because of the wide safety range. Patients at risk of developing PAH could be managed with regional anesthesia. We managed the patients safely according to the preoperative risk of each patient.

6252

Anesthesiology and cardiology: a successful partnership managing Catecholaminergic Polymorphic Ventricular Tachycardia in pregnancy

Vaz I.[1], Silva M.[1], Romano C.[1], Sanhá M.[1], Milheiro A.[1]
1Centro Hospitalar Vila Nova de Gaia/Espinho - Vila Nova de Gaia (Portugal)

Background: Catecholaminergic Polymorphic Ventricular Tachycardia (CPVT) is a genetic disorder characterized by life-threatening arrythmias in response to stress, either physical or emotional. It usually begins in childhood or adolescence and no relation with structural heart disease or prolonged QT interval is present. During pregnancy, many cardiovascular changes occur, and despite the risk of additional episodes is still uncertain, attention must be paid with a carefully planned multidisciplinary approach. We present a case report of successful pregnancy in a woman with previous diagnosis of Catecholaminergic Polymorphic Ventricular Tachycardia.
Case Report: A 36-year-old pregnant female, classified as ASA III, presented with history of mitral valve prolapse and CPVT triggered by exercise but with no recent episodes. Although she was aware of her condition, a non-planned pregnancy occurred and in order to decide how to manage the patient, a multidisciplinary team was brought together. Cardiology, in order to understand if she was a candidate for an implantable cardioverter - defibrillator or if maintaining her regular beta-blocker throughout pregnancy was enough; anaesthesiology and maternal-fetal specialists to decide the optimum timing, mode of delivery and analgesic technique. At 39 weeks she was admitted for a programmed C-section with an epidural technique. No complications were reported.
Discussion: A possible arrythmia during pregnancy can be fatal for the mother or, even when the treatment is successfully managed to the mother, jeopardize the fetus. An hemodynamic compromise of placental blood flow may occur or even expose the fetus to adverse effects of the drugs used, having in mind their potential teratogenic effects. Also, as the literature shows and this case acknowledges, pregnancy and post-partum arrhythmic risk in CPVT patients does not appeared to be elevated compared with the nonpregnant period, although more studies are needed. Our case report illustrates how an interdisciplinary approach is critical balancing the emotional consequences of avoiding a pregnancy and the risk of major cardiac events. An experts team was required to ensure safety throughout pregnancy, labour and delivery.

5949

Maternity in women with pulmonary arterial hypertension: what is the anesthetist's role?

Alvarez Torres E.[1], Real Navacerrada M. I.[2], Escribano Subías P.[2], Zarzuela Nuñez E.[2], Tebar Cuesta M. I.[2], Cortés Guerrero M.[2]
[1]Hospital Universitario 12 Octubre - Madrid (Spain), [2]Hospital Universitario 12 de Octubre - Madrid (Spain)

Background and Goal of Study: Pulmonary arterial hypertension (PAH) is an uncommon disease that affects mostly women in childbearing age. Despite all advances in PAH therapy, maternal mortality remains high1. The aim of this study is to review the anesthetic management and outcome of these patients.
Methods: A retrospective descriptive study of 10 pregnant women with idiopathic or heritable PAH treated in a tertiary referral hospital between 2011 and 2017 was performed.
Results and Discussion: PAH was diagnosed before pregnancy in 8 out of 10 patients. Another patient was diagnosed during the first trimester and the last one during the puerperium. Three of them decided to terminate pregnancy due to high maternal risk. The 6 women who decided to continue the pregnancy were followed up by a multidisciplinary pulmonary hypertension team. All of them were responders to acute vasoreactivity tests. An elective cesarean section in week 34 to 37 was performed in all cases. In 5 of them under epidural anesthesia, and in the 6th one under a low dose combined spinal-epidural anesthesia. They were monitored in an ICU for 24-48 hours. The hospital stay was between 4 and 11 days. No major morbidity occurred. NYHA functional status remains stable nowadays. Reviewing the 3 patients who decided to terminate pregnancy, one is in lung transplantation list after a deterioration of her disease during pregnancy. The only death registered corresponds to the patient diagnosed during puerperium who had a vaginal delivery without any special care and died of a refractory cardiogenic shock. Pregnancy represents a cardiovascular challenge for women with PAH due to physiological changes during gestation which increase the risk of right ventricular failure1. Clinical guidelines suggest that termination of pregnancy should be offered to every patient due to high maternal risk2. When pregnancy is continued, multidisciplinary management and planning are essential. Epidural anesthesia with slow and incremental loading or low-dose combined spinal-epidural anesthesia seems to be an acceptable choice.
Conclusion: A pregnant woman with PAH represent a challenge for the anesthesiologist. In selected patients, with good functional status and an adequate treatment response, regional anesthesia could be the best option.
References:
1. Hemnes AR et al. Pulm Circ 2015; 5: 435–465.
2. N. Galiè et all. 2015. Eur Heart J, 2016, 37:67-119.

6219

Anaesthesia for caesarean section in women with sarcoidosis induced pulmonary hypertension

Klibus M.[1], Apeinane E.[1], Solovjova J.[2], Sarkele M.[1], Sabelnikovs O.[1]
[1]Riga Stradins University - Riga (Latvia), [2]Pauls Stradins Clinical University Hospital - Riga (Latvia)

Background and Goal of Study: Pulmonary hypertension (PH) as a complication of advanced sarcoidosis [1] is associated with increase risk of perioperative complications and adverse outcome in pregnant women[2]. The aim of this case report is to report anaesthesia for caesarean section and management of postpartum complications of patient with sarcoidosis induced PH.
Materials and Methods: 39 years old pregnant woman at 35 weeks of gestation age with known sarcoidosis diagnosis was admitted to Pauls Stradiņš Clinical University Hospital (Riga, Latvia) with dyspnea, lower limb edema, acrocyanosis. On admission – hemodynamics was stable, but EchoKG showed right ventricle systolic pressure 110mmHg. On the 2nd day caesarean section was performed under epidural anaesthesia. Required level of anaesthesia was achieved using Sol. Bupivacaini 0.5%15ml combined with fentanyl 50mkg. After surgery she was admitted to the cardiac ICU. For postoperative analgesia continuous epidural infusion of Sol. Bupivacaini 0.125% 5ml/h was used. On the 3rd day patient was discharged to the maternity ward.On the day 14 she was readmitted to general ICU with rapidly progressing septic shock due to pelvic abscess. Cardiorespiratory failure progressed and on the day 15 patient had negative outcome.
Results and Discussion: Epidural anaesthesia is advocated for caesarean section to the patients with severe PH, because lower risk of cardiopulmonary compromise. General anaesthesia decreases venous return and increases pulmonary vascular resistance. Spinal anaesthesia was avoided because of the risk of sudden decrease in the systemic vascular resistance. [3] Treatment of sarcoidosis usually includes systemic immunosuppressants which increase the risk of infection. [1]
Conclusions: Epidural anaesthesia during caesarean section is a method of choice for patients with PH. Underlying causes of PH that require additional treatment can even more increase mortality.
References:
1. Duréault A, et al Severe infections in sarcoidosis Incidence, predictors and long-term outcome in a cohort of 585 patients Medicine (Baltimore). 2017 Dec; 96(49): e8846.
2. Hemnes A. R. Statement on pregnancy in pulmonary hypertension from the Pulmonary Vascular Research Institute. Pulm Circ. 2015 Sep; 5(3): 435–46.
3. Elizabeth I. Krenz Epidual Anesthesia for Cesarean Delivery in a Patient With Severe Pulmonary Artery Hypertension and a Right-to-Left Shunt Ochsner J. 2011 Spring 78–80.

6356

Mechanism of pregnancy bidirectional effect on the pulmonary circulation in rats with pulmonary hypertension

Sun Y.[1]
[1]*Beijing Anzhen Hospital - Beijing (China)*

Background and Goal of Study: To observe the changes in the tension of pulmonary artery rings and the morphology of pulmonary arterioles and discuss the pathogenesis of pulmonary arterial hypertension and the effect of pregnancy on pulmonary arterial hypertension.
Materials and Methods: 55 female 6-week-old SD rats were randomly divided into 4 groups: Blank control group, (n=10), monocrotaline (MCT) group (n=13), pregnancy group (n=12) and pregnancy MCT group (n=20).After successful modeling, hemodynamic data were collected by internal jugular catheterization and femoral artery catheterization. Subsequently, the third-stage pulmonary artery rings of the rats were taken to observe the changes in pulmonary artery tension for the rats in all groups. At the same time, lung tissue specimens were collected to observe the damage to pulmonary arterioles.
Results and Discussion: Compared with pregnant group, MPAP was significantly increased in pregnant MCT group ($p<0.05$); the Ach-induced endothelium-dependent arterial diastole rate in the MCT group was significantly lower than that in the blank control group ($p<0.05$), and the Ach-induced endothelium-dependent arterial diastole rate in the pregnant MCT group was significantly lower than that in the pregnant group or MCT group ($p<0.05$). There was no significant difference in pulmonary endothelium-dependent diastolic function between the pregnant group and the blank control group ($p>0.05$). In the MCT group and the pregnant MCT group, the thickness of the rats' pulmonary artery wall and pulmonary arterioles increased, the inner diameter gradually narrowed, hemangioma capillanisum was formed in the pulmonary arterioles, and some small blood vessels were obviously occluded.
Conclusion: Pregnancy further reduces pulmonary endothelium-dependent diastolic function of PAH rats and promotes the damage to pulmonary arterioles.
References:
1. Galie N, Humbert M, Vachiery JL, et al. 2015 ESC/ERS Guidelines for the diagnosis and treatment of pulmonary hypertension. Eur Respir J ,2015, 46:903-975.
2. Hemnes AR, Kiely DG, Cockrill BA, et al. Statement on pregnancy in pulmonary hypertension from the Pulmonary Vascular Research Institute. Pulm Circ, 2015, 5:435-465.
3. Frost AE, Badesch DB, Barst RJ et al. The changing picture of patients with pulmonary arterial hypertension in the United States: how REVEAL differs from historic and non-US Contemporary Registries. Chest, 2011,139:128-137.

5215

Anaesthetic management of a case of early onset severe preeclampsia with HELLP syndrome for hysterotomy – TEG guided management: A case report

Jain S.[1], Korichi N.[1], Shibli K.[1]
[1]*Hamad Medical Corporation - Doha, Qatar - Doha (Qatar)*

Background: HELLP syndrome, a complication of severe pre-eclampsia occurs in 10–20% cases of severe pre-eclampsia1 and represents an advanced clinical stage of pre-eclampsia. It can lead to significant maternal (up to 24%) and perinatal mortality (up to 40%)1. Onset earlier than 28 weeks is rare and there is little published data on maternal and perinatal outcome.2 Anesthesia management of these cases for emergency surgery can be challenging and TEG can play an important role in perioperative management of these cases.
Case Report: 36-year-old lady, G5P3 previous one caesarean section, gestational age 21 weeks, was admitted to labour ward with hypertensive crisis (180/100 mm Hg) and HELLP. She was taken up for emergency hysterotomy because of uncontrolled blood pressure despite of IV antihypertensive and prophylactic magnesium sulphate. Given the case severity and contraindications to neuraxial blockade, we opted for general anaesthesia with arterial line for continuous BP monitoring. Hysterotomy through classical uterine incision was done. Thromoelastogram done intraoperatively showed findings consistent with thrombocytopenia and early coagulopathy. Estimated blood loss was 1100ml. We transfused 2 units of PRBC,6 units of pooled platelets and 4 units of fresh frozen plasma along with 2gm fibrinogen and 1gm injection tranexamic acid guided by the TEG findings. At the end of surgery, patient was extubated in the operating room and shifted to ICU.
Discussion: Emergency surgery with a triad of uncontrolled blood pressure, on-going DIC changes and haemorrhage makes anaesthesia for patient with HELLP challenging.TEG demonstrate the global interaction of platelets in the coagulation cascade (aggregation, clot strengthening, fibrin cross-linking, and fibrinolysis) and can guide transfusion strategy3.Based on TEG analysis, correction can be provided with specific blood product administration We managed our patient with same principles and had smooth anesthesia and post-operative recovery.
References:
1. Seminars in Neonatology 2000;5:197-207.
2.Evaluation and management of severe preeclampsia before 34 weeks' gestation. AJOG 2011;205:191-198.
3.Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, vol. 21, no. 29, 2013
Learning points: Early onset severe Preeclampsia and HELLP is a challenge for anaesthetist. General anaesthesia if indicated needs careful planning. TEG can go a long way in successful outcome in such cases.

5024

Use of deep neuromuscular blockade in intrauterine myelomeningocele correction surgery. Series of seven cases

Nani F. S.[1], Sinedino B. E.[1], Pécora F. S. T.[1], Peralta C. F. A.[1], De Boer H. D.[2], Carlos R. V.[1]
[1]*Maternidade Pro Matre Paulista - Sao Paulo (Brazil),* [2]*Martini General Hospital - Groningen (Netherlands)*

Background: Adzick et al demonstrated the benefits of surgical correction of the neural tube defect in prenatal period.[1] Maintenance of deep neuromuscular block (PTC < 5) was performed to guarantee intraoperative immobility. This case series describes the use of deep neuromuscular block for this type of fetal surgery.
Case Report: A series of seven cases is reported in which deep neuromuscular block was used in the management of neuromuscular relaxation in intrauterine myelomeningocele correction surgery. The data are presented in table 1. The aim of relaxation was PTC <5 responses. To maintain deep neuromuscular block, a bolus of rocuronium 0.3 mg/kg (1x ED95) was given if needed. Sugammadex was used for reversal in all patients. Fetal surgery and anaesthesia occurred uneventfully.

	Deep Neuromuscular Blockade (n=7)
weight (kg)	73.57 ± 11.97
height (cm)	167.57 ± 4.99
age (years)	34 ± 3.6
surgical time (min)	201.42 ± 37.27
anesthesia time (min)	272.14 ± 49.31
rocuronium (mg)	147.17 ± 26.15
sugammadex (mg/kg)	3.54 ± 1.08
reversal time (sec) 2mg/kg (n=2)	112.5 ± 74.2
reversal time (sec) 4mg/kg (n=5)	132 ± 161.3

Discussion: The level of neuromuscular block at the diaphragm has a major impact on surgical conditions, especially during abdominal and thoracic procedures. We hypothesize that surgical correction of intrauterine myelomeningocele also fits this definition. Thus, maintenance of deep level of neuromuscular block might reduce adverse surgical events, improve the outcome of this procedure and may contribute to an increased safety during surgical correction of intrauterine myelomeningocele. Further studies are needed to confirm this hypothesis.
References:
1. Adzick NS, Thom EA, Spong CY, Brock JW, 3rd, Burrows PK, Johnson MP, et al. A randomized trial of prenatal versus postnatal repair of myelomeningocele. N Engl J Med. 2011;364(11):993-1004.
Learning points: Neuromuscular management in intrauterine myelomeningocele correction surgery.

4816

Ex utero intrapartum bronchoscopy and selective intubation followed by delivery and neonatal pneumonectomy. A case report

Arteaga Galich F.[1], Stang M. V.[1], Jauregui E. G.[1], Rossi P. I.[1], Teijido C. A.[1], Figar Gutiérrez A.[1]
[1]Hospital Italiano de Buenos Aires - CABA (Argentina)

Background: Fetuses with large congenital pulmonary airway malformations (CPAMs) are at an increased risk of cardiopulmonary collapse after birth. Ex utero intrapartum treatment (EXIT) allows the selective intubation of the normal lung while on placental support and potentially prevents collapse after delivery on initiation of positive pressure ventilation (PPV).
Case Report: A 24 year-old-woman with 36.5 weeks' gestation, whose fetus was diagnosed with a large left lung CPAM, mediastinal shift and polyhydramnios. Right lung development was normal. A c-section with EXIT protocol, selective intubation and pneumonectomy after delivery were decided. Anesthesia for the c-section was combined spinal epidural anesthesia and general anesthesia with rapid sequence induction with propofol, rocuronium and remifentanil. Norepinephrine infusion was used to maintain arterial blood pressure. A nitroglycerine continuous infusion with sevorane (less than two MAC) provided multimodal uterine relaxation. After fetus exposure, pulse oximetry sensor was placed (showing 30-40%) and intramuscular anesthetic delivered (fentanyl, vecuronium and atropine). Rigid bronchoscopy and selective intubation were performed, PPV initiated and separation of placental circulation completed. SpO2 increased to 85-90% on 30% O2. Umbilical catheters were placed and the patient was transferred to the contiguous theatre for thoracotomy and CPAM resection. A balanced general anesthetic with remifentanil and sevoflurane was used. After left lung exposure the endotracheal tube was withdrawn to allow for left lung insufflation. Only the lingular segment showed signs of air entry, so pneumonectomy was decided. Lung hilum manipulation lead to desaturation and hypotension, but SpO2 increased and hemodynamics were restored after epinephrine infusion and FiO2 titration. An US guided paravertebral block was done before transfer to NICU. The patient required PPV for 6 days and was discharged on day 22.
Discussion: EXIT procedures constitute an excellent delivery strategy for fetuses with prenatally diagnosed airway malformations. A complete evaluation of prenatal images and a multidisciplinary team are key factors for a successful approach.
Learning points: EXIT procedure allowed to secure the airway and provide PPV after delivery in a patient diagnosed with CPAMs. Adequate patient selection and organized multidisciplinary management is fundamental for successful treatment of neonates with large CPAMs.

4888

Monitoring of fetal heart rate during fetoscopic surgery of intrauterine repair of neural tube defects as a sign of maternal and fetal wellbeing

Pascual Arellano M.[1], Manrique S.[1], García-Martínez I.[1], Perera R.[1], Suárez E.[1]
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Introduction: Minimally invasive fetal surgery is an accepted treatment for prenatal repair of neural tube defects (NTD) and seems to be associated with less maternal hemodynamic changes than open repair. Myocardial depressant effects of anesthesia, fetal stress and/or compromised placental or umbilical blood flow can lead to significant alterations in the intraoperative cardiovascular state of the fetus. One of the most important parameters in surgical monitoring is fetal heart rate (FHR), which allows hemodynamic alterations to be quickly diagnosed and treated. Few studies have addressed fetal hemodynamic monitoring in MMC correction, and most focus on open surgery. The objective of our study is to evaluate the fetal and maternal wellbeing during fetoscopic repair of NTD, by describing FHR at specific times of surgery.
Methods: A prospective cohort study was carried out at VH Barcelona Hospital Campus between 2015 and 2019. 26 Pregnant women undergoing intrauterine fetoscopic repair of NTD were recruited. A single 0.25% bupivacaine peridural bolus was administered prior to general anesthesia. Maintenance was made with sevoflurane (MAC 0.4 to 1.9%) and remifentanil. Drugs for fetal anesthesia were given by IM injection into the fetal gluteus before surgery. FHR was monitored by Doppler ultrasound (DU) as shown in table 1. Normal FHR range was 110-160 bpm. Linear mixed-effects model fitted by maximum likelihood was used to assess the differences of each variable. Multiple comparisons of means were by Tukey contrast. The statistical software R was used for the analysis of the data.
Results and discussion: FHR during the surgery was recorded in all cases. A case of fetal bradycardia was reported.FHR did not undergo significant changes during fetoscopic surgery (p=0.882). This contrasts with the decrease observed during open surgery where uterine manipulation and umbilical cord compression appear to be related to bradycardia. Other invasive ways to monitoring fetal wellbeing (umbilical venous blood gases) can lead to devastating effects.
Conclusion: FHR measurement by DU its a safe and reliable method of measuring fetal wellbeing during fetoscopic surgery.

Table 1. Fetal heart rate at specific moment of the surgery.

	N	Mean	SD	Minimum	Maximum
Before anesthesia	10	139.0	8.98	126	151
After maternal anesthesia	26	135.0	8.68	116	151
Beginning of surgery	26	133.5	9.14	116	152
Uterine exteriorization	26	132.7	8.64	115	150
Beginning of fetoscopy	26	133.0	9.42	117	152
Fetal anesthesia	26	133.0	8.12	120	150
During fetal surgery	26	132.3	8.79	109	142
End of fetal surgery	26	134.1	11.70	111	152
Uterine reintroduction	26	134.8	12.64	112	160
End of surgery	26	133.3	13.12	110	157
End of anesthesia	26	133.6	11.45	112	155

5011

Management of post-dural puncture headache in prepartum period after fetal surgery. A case report

Ferré M. S.[1], Teijido C.[1], Agejas R.[1], Figar Gutierrez A.[1]
[1]Hospital Italiano de Buenos Aires - Buenos Aires (Argentina)

Background: Post-dural puncture headache (PDPH) is a common anesthesia complication at labor. It's incidence varies depending on needle gauge, design, age, patient sex and anesthesiologist experience.1 With the advent of fetal surgery it might also occur in a pregnant patient. There is scarce evidence of PDPH treatment during pregnancy.
Case Report: A 44 years old, monochorial diamniotic twins at 18 weeks' gestation, scheduled for fetoscopy selective laser coagulation of anastomotic vessels on the chorionic plate because of a stage 2 twin-to-twin transfusion syndrome.2 Epidural anesthesia was performed with 16G tuohy needle after two failed attempts at L3-L4 level, ropivacaine (15 mg) and fentanyl (100 µcg) were administered. An epidural catheter was placed and ropivacaine was administered through it. This technique was appropriate for an uneventful fetoscopy. 24 hrs later she developed a headache with nausea and vomiting. Signs and symptoms were compatible with PDPH. Oral treatment was indicated with paracetamol (1gr/8hs), tramadol (50mgQID), caffeine (500mgBID), omeprazole (20mgQD) and metoclopramide on demand. Abundant fluid intake was advised along with resting with head at 0 degrees. Emergency contact phones and alarm patterns were given to her at discharge. She had a very good response and remission of symptoms over the next 24 hrs.
Discussion: Our in hospital PDPH standard treatment protocol is related to the postpartum period only. Non-steroidal anti-inflammatory drugs (NSAIDs) should be given in pregnancy only if the maternal benefits outweigh the potential fetal risks.3 Their use is associated with premature closure of the fetal ductus arteriosus and oligohydramnios when used after 30 weeks' gestation. NSAIDs prenatal exposure might affect brain, kidney, lung, skeleton, gastrointestinal tract and cardiovascular system, as it has been reported. PDPH protocols should be modified to not only refer to the postpartum period and take this considerations that might affect fetus health into account.
References:
1. Plaza,Rueda,Palacio.Manejo en hospitalización de la cefalea post punción dural en obstetricia.Hospital Clínic de Barcelona,2014.
2. SMFM.Simpson.Am.J.Obstet. Gynecol.208,3–18(2013).
3. Antonucci.Curr.DrugMetab.13,474–490(2012).
Learning points: Prenatal PDPH is scarcely reported in literature. Development of fetal surgery might increase prenatal PDPH incidence. NSAID should be avoided in prenatal PDPH.

5185

Optimizing multimodal uterine relaxation for laparoscopic myelomeningocele repair guided by EEG spectrogram

Ferré M. S.[1], Adrover A.[1], Deluca D.[1], Boveri H.[1], Teijido C.[1], Figar Gutierrez A.[1]
[1]Hospital Italiano de Buenos Aires - Buenos Aires (Argentina)

Background: Myelomeningocele (MMC) is a neural tube defect that affects approximately 5-10 pregnancies per 10,000 in the United States. There is evidence showing that prenatal repair might be the best choice.1 New surgical techniques like laparoscopic MMC repair have been developed.
Case Report: A 34 y/o woman scheduled for laparoscopic MMC repair surgery at 23+5 weeks' gestation was admitted to our hospital. A latex free environment was provided from admission to discharge. Magnesium sulfate infusion protocol was administered for fetal neuroprotection. A combined spinal epidural anesthesia was performed. Hyperbaric bupivacaine (10 mg) with fentanyl (25 µcg) was administered intrathecally. An epidural catheter was placed for postoperative pain management. Rapid sequence induction was carried out with fentanyl (100 µg), propofol (80 mg) and rocuronium (60 mg). Maintenance of anaesthesia was achieved with target controlled infusion (TCI) of remifentanil 4-8 ng/ml, sevoflurane below 1.2 Minimum alveolar concentration (MAC) and fentanyl boluses. A Multimodal Uterine Relaxation (MUR) strategy was applied: intrarectal indomethacin (before and after surgery), atosiban (7.5 mg before surgery, 300 µg/h for 3 h and 100 µg/h for 48 h), intraoperative nitroglycerin (0.1 µg/kg/min and 20 a 40 µg boluses when required) and intraoperative sevoflurane titrated according to EEG spectrogram. Uterine relaxation status was assessed by surgeons.
Discussion: Sevoflurane has been widely used as an effective uterus relaxant, but there is an increasing concern about an FDA warning about neurodevelopmental issues in children exposed to certain general anesthetics. Taking that into consideration, we aimed to lower exposure to general anesthetics with a MUR approach guided by EEG spectrogram for achieving both, an effective uterine relaxation and an optimal depth of anesthesia. It captures the effectiveness of individual agents in optimal dosages that maximize efficacy and minimize side effects.
References:
1. Ferschl, M., Ball, R., Lee, H. & Rollins, M. D. Anesthesia for in utero repair of myelomeningocele. Anesthesiology 118, 1211–1223 (2013).
Learning points: EEG spectrogram is a useful tool for lowering MAC. MUR should be considered for open or laparoscopic MMC repair.

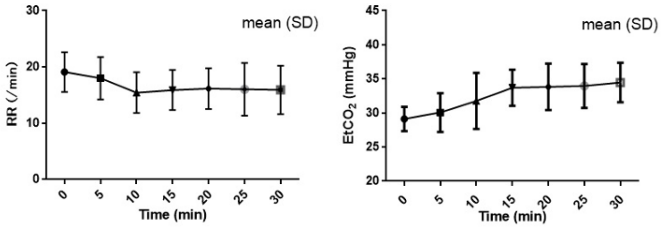
5703

The effect of remifentanil infusion on respiratory status in pregnant women undergoing fetal surgeries

Sato M.[1], Toyama S.[1], Ohara R.[1], Yamashita Y.[1], Hashiya M.[1], Suzuki Y.[1]
[1]National Center for Child Health and Development - Tokyo (Japan)

Background and Goal of Study: Since remifentanil undergoes extensive placental transfer, maternal administration has been used for fetal immobilization and/or maternal sedation during fetal therapies. Generally, remifentanil is known to induce respiratory depression in proportion to the concentration of remifentanil (1). The aim of this study was to evaluate the effect of remifentanil on maternal respiratory status during fetal surgeries.
Materials and Methods: We examined obstetric and anesthetic data in pregnant women with twin-to-twin transfusion syndrome who underwent fetoscopic laser coagulation in our hospital between November 2018 and November 2019. The patient received combined spinal-epidural anesthesia with intrathecal injection of hyperbaric bupivacaine 7.5 mg, and local anesthetics were administered epidurally as necessary to obtain an adequate sensory block level. After confirming fetal conditions by obstetricians, remifentanil infusion was initiated at 0.1 µg/kg/min just prior to surgical procedure. When the fetal movement was observed by obstetricians, infusion rate of remifentanil was increased to attain optimal operative conditions. 2 L/min oxygen was supplied via nasal cannula and maternal respiratory condition was monitored by CapnostreamTM 20P (Medtronic, Minneapolis, MN, USA), which can measure both accurate end-tidal CO2 (ETCO2) and respiratory rate (RR) continuously.
Results and Discussion: Thirty patients were enrolled in this study. The mean (SD) age, BMI, and gestational weeks at the were 33 ± 4, 24 ± 4 and 21 ± 2, respectively. The median (IQR) sensory block level prior to the procedure was Th8 (4-10). Maternal RR gradually decreased until 10 mins after the initiation of remifentanil infusion and then remaind constant level, and maternal ETCO2 gradually increased until 15 mins after the infusion and then remained constant level (Fig.1). Serious respiratory depression was not observed in any patients.
Conclusion: In our study, maternal RR decreased until 10 mins and ETCO2 increased until 15 mins after the infusion of remifentanil, then remainded constant level.
References:
1. Babeneco HD, et. al. Anesthesiology 2000; 92: 393-8.

Fig.1 The changes of RR and $ETCO_2$



6382

Triplet pregnancy with preterm rupture of membranes in the setting of two prior Cesarean deliveries, high risk of placenta accreta and morbid obesity

Shatil B.[1], Landau R.[2]
[1]Emory University Hospital Midtown - Atlanta (United States), [2]Columbia University Medical Center - New York City (United States)

Background: 31yo obese (BMI 47, Mallampati 3) G8P3 woman with 2 prior cesarean deliveries (CD), 2 dilatation and curettage (D&C), uterine fibroids and a history of eclampsia presented with preterm rupture of membranes at 18-week gestation of a spontaneous monochorionic triamniotic triplet pregnancy. Blood pressures and laboratory tests were within the norm. Concerns for serious adverse outcomes following D&C included: (1) a morbidly adherent placenta (accreta) since a single anterior placenta overlying the previous uterine scars was identified on ultrasound, (2) uterine rupture in the setting of multiple previous uterine surgeries, and (3) postpartum hemorrhage (PPH) in the setting of fibroids, possible accreta and morbid obesity.1 Anesthesia-related concerns included: history of difficult intubation, obstructive sleep apnea and asthma. Patient was told to avoid general anesthesia (GA) when possible and requested neuraxial anesthesia, which was also our preference.
Case Report: Two large bore IV lines (16G) were placed, 1g IV prophylactic tranexamic acid was given, and blood products and all uterotonics were in the OR. Spinal anesthesia was performed in the sitting position with a 25G Whitacre needle; a long-acting single shot spinal with hyperbaric bupivacaine 15mg, fentanyl 20mcg and clonidine 50mcg were given. Difficult airway equipment was available in case of accreta, uterine rupture, PPH and/or need for GA. Additional IV clonidine 75mcg was given for additional sedation. The procedure was completed with blood loss <300ml. The anesthetic block lasted 4 hours and the patient was discharged home 9 hours after spinal anesthetic.
Discussion: Spontaneous triplet pregnancies occur in 32/100,000 pregnancies. Odds of placenta accreta or uterine rupture increase with every pregnancy and uterine incision/procedure. Given this patient's multiparity and multiple obstetric procedures, her risk for accreta was as high as 61%.2 Clonidine has been shown to increase duration of neuraxial by an average 128 minutes. Clonidine also increased sedation and anxiolysis, but did not increase the risk of hypotension, pruritis or postoperative nausea/vomiting.3
References:
1. Carpenter JR. Intrapartum Management of the Obese Gravida. Clin Obstet Gynecol 2016.
2. Silver RM, Branch DW. Placenta Accreta Spectrum. N Engl J Med 2018.
3. Crespo S, Dangelser G, Haller G. Intrathecal clonidine as an adjuvant for neuraxial anaesthesia during caesarean delivery. Int J Obstet Anesth 2017.

5804

Factors Associated with Unsuccessful Fetal Immobilization in Anesthetic Management with Remifentanil Infusion during Fetoscopic Surgery

Hashiya M.[1], Toyama S.[1], Sato M.[1], Suzuki Y.[1]
[1]National Center for Child Health and Dev - Setagaya-Ku (Japan)

Background and Goal of Study: Fetoscopic laser photocoagulation (FLP) is a procedure used to treat twin-to-twin transfusion syndrome (TTTS). We perform this procedure under combined spinal epidural anesthesia (CSEA) where the maternal administration of remifentanil is used to provide fetal immobilization and analgesia. Although remifentanil infusion is shown to attain adequate operative condition due to sufficient fetal immobilization during fetal surgeries (1), in our experience remifentanil often produces insufficient fetal immobility. Herein, we investigated the factors associated with unsuccessful fetal immobilization in anesthetic management with remifentanil infusion during FLP for TTTS.
Materials and Methods: Pregnant women with TTTS who underwent FLP in our hospital between January 2018 and April 2019 were included in this study. Patients were divided into 2 groups: pregnant women with successful fetal immobilization (Movement group) and unsuccessful fetal immobilization (Non-movement group). After CSEA with intrathecal injection of hyperbaric bupivacaine 7.5 mg, remifentanil infusion was initiated at 0.1 μg/kg/min just prior to surgical procedure. We retrospectively compared obstetric and anesthetic data between the two groups. Data were presented as median (IQR).
Results and Discussion: Maternal age was 35 (34-38) years of age and 31 (29-37) years of age in movement group (n=13) and non-movement group (n=58), respectively (P=0.018). Gestational age was 23.6 (21.6-24.0) weeks and 19.9 (18.4-22.6) weeks in non-movement and movement groups, respectively (P=0.004). Estimated fetal body weight in both donors and recipients was larger in non-movement group than in movement group [donors: 431 (277-510) vs. 200 (128-349) g, P=0.003 and recipients: 596 (411-649) vs 286 (188-518) g, P=0.001, respectively].
Conclusion: Unsuccessful fetal immobilization was 18% in CSEA with remifentanil infusion during FLP for TTTS. Higher maternal age, higher gestational age, and larger fetal body weight were associated with unsuccessful fetal immobilization.
References:
1. Van de Velde M, et al. Anesth Analg 20005; 101: 251-8.

6381

Heterotopic pregnancy: infrequent case with anesthetic implications

Camoes P.[1], Da Costa Leite A. I.[1], Lugarinho Monteiro T.[1]
[1]Coimbra Hospital Center and University - Coimbra (Portugal)

Background: Heterotopic pregnancy, where 2 embryos implant in different sites, usually due to ovarian hyperstimulation syndrome, in vitro fertilization or tubarian factor, is rare(1)(2). Pregnancy and fetus safety challenges imply adaptations in anesthesia and surgery. In this state, abortion rates in the 1st trimester reach 10%, and laparoscopic salpingectomy is standard. As anesthetics and surgery may affect the fetus, specially during the 1st trimester, risk-benefit must be minded each time(2).
Case Report: Female patient, aged 32, 75kg, 179cm, ASA IIIE, 8 weeks into a monitored heterotopic pregnancy, went in for an emergency 55-minute salpingectomy. General anesthetics used were propofol and fentanyl. Anesthetic maintenance with sevoflurane. Hemodynamic stability was kept, with slight hypotension upon induction, reversed with 5mg ephedrine. As no other anesthetic intercurrences ensued and considering the physiological parameters of pregnancy, paracetamol 1g and metoclopramide 10mg were administered. Paracetamol was kept post-op. A month after surgery, exams showed normal pregnancy progress.
Discussion: Research on anesthetic-surgical acts during pregnancy is scarce. As the patient's clinical state may demand invasive methods, obstetric risks are reduced with clinically approved procedures(2). Risks of laparoscopy on pregnant women do not differ from all other patients, as it still is invasive. General anesthetic management consists of rapid-sequence induction with standard agents, tracheal intubation and maintenance with a volatile agent. Propofol and sevoflurane are harmless anesthesia inductors. Phenylephrine is the consensual vasopressor, though others can be used(3). NO has been considered safe, but it acts on methionine synthase and DNA metabolism and it is not critical, so it is avoidable(3). Most opiates are safe. However, codeine in the 1st trimester is linked to increased risk of spina bifida and ketamine causes hardening of uterine tonus and possible fetal asphyxia. Metoclopramide is a safe anti-emetic, and paracetamol and fentanyl are harmless pain killers(3).
References:
1. Obstet Gynecol Surv 2001; 56:50; 2-Journal of Clinical Anesthesia 2006; 18: 60-66; 3-Minerva Anestesiologica 2007; 73: 235-40.

Learning points: Surgical procedures pose risks for all patients but research is scarce on obstetric subjects. Emergency cases can lead to more invasive measures, minding the risk-benefit and using consensually safe techniques and drugs.

4674

Hypotension before and after Caesarean section delivery: risk factor analysis

Wang Y. C.[1], Tai W. H.[1], Lin W. T.[1], Wu C. Y.[1], Department of Anaesthesiology, National Taiwan University Hospital
[1]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Maternal hypotension is prevalent and multifactorial during Caesarean section. For example, hypotension before delivery may result from sympathetic blockade of the lower trunk and extremities caused by spinal anaesthesia, whereas hypotension after delivery may result from uterotonics-induced arterial vasodilation. However, it remains unclear whether the risk factors for hypotension differ before and after delivery.
Materials and Methods: Parturients undergoing Caesarean section between 2016 and 2017 were consecutively included. The study collected data on demographic characteristics, intraoperative variables, and types of uterotonic agents used. Hypotension was defined as systolic blood pressure (SBP) < 100 mmHg or a >20% decrease compared with the baseline.
Results and Discussion: A total of 871 parturients were included and analysed. Regression analysis revealed that a higher body mass index (OR: 1.0401, 95% CI: 1.0082–1.0730, p = 0.0134) and higher preanaesthetic heart rate (OR: 1.0123, 95% CI: 1.0032–1.0215, p = 0.0079) were risk factors of hypotension before delivery, whereas general anaesthesia was a protective factor (OR: 0.0179, 95% CI: 0.0024–0.1323, p = 0.0001). Risk factors of hypotension after delivery included addition of a uterotonic agent (OR: 1.5375, 95% CI: 1.1301–2.0917, p = 0.0062), hypotension before delivery (OR: 2.0831, 95% CI: 1.5332–2.8301, p < 0.0001), higher preanaesthetic SBP (OR: 1.0316, 95% CI: 1.0225–1.0407, p < 0.0001), and higher blood loss amount (OR: 1.0016, 95% CI: 1.0003–1.0030, p = 0.0205). We discerned that hypotensive episodes before and after delivery may be connected and that these two hypotension episodes are associated with dissimilar preanaesthetic haemodynamic variables. A higher preanaesthetic heart rate may represent a higher sympathetic activity state, which may be sensitive to spinal anaesthesia–induced haemodynamic deterioration. Furthermore, SBP was related to effective arterial elastance, an index of arterial load. Uterotonic agents are believed to have a vasodilatory effect on small and peripheral arteries, which affect arterial load, and consequently SBP.
Conclusion: Despite the interaction between maternal hypotension before and after delivery, the two hypotensive episodes were related to different preanaesthetic haemodynamic variables. These findings may facilitate the development of future treatment.

4678

Implication of continuous noninvasive finger cuff arterial pressure devices during caesarean delivery for goal-directed fluid therapy and postspinal hypotension detection: a randomised controlled trial

Wu C. Y.[1], Chen Y. H.[1], Chiu H. C.[1], Lin P. C.[1], Huang Y. J.[1], Chou W. H.[1]
[1]National Taiwan University Hospital - Taipei city (Taiwan)

Background and Goal of Study: Postspinal hypotension, defined as 20% reduction in baseline oscillometric systolic blood pressure, is associated with maternal adverse effects during caesarean delivery. Application of continuous noninvasive finger cuff arterial pressure (CNAP; ClearSight™ system) may be beneficial because it accommodates goal-directed fluid therapy (GDFT) and may facilitate hypotension detection, but these benefits require verification.
Materials and Methods: After obtaining institutional ethics board approval and informed consent, 66 consecutive parturients undergoing elective caesarean delivery were randomly divided into a preload group (N= 32) and GDFT group (N= 34). Before spinal anaesthesia, preload group parturients received a fixed 1000-mL volume of crystalloid within 15 minutes, and GDFT group parturients received repeated challenges (3 ml/kg) with crystalloid to maximise the stroke volume. Postspinal hypotension was defined using the oscillometric method and treated using intravenous norepinephrine administration. Maternal adverse effects (nausea, bradycardia, dizziness, and shivering) were recorded, and neonatal outcomes (Apgar score and umbilical blood analysis) were assessed.
Results and Discussion: Postspinal hypotension incidence was 49%. Parturients

in the GDFT group received more fluid than did those in the preload group (1126 ± 106 vs. 1245 ± 200 mL; p= 0.001), but the incidence of postspinal hypotension (78.1% vs. 70.6% in the preload group and GDFT group respectively; p= 0.578) and dose of norepinephrine (12.0 ± 10.4 vs. 14.1 ± 12.7mcg in the preload and GDFT groups, respectively; p= 0.269) were comparable between the two groups. Neonatal umbilical blood pH and pO2 were lower in the GDFT group, but these values were within the normal range. The incidence of maternal adverse effects was comparable between the two groups, although fewer parturients in the GDFT group experienced nausea (35.3% vs. 59.4%; p= 0.0834). CNAP and oscillometric systolic pressure were poorly concordant with each other (54.6%), and the CNAP detected two more hypotensive parturients. No CNAP normotensive parturient experienced maternal adverse effects, but two oscillometric normotensive parturients experienced nausea.
Conclusion: GDFT with a CNAP device did not ameliorate postspinal hypotension but may be beneficial for nausea. In addition, CNAP-defined normtension is useful in absence of maternal adverse effects.

5067

Predictability of preoperative carotid artery corrected flow time for hypotension after spinal anesthesia in patients undergoing cesarean section

Lee W. T.[1], Kim H.[1], Kwon J. Y.[1], Choi Y.[1], No H. J.[1], Kim D. H.[1]
[1]Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea)

Background and Goal of Study: Spinal anesthesia induced hypotension is frequently reported in cesarean section. The related mechanisms are reduction of systemic vascular resistance and effective intravascular volume resulted from sympathetic block, which is more aggravated from aortocaval compression. Corrected blood flow time (FTc) is affected by left ventricular preload and is inversely related to systemic vascular resistance. Our hypothesis was that pre anesthetic carotid artery FTc could predict hypotension after induction in patients undergoing cesarean section under spinal anesthesia.
Materials and Methods: This prospective observational study was performed in 47 patients aged 20 to 40 years scheduled for elective cesarean section under spinal anesthesia. Two faculty anesthetists performed two assessment of carotid artery FTc before spinal anesthesia. FTc was calculated by Bazett's formula and Wodey's formula and recorded as FTc (B), and FTc (W), respectively. The occurrence of hypotension was recorded from the spinal anesthetic injection until the fetus was delivered. The definition of hypotension is that the systolic blood pressure drops to less than 80 mmHg, or less than 75%. The areas under the receiver operating characteristic curves were calculated to measure predictability of FTc on occurrence of hypotension.
Results and Discussion: 35 patients completed the study. Hypotension occurred in 21 cases (60%). FTc (B) and FTc (W) were significantly higher in non-hypotension group than hypotension group (365.8 ± 18.1 ms vs. 334.7 ± 10.9 ms, P < 0.001; 342.4 ± 15.0 ms vs. 316.0 ± 8.6 ms, P < 0.001; respectively). Receiver operating characteristic curve analysis revealed FTc (B) 346.4 ms and FTc (W) 326.9 ms as the optimal cut-off values for prediction of hypotension with outstanding prediction ability (Table 1).

	AUROC curve (95% CI)	Optimal cut-off value	Gray zone	Patients in gray zone (%)	Youden Index J
FTc (B)	0.905 (0.757-0.978)	346.4 ms	333.8-355.2 ms	14 (40)	0.762
FTc (W)	0.922 (0.779-0.985)	326.9 ms	323.9-333.1 ms	5 (14)	0.810

AUROC, area under the receiver operating characteristic. CI, confidence interval.
Conclusion: In the current study, carotid artery FTc was found to be predictive indicator of hypotension with AUC more than 0.9. Considering the gray zone, FTc (W) is a better indicator than FTc (B).

5287

Different vasopressors for managing maternal hypotension during caesarean section under spinal anaesthesia: A systematic review and network meta-analysis

Ryu C.[1], Park Y. H.[1], Kang H.[1]
[1]Chung-Ang University Hospital - Seoul (South Korea)

Background and Goal of Study: Maternal hypotension during the elective caesarean section is often induced after spinal anaesthesia and vasopressors are the most reliable method for counteracting this hypotension. We conducted a systematic review and network meta-analysis to compare and specifically evaluate the most effective vasopressor for preventing maternal hypotension, and decreasing fetal acidosis in parturients undergoing spinal anaesthesia for caesarean section.
Materials and Methods: We performed systematic and comprehensive search to detect all of the randomized controlled studies on vasopressors for the management of maternal hypotension during caesarean section under spinal anaesthesia, published until June 30, 2019. We conducted a network meta-analysis to combine the direct and indirect comparisons of the vasopressors. The primary outcomes are minimum systolic blood pressure and incidence of hypotension and fetal acidosis. Stata SE 15.0 was used for the meta-analysis.
Results and Discussion: Forty-one studies (n=2,885) with 6 different vasopressors injected in various ways were included. According to surface under the cumulative ranking curve (SUCRA) value, IV continuous infusion of norepinephrine (SUCRA value 90.2%) was found to be most efficacious vasopressor that had lowest incidence of hypotension, followed by mephentermine (83.8%), and phenylephrine (75.4%). The predictive interval plot showed that IV continuous infusion of all kinds of vasopressors were more effective than control. On the other hand, phenylephrine IV continuous infusion (83.9%) was most efficacious for maintaining relatively higher minimum SBP. In terms of preventing fetal acidosis, only angiotensin II IV continuous infusion (87.9%) was efficacious for resulting closer pH to 7.4. However, there was no statistical significance on 1 min and 5 min Apgar score.
Conclusions: All analyzed vasopressors are more effective only when those were infused continuously comparing with IV bolus injection in managing maternal hypotension. Therefore, clinicians should infuse any vasopressors continuously in this condition. According to the SUCRA, norepinephrine IV continuous infusion ranked the most efficacious vasopressor that had lowest incidence of maternal hypotension. Therefore, it may be suggested as a potential alternative to phenylephrine. On the other hand, there was no significant difference in umbilical arterial pH except angiotensin II IV continuous infusion.

5773

A randomized controlled trial of prevention of hypotension during elective caesarean section with a fixed-rate noradrenaline infusion versus a fixed-rate phenylephrine infusion

Theodoraki K.[1], Hadzilia S.[2], Valsamidis D.[2], Stamatakis E.[2]
[1]Aretaieion University Hospital, National and Kapodistrian University of Athens - Athens (Greece), [2] «Alexandra» General Hospital of Athens, Greece - Athens (Greece)

Background and Goal of Study: Spinal anesthesia for cesarean section can be complicated by hypotension, with untoward effects for both the mother and fetus. Phenylephrine can lead to reflex bradycardia, therefore noradrenaline has emerged as a superior alternative, with better maintenance of cardiac output as compared to the former. The aim of this double-blind randomized study was to compare a fixed-rate prophylactic noradrenaline infusion to a fixed-rate prophylactic phenylephrine infusion during elective caesarean section under combined spinal-epidural anesthesia
Materials and Methods: Eighty-two parturients were randomized to Group N (noradrenaline 4 μg/min) or Group P (phenylephrine 50 μg/min) fixed-rate infusions, starting simultaneously with the administration of the subarachnoid solution. Rescue bolus interventions of ephedrine 5 mg for hypotension or atropine 0.6 mg for heart rate<55 bpm were administered accordingly. The primary end-point of the study was the incidence of maternal bradycardia (HR<60 bpm). Additionally, maternal hemodynamics, the incidence of hypotension (SBP<80% of baseline) or hypertension (SBP>120% of baseline), the requirement for ephedrine or atropine bolus administration as well as the acid-base status and Apgar score of the neonate were recorded
Results: The incidence of bradycardia as well as the requirement for atropine administration was higher in the phenylephrine group (p=0.001 and 0.002, respectively). Additionally, fetal pH, bicarbonate concentration, base excess and fetal blood glucose concentration were higher in the noradrenaline group (p=0.027,

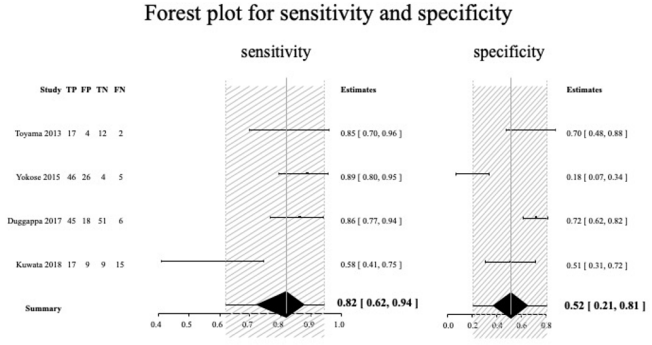
0.014, 0.037 and 0.019, respectively), while Apgar scores did not differ. No difference in the occurrence of hypotension, hypertension or in the requirement for bolus vasoconstrictive medication was demonstrated.
Conclusion: A fixed-rate infusion of 4µg/min of noradrenaline is as effective in the management of hypotension during spinal anesthesia for caesarean section as a fixed–rate infusion of phenylephrine, with the avoidance of phenylephrine-induced bradycardia and its potential untoward effects on maternal cardiac output. The more favorable neonatal acid-base profile of noradrenaline might be due to better maintenance of placental blood flow in the noradrenaline group due to its beta action, while the higher fetal glucose concentration in the same group might result from a catecholamine-stimulated glucose metabolism increase and a β-receptor mediated insulin decrease.

4552

Predictive ability of the perfusion index for hypotension after spinal anesthesia in Caesarean section: A systematic review and Bayesian bivariate meta-analysis

Koga M.[1], Mihara T.[1], Yokose M.[1], Goto T.[1]
[1]Yokohama City University Hospital - Yokohama (Japan)

Background and Goal of Study: The perfusion index (PI) is measured by pulse oximetry and reflects the vasomotor tone. Previous studies have indicated that the PI could predict hypotension after spinal anaesthesia for caesarean section; however, the predictive ability of the PI is controversial. This study aimed to investigate the predictive ability of the PI for hypotension after spinal anaesthesia in caesarean section.
Materials and Methods: This study is a systematic review and meta-analysis. We searched for retrospective and prospective observational studies and trials using five databases and three preregistration sites. After reviewing the title and the abstract list for eligibility, the full texts of the potentially relevant studies were retrieved. Retrieved articles were reviewed by two independent investigators and further investigated qualitatively and quantitatively. The pooled sensitivity, pooled specificity, and area under the summary receiver operating characteristic curve (AUC-sROC) with their 95% credible intervals (CrI) were calculated by Bayesian bivariate meta-analysis using the integrated nested Laplace.
Results and Discussion: We obtained 137 trials from five databases and three trial registration databases. After full-text retrieval and qualitative analysis, four prospective observational studies were subjected to quantitative analysis. Four studies included 276 patients who underwent elective caesarean section and reported the predictive ability of the PI with cut off values between 3.0 and 3.5. The pooled sensitivity and specificity were 0.82 (95% CrI: 0.62–0.94) and 0.52 (95% CrI: 0.21–0.81), respectively. The AUC-sROC was 0.82 (95% CrI: 0.53–0.95).
Conclusion: The predictive ability of the PI for hypotension after spinal anaesthesia in a caesarean section may be high (i.e., the AUC-sROC > 0.8). The high pooled sensitivity suggests that it is useful for exclusive prediction. However, we could not reach a firm conclusion because of the wide CrI. We need further observational studies to confirm the predictive ability of the PI.



5747

Retrospective evaluation of maternal and fetal effects of shock index value in hypertensive diseases due to pregnancy

Cakar K.[1], Zengin S.[1], Soysal S.[1], Saracoglu A.[1]
[1]Marmara Uni. Pendik Training and Education Hospital - Istanbul (Turkey)

Background and Goal of Study: Maternal Early Warning Criteria including; systolic - diastolic blood pressure (SBP - DBP), peripheral oxygen saturation and urine output, is a useful marker for predicting postoperative complications. Shock index (SI) is the ratio of heart rate to systolic blood pressure and was used to determine the need for fluid and transfusion in hypovolemia. The normal range was between 0.5-0.7, and as it is >1, it is correlated with postpartum severe bleeding in patients .The modified shock index (MSI) is a recently developed marker for the same purpose as the ratio of heart rate to mean arterial pressure. The aim of this study is to evaluate the effectiveness of SI and/or MSI as a parameter of early warning system in predicting maternal and fetal complications and mortality in pregnancy-related hypertensive diseases (GHT).
Materials and Methods: Following the local Ethics Committee approval, between 2012-2017, 192 patients between the ages of 13-47, undergoing cesarean section due to preeclampsia and eclampsia were enrolled in this study. We included 140 patients with preeclampsia, 15 with eclampsia, 24 with chronic hypertension and 13 with GHT. Vital signs, demographics and postoperative complications were recorded. IBM SPSS Statistics 22 was used for the statistical analysis. The results were evaluated at 95% confidence interval and a p-value less than 0.05 was accepted as statistically significant.
Results and Discussion: Maternal age was significantly lower in patients who were internalized due to eclampsia (p <0.01) and SI, MSI were high. Heart rate, SBP-DBP, SI and MSI values at the time of admission were similar after the operation. Postpartum SI was significantly higher in eclampsia and GHT group compared to other groups (p <0.05). SI and MSI values of the patients at admission and delivery were significantly higher in all groups. The number of epileptic seizures and length of stay in the Intensive Care Unit, intubation rate of fetus were higher in the eclampsia group (p <0.05). There was a positive correlation between admission SI values and embolism and arrhythmia at admission MSI and between MSI at birth and IURG.
Conclusion: We concluded that MSI and SI values may be an important predictor of predicting complications in mother and fetus as well as evaluating SBP-DBP measurements as risk markers, especially in pregnancies with eclampsia.

6272

Evaluation of the sympathetic blockade intensity after spinal anesthesia for cesarean section: interest of the ankle-brachial index

Ferhi F.[1], Romdhani C.[2], Tarhouni M. A.[1], Brahim A.[1], Ben Jazia K.[1]
[1]Farhat Hached Hospital - Sousse (Tunisia), [2]Military hospital of Tunis - Tunis (Tunisia)

Background and Goal of Study: The ankle-brachial index (ABI) is the ratio of the blood pressure at the ankle to the blood pressure in the upper arm (brachium). ABI is an essential diagnostic tool for peripheral artery disease and other vascular injuries of the lower limbs. This tool is not commonly used in the operating room, apart from in vascular surgery. Our study aimed to investigate the ABI following the onset of spinal anesthesia for cesarean section regarding changes in macrocirculation and its implications for the redistribution of blood flow following this induction.
Materials and Methods: A monocentric observational prospective study was carried out. We included patients according to the principle of voluntarism, who were undergoing cesarean section by spinal anesthesia, and we measured the brachial-ankle index on both sides before and during the procedure.
Results and Discussion: We included 103 patients. The ABI showed a significant drop after spinal anesthesia reaching values between 0.4 and 0.6 after 10 minutes of sympathetic block installation and returned to normal values 30 to 60 minutes after the start of the procedure. Patients with preeclampsia (n = 38) had higher initial values, more abrupt decline after spinal anesthesia. Patients whose newborns were admitted to the intensive care unit (n = 25, 11 of whom required mechanical ventilation) had a greater fall in the ABI between 5 minutes and 20 minutes (p = 0.002).
Conclusion: The conventional monitoring means may be insufficient and may underestimate the harmful effects of anesthesia on the maternal-fetal circulation. ABI is a non-invasive monitoring that can be easily deployed in the operating-theater.

5686

Anesthesia for pregnant pacient porter of myasthenia gravis and scleroderma: case report

Vieira M.[1], Vasconcelos C.[1], Arcanjo F. S.[1], Pessoa Neto A.[1], De Oliveira Filho A.[1]
[1]Santa Casa De Misericordia De Sobral - Sobral (Brazil)

Background: Myasthenia gravis is an autoimmune chronic disease has prevalence of 1 in 7.500 Scleroderma affects mostly young women, in which pregnancy increases the disease in 50% of the patients.
Case Report: Patient, 20 years old, PS3E, gestational age 33 weeks and 4 days, diagnosed with myasthenia gravis and limited cutaneous scleroderma was hospitalized for severe pre-eclampsia. Previous cesarian-section since 11 months with fetal death of 27 weeks due to eclampsia. Came to obstetric emergency with blood pressure of 170 x 100mmHg and strong headache. Cesarian-section was indicated. At the pre-anaesthesic evaluation was observed predictors of difficult airways: mouth opening 2cm, Mallampati 4 and thyromentanian distance 6cm. Optated for spinal anesthesia and the presence of 2 anaesthesiologists at the operation room. The general surgery team was present if was necessary emergency surgical approach of airways. Monitoring: oximeter, non-invasive pressure, cardioscopy with 5 derivations. Spinal anesthesia was performed with Quincke 26G needle, a median puncture after second attempt at L3-L4 vertebral interspace. Hyperbaric bupivacaine 13mg and morphine 100mcg were injected at subdural space. The level of sensory block reached T4. Intravenous drugs as cefazoline 2g, dexamethasone 10mg, ocitoxytocin 9 UI and ondansentron 8mg were made. After the procedure, the patient was directed to the recovery room in spontaneous ventilation, staying under observation for 24 hours. The patient evolved without complications, being directed to the infirmary.
Discussion: Patients with myasthenia gravis usually need ventilatory support after the surgery. The muscular strength seems adequate during the immediate postoperative, but it can deteriorate some few hours later. The anaesthesic evaluation of the patients with scleroderma must show attention to the narrowing of the oral opening due to the cutaneous stiffness and the laryngoscopy by optical fiber might be necessary.
References:
1. Schwartz JJ. Doenças da Pele e musculoesqueléticas. In : Hines RL , Marechal KE. Stoelting anestesia e doenças coexistentes. 5 Ed. Rio de Janeiro, Elsevier,2010; 443-54.
Learning points: Coexisting diseases can severely increase the anaesthesic risk in pregnant patients.

4588

Incidence and risk factors of breakthrough pain during Caesarean section: A two-center, prospective, observational study

Lippens N.[1], Roofthooft E.[2], Rex S.[3], Van De Velde M.[3]
[1]Ghent University Hospital - Ghent (Belgium), [2]ZNA Middelheim - Antwerpen (Belgium), [3]Leuven University Hospital - Leuven (Belgium)

Background and Goal of Study: Caesarean section (CS) is the most common surgical procedure worldwide. Neuraxial anaesthesia is the most commonly used anaesthetic technique. When neuraxial anaesthesia fails, the mother can experience breakthrough pain for which a change in anaesthetic technique can be required. The main purpose of this prospective, observational study was to determine the incidence of breakthrough pain during a CS defined as “pain requiring a change in anaesthetic technique or the administration of an additional anaesthetic in order to treat pain”. In this trial also the risk factors of breakthrough pain during CS were determined.
Materials and Methods: The study protocol was approved by the hospital ethics committees UZ Leuven and ZNA Middelheim. Three hundred and ninety-three patients who underwent a CS in UZ Leuven (206/393) and ZNA Middelheim Antwerp (187/393) were included in the study. All CS performed under neuraxial anaesthesia (planned and unplanned) during the study period were included in the observations. Participants received normal standard of care, routine for the hospital. The primary endpoint was the incidence of breakthrough pain. Possible risk factors were also evaluated. A p-value <0.05 was considered statistically significant.
Results and Discussion: Sixty-four of the 393 cases reported breakthrough pain requiring a change in anaesthesia strategy (16%). Duration of surgery (40±15 min in patients without pain vs 51±23 min in patients with pain, p<0.01), numbers of top-ups to manage breakthrough pain during labor (0.3±0.7 in patients without pain vs 0.7±0.9 in patients with pain, p<0.01) and the number of PCEA boluses during labor (3±5 in patients without pain vs 6±5 in patients with pain, p=0.03) were the only significant risk factors for breakthrough pain during CS. Expertise of the anesthesiologist just did not reach statistical significance. No other factors were identified to increase the risk of breakthrough pain.
Conclusion: Breakthrough pain during a CS is extremely uncomfortable for the mother. A pro-active policy is required in order to prevent breakthrough pain or discomfort during CS. Early identification of problematic epidural catheters for labor analgesia is essential in the prevention. Strategies to reduce the incidence may include a reduction in duration of surgery and administration of a prophylactic epidural top-up if duration of surgery is prolonged.

4474

Anesthetic and surgical outcomes for placenta accreta cesarean delivery in the hybrid versus the labor ward operating room: Retrospective cohort study

Ronel I.[1], Aptekman B.[1], Kori I.[1], Levin I.[1], Ronel R.[2], Weiniger C.[1]
[1]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel), [2]University of Oxford - Oxford (United Kingdom)

Background: Prophylactic balloon occlusion (PBO) may reduce hemorrhage during cesarean delivery for suspected placenta accreta spectrum (PAS). We report planned use of a hybrid operating room (hOR) using POB prior to cesarean delivery compared with management in the labor ward operating room (lwOR).
Methods: Retrospective study (IRB approved) identified all PAS (01/01/2016 to 31/12/2018) from hOR and lwOR. Primary outcome was estimated blood loss (EBL). Anesthesia mode was at the anesthesiologist’s discretion [neuraxial or general anesthesia(GA)]. Maternal, obstetric and perioperative characteristics are reported using descriptive statistics. EBL was compared (hOR vs. lwOR) using Mann-Whitney U test and anesthesia mode using Chi-square.
Results: Twenty-four women were identified, hOR=10 and lwOR=14. All hOR cases had ≥1 PAS ultrasound (US) characteristic, 4 cases had surgically confirmed PAS. All lwOR cases had surgical confirmation of PAS and 6 had US characteristics. Median(IQR) EBL was 900(500-1125)mL vs. 1100(1000-1625)ml, hOR vs. lwOR respectively, p=0.048. Nine hOR cases underwent spinal (for balloon insertion) followed by GA; one underwent the procedure under combined spinal epidural. In lwOR, 6 cases had GA, 7 had spinal and one had spinal followed by GA. The rate of pure GA was significantly higher for women in lwOR, p=0.014. Total number packed cells transfused 11 vs. 23 for hOR and lwOR respectively with mean(SD) of 1.1(1.7) vs. 1.5(2.1), respectively; p=0.06. Mean(SD) cryoprecipitate transfusion was also lower in hOR compared to lwOR: 1(3.2) vs. 2.7(4.6). No platelets or plasma were transfused in hOR compared to total of 33 units transfused in lwOR. Length of surgery differed; 102(67) vs. 54(30) minutes, hOR vs. lwOR respectively, p=0.026. Complications from the PBO included one thrombus requiring thrombectomy and two cases of self-limiting groin hematomas.
Conclusion: EBL was significantly higher among women undergoing cesarean for PAS in the lwOR. Our data suggest that planned use of hOR is potentially beneficial for women with suspected PAS undergoing delivery, with a greater likelihood of undergoing the procedure under neuraxial anesthesia.

5290

Epidural conversion for emergency cesarian section – a nationwide Israeli survey

Giladi Y.[1], Weiniger C.[2], Shatalin D.[1], Orbach-Zinger S.[3], Ifraimov R.[4], Ioscovich A.[1]
[1]Shaare Zedek Medical Center - Jerusalem (Israel), [2]Sourasky Medical Center - Tel Aviv (Israel), [3]Rabin Medical Center Beilinson Campus - Petach Tikva (Israel), [4]Faculty of Medicine Hebrew University - Jerusalem (Israel)

Background and Goal of Study: Epidural augmentation/conversion from analgesia toward emergency c-section anesthesia is a common practice. According to literature, best practice is no more than 3% failed conversions. In this survey we examined the common augmentation practices among different hospitals in Israel. We investigated whether practices vary by hospital size (determined by annual deliveries), and if different factors correlate with success rate.
Materials and Methods: A questionnaire containing 43 questions was sent to obstetric anesthesia unit heads and to four additional anesthesiologists (residents + senior) in 24 obstetric anesthesia units nationwide. Answers were received anonymously and online, using the Monkey Survey method.
Results and Discussion: 99/120 participants responded to the survey (82.5%). Reports on success rates were highly variable – ranging from 0-40%. Only 26% of hospitals reported best practice rates (no more than 3% failed conversions).

80% of large hospitals have a detailed epidural augmentation protocol (p=0.034). More than 80% use Lidocain. 74.7% supplement with bicarbonate. 24.2% add adrenaline, mostly in large hospitals (p<0.001). The most commonly used drug combination is lidocaine+fentanyl+bicarbonate, with no adrenaline (41%). In large hospitals, 96% initiate drug bolus before entering operating room (p<0.001). We found that hospitals that require official training in obstetric anesthesia have lower failed conversion rates (p=0.036). We found that successful conversion is weakly correlated with bicarbonate supplementation (p=0.056).
Conclusion: We report variations in common practices, depending on hospital size. However, these have little effect on success rate. Proper training to anesthesiologists who work regularly in delivery rooms, and bicarbonate supplementation can improve epidural conversion for c-sections.
Acknowledgements: Dr. Amir Giladi, Tali Bdolah-Abram.

5812

Fast-track in caesarean section: a multidisciplinary challenge

Comino Trinidad O.[1], Magaldi M.[1], Meler E.[2], Santana M.[2], Aliaga J. L.[1], Plaza A.[1]
[1]Hospital Clínic De Barcelona, Department of Anaesthesiology, Resuscitation and Pain Therapy - Barcelona (Spain), [2]Hospital Clínic De Barcelona, Department of Maternofetal Medicine - Barcelona (Spain)

Background and Goal of Study: The publication of the Enhanced Recovery After Surgery in caesarean delivery guidelines has created a pathway for postoperative care. Recommendations include nausea and vomiting prevention, postoperative analgesia, early mobilization and urinary drainage. It is a multidisciplinary challenge that involves obstetricians, anaesthesiologists and midwives. The aim of our study is to assess whether the non-insertion or early removal of urinary catheter (UC) after caesarean section (CS) affects the time of first micturition and the time to mobilization, as well as how these times are affected by morphine on neuraxial anaesthesia.
Materials and Methods: An observational study is being conducted in our centre. According to obstetric criteria, the non-placement of UC or its early removal (<6h) are conducted when possible in CS. Demographic and obstetric data, type of CS, time of UC removal, type of anaesthesia and opioid used, complications, time of first micturition and time to mobilization were collected. Data were analysed using Stata vs15.
Results and Discussion: 37 women, mean age 34,1 years (SD 5,3) are currently included in the study. 24 underwent elective CS, 9 had CS in labour and 4 had urgent CS. UC was placed in 27 patients, early removed in 21 and not placed in 10. Epidural anaesthesia was used in 9 patients and spinal anaesthesia in 28. Neuraxial morphine was used in 18 patients. Comparing patients who received morphine to those who did not, no differences were found in the time of first micturition and the time to mobilization (p>0.05), nor in postoperative complications. A difference of 6,9 hours (IC95% 1-12,8h, p=0,02) was found between the time of mobilization in patients in which UC was not placed or early removed compared to those with late removal (>6h), with no differences in the time of first micturition after UC removal.
Conclusions: The non-placement of UC or its early removal promotes early mobilization without increasing urinary retention. Low dose of neuraxial morphine does not delay first micturition or mobilization and does not increase postoperative complications. This is an ongoing study and more data should be collected to provide stronger recommendations.
References:
1. Macones GA et al. Guidelines for postoperative care in cesarean delivery: Enhanced Recovery After Surgery (ERAS) Society recommendations (part 3). Am J Obstet Gynecol. 2019 Sep;221(3):247.e1-247.e9.

5887

Re-audit of postoperative monitoring of women undergoing caesarean section (CS) under neuraxial block with diamorphine: A monitoring tool of improved perioperative care and measure of practicality of guidance

Kalindidi R. V.[1], Ibrahim M.[1], Muthukumaraswamy M. K.[1], Kapsokalyvas I.[1]
[1]Medway Maritime Hospital NHS Trust - Gillingham (United Kingdom)

Background and Goal of Study: Poor postoperative care was found to be a contributing factor for three maternal deaths on CEMD triennium report. NICE has suggested an hourly 12-hour monitoring at the ward level for women who received intrathecal diamorphine on its 2004 guidance to avoid delayed respiratory suppression (1).
Materials and Methods: We conducted a prospective audit to check whether post-operative CS patients with opioids were monitored for all 3 parameters i.e. pain score, sedation score (AVPU), respiratory rate for up to 12 hours in the recovery and ward as per the NICE guideline, and also see whether any improvement from previous audit has been done. Fifty women who had CS in theatres were followed up the next day and their notes were reviewed to see how many observations of pain score, sedation score and respiratory rate were actually done in the recovery and the ward.
Results and Discussion: Our previous audit showed compliance rate of 42% in terms of observations numbers. Following the implementation of recommendations our compliance rate has improved to 49.4%. We aimed for a target compliance of 80% to NICE guidance (2). Staff shortage, work load on the ward, simultaneous monitoring of other scoring systems (e.g. MEWS, MEOWS) and local training availability are all contributing to not achieving 100% compliance. Our correspondence with NICE on the points of reality and level of evidence was taken up for consideration to review the current guidance by the NICE developers.
Conclusions: Although rare, delayed respiratory depression following intrathecal opioid administration can be fatal in post-partum women. More studies are needed to determine who are likely to be at risk. Meanwhile, monitoring is essential. Clinical audit is known as an effective tool to measure compliance level with guidance. Our study has proven to be a realistic tool to measure the practicality of an idealistic guidance in our practice.
Learning point: Clinical audit not only improves the clinical practice and patient safety, but is also a realistic tool to measure the practicality of an idealistic guidance.
References:
1. Carvalho, B. (2009). Respiratory Depression after Neuraxial Opioids in the Obstetric Setting. Obstetric Anesthesia Digest, 29(3), pp.111-112.
2. Nice.org.uk. (2019). 1 Guidance | Caesarean section | Guidance | NICE. [online] Available at: https://www.nice.org.uk/guidance/cg132/chapter/1-Guidance#recovery-following-cs [Accessed 4 Dec. 2019].

5613

Spinal Anesthesia for Cesarean Delivery in a Parturient with Klippel-Feil Syndrome

Sivevski A.[1], Samardziski I.[1], Karadzova D.[1], Spasovski S.[1], Pavlovski B.[1], Krstevska J.[1]
[1]Clinic of Gynecology and Obstetric, Univ - Skopje (Republic of North Macedonia)

Background: There are no specific recommendations for type of anaesthesia in patients with Klippel-Feil Syndrome (KFS). We report successful anesthetic management in parturient undergoing C-Section (CS) under spinal anaesthesia (SA).
Case Report: A 30 year old primipara 151 cm in height, 48 kg weigh, with low hairline and short neck with restricted neck movements and severe thoracic kyphoscoliosis was scheduled for CS. Preoperatively laryngoscopy was performed by otorhinolaryngologist and have presented features of difficult airway (Mallampati 3). Her vital capacity was 24% of predicted with an FEVI/FVC ratio of 0.85. We use SA with 8 mg 0.5% isobaric bupivacaine, 20 mcg fentanyl and 100 mcg morphine (total volume 2.2 ml). This provided anesthesia up to Th4 sensory level, without significant effects on cardiovascular or respiratory function. No side effects occurred and the parturient was discharged after 7 days.
Discussion: The clinical findings of short neck, limited neck movement, low posterior hair line and thoraco-lumbal kyphoscoliosis led to diagnosis of KFS although various other congenital anomalies can be associated (1). The major anaesthetic considerations while managing a patient with KFS are spinal deformities, which can lead to anticipated difficult airway due to fused cervical vertebrae. Epidural anesthesia can be a technique of choice for the majority of CS but there is concern regarding to identification of the epidural space and unpredictable spread of

anesthetic within the modified epidural space in KFS (2). Low dose SA minimize this inadequacy, providing a more reliable sensory block, but care is given to choose the right spinal dose. It is our experience to limit the dose of isobaric bupivacaine up to 10 mg which in many cases proved to be correct.

References:
1. Kavanagh T, Jee R, Kilpatrick N, et al. Elective cesarean delivery in a parturient with Klippel-Feil syndrome. Int J Obstet Anesth. 2013;22(4):343–348.
2. Dresner MR, Maclean AR. Anaesthesia for caesarean section in a patient with Klippel-Feil syndrome. The use of a microspinal catheter. Anaesthesia. 1995;50(9):807–809.

Learning points: Spinal low-dose anesthesia in some situations might also be successful alternative technique for CS in patients with KFS.

5156

Cauda equina syndrome following combined spinal-epidural anesthesia with levobupivacaine and sufentanil for elective cesarean section

Marinho S.[1], Frias P.[2], Rodrigues F.[3], Paiva A.[3], Sousa A.[3]
[1]Hospital do Divino Espirito Santo de Ponta Delgada - Ponta Delgada (Portugal), [2]Hospital do Divinio Espírito Santo de Ponta Delgada - Ponta Delgada (Portugal), [3]Hospital do Divino Espírito Santo de Ponta Delgada - Ponta Delgada (Portugal)

Background: Cauda equina syndrome (CES) is a rare complication of spinal and epidural anesthesia, more frequently reported with lidocaine1. We describe a case of CES following spinal administration of levobupivacaine.
Case Report: A 33-year-old female (72 kg, 160 cm), ASA II, with no relevant background or known allergies, underwent elective cesarean section under locoregional anesthesia. The combined technique was performed in the sitting position, first attempt, with 18G Tuohy epidural and 27G lancet spinal needles at L3-L4 interspace. Levobupivacaine 0.5% (8mg) and sufentanil (1.5 mcg) were injected intrathecally. No adverse events, pain or paresthesia were reported during the procedure. After the uneventful cesarean and upon recovery from motor block, she was discharged to the obstetrics ward. Postoperative analgesia with levobupivacaine 0.25% (15 mg), via epidural bolus, 4/4h was initiated. Within 34 hours, patient referred neurological symptoms: diminished strength and abolished osteotendinous reflexes (OTR) in the left lower limb (LLL), bilateral L4-L5 and sacral dermatomes hypoesthesia, sphincter dysfunction and saddle anesthesia. Lumbosacral CT scan and MRI revealed no hematoma or compression of the cauda equina nerve roots or spinal medulla. Patient began a 7-day course of IV methylprednisolone (1g q.d.). At hospital discharge, she could walk short distances, had improved strength, diminished OTR and less hypoesthesia in the LLL but kept sphincter dysfunction and saddle anesthesia. Nine-month follow up revealed no sphincter dysfunction and improved strength with autonomous walking but maintenance of diminished OTR on the LLL and saddle anesthesia.
Discussion: Saddle anesthesia, sphincter dysfunction and paraplegia are consistent with CES. Damage to the nerve roots may be due to compression, inflammation, direct trauma, ischemia or neurotoxicity1, being the latter the most likely cause in this case. The role of epidural analgesia bolus cannot be neglected, since transmeningeal transfer or catheter migration with subsequent neurotoxic spinal concentration of levobupivacaine may have occurred.

References:
1. Chen X, Xu Z, Lin R, Liu Z. Persistent cauda equina syndrome after cesarean section under combined spinal-epidural anesthesia: a case report. Journal of Clinical Anesthesia. 2015;27(6):520–3.

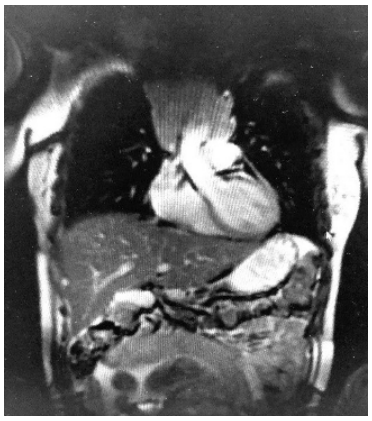
Learning points: Prompt suspicion of neuroaxial complications, early detection and treatment are vital to minimize the risk of permanent damage.

5821

Perioperative management for elective cesarean section in a woman with superior vena cava syndrome

Catalán M.[1], Mazzinari G.[2], Ferrer P.[2], Argente M. P.[2], Perioperative Medicine Research Group
[1]Hospital Universitari i Politecnic la Fe - Valencia (Spain), [2]Hospital Universitari i Politecnic La Fe - Valencia (Spain)

Background: Patients with superior vena cava syndrome (SCVS) bring out two main problems for anesthesiologists: hemodynamic and respiratory compromise (1). Pregnancy per se is already associated with increased hemodynamic and respiratory risk, which hinders SCVS diagnosis. SCVS in a pregnant woman generate a particularly with high perioperative risk scenario (2).
Case report: Pregnant woman with SVCS due to a diffuse B-cell non-Hodgkin lymphoma of the primary mediastinal type who underwent elective cesarean section at 32 week gestation time. A titrated epidural was performed successfully hemodynamic stability during surgery. In case of failed epidural we pre-planned a general anesthesia with fiberoptic guided intubation if hemodynamic stability and fetal wellbeing was preserved or a general anesthesia with rapid sequence induction otherwise. The cardiac surgery team was physically present on the surgical block and cardiopulmonary bypass (CBP) and/or extracorporeal membrane oxygenation (ECMO) was readily available.



Discussion: SVCS in pregnant management is scantly reported in anesthetic literature (3). We believe that there is no ideal anesthetic plan for this clinical scenario. Yet neuroaxial techniques are a sound first option management. Other anesthetic procedures can be nevertheless be considered in each individual case. Having a detailed plan of action is crucial regardless on the anesthetic technique of choice.

References:
1. Narang S et al Anesthesia for patients with a mediastinal mass. Anesthesiol Clin North Am. 2001.
2. Buvanendran A et al. Perioperative management with epidural anesthesia for a parturient with superior vena cava obstructioin. Anesth Analg. 2004.
3. Yoo K. Chan et al Gopalakrishnan Rajan, Khong C, Yew C. A Case-report. Anesthetic management of a parturient with superior vena cava obstruction for cesarean section. Anesthesiology. 2001.

Learning points: In pregnant women with SVCS with compression symptoms avoid AG whenever possible, and avoid sudden sympathetic block. Provide an airway management plan. Provide a contingency plan for potential failure (CEC, ECMO etc.).

5936

Cesarean section in a patient with Severe Aortic Stenosis: an anaesthetic approach

Nogueira S.[1], Teles D.[1], Faria A.[1]
[1]Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Aortic stenosis (AS) may present for the first time during pregnancy, and severe form poses a high risk with heart failure occurring in 10% and arrhythmia in 3-25%.1 We present a case of severe AS submitted to caesarean section under general anaesthesia.
Case Report: A 42-years-old primigravida, 36 weeks gestation, was submitted to caesarean section due to severe AS. The diagnoses of congenital bicuspid aortic valve occurred early in the pregnancy, after episodes of palpitations, without other symptoms. Cardiac surgery was delayed due to mother's cardiac stability. A multidisciplinary team was involved in the preoperative assessment. On the day of surgery she received premedication with metoclopramide and ranitidine. Intraoperatively an arterial line, a central venous catheter and BIS® were added to ASA standard monitoring. A rapid sequence induction was performed with alfentanyl, lidocaine, etomidate and succinylcholine and the airway was secured. Maintenance was achieved with 50:50 oxygen and nitrous oxide and sevoflurane targeting BIS® 40-60. Deliver occurred within 4 minutes and was born a female baby, weighing 2710 g, Apgar score 8/10/10. Additional bolus of fentanyl and rocuronium were added as needed. During surgery she was hemodynamically stable, with no major blood loss and no periods of oxygen desaturation. Emergence from anaesthesia occurred without complications. Full resuscitation equipment and a cardiac surgical team was always available. The postoperative period occurred in a cardiothoracic intensive care unit without complications, with hospital discharge after 6 days.
Discussion: As severe AS poses an increased risk of morbidity and mortality, this case highlights that with multidisciplinary approach and an exhaustive preparation this patients can be managed uneventfully.
References:
1. Clark, V., Van de Velde, M., Fernando, R. Acquired heart disease.Oxford Textbook of Obstetric Anaesthesia (First edition). Oxford University Press; 2016; 41:653.
Learning points: Proper knowledge of physiological changes that occur during pregnancy and their impact on AS physiopathology alongside an extensive preparation will lead to a proper management with better outcomes.

6336

Anaesthetic management in a pregnant woman with right atrial thrombus: Case report

Karatas A.[1], Çalım M.[1], Karaaslan K.[1]
[1]Bezmialem Vakif University, Medical Facu - Istanbul (Turkey)

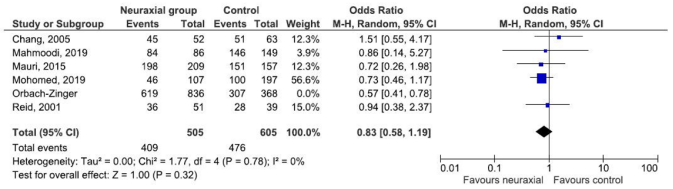
Background: Cardiac masses include primary or metastatic tumors of the heart, thrombus, vegetation, calcification of valve or annulus. These masses mostly originate from the left atrium and ventricle, rarely seen on the right side of the heart. Cardiac mass during pregnancy is a rare condition. We aimed to present anaesthetic management of a pregnant patient with a mass in the right atrium.
Case report: A 35-year-old, 30-weeks gestational pregnant patient had a history of right mastectomy, radiotherapy and chemotherapy in 2014 due to breast cancer. Her symptoms were dyspnoea and tachycardia. Echocardiography and cardiac MR imaging revealed a 3.5x4.5 cm thrombus that filled most of the right atrium, extending into the right jugular vein and vena cava superior, which did not expose the lumen and allow flow. There were no thrombus in the inferior vena cava, lower and upper extremity veins. After follow up 8 days in the coronary intensive care unit, cesarean section was decided. During the obstetric follow-up, it was learned that she was heparinized and treated with 1 cure betamethasone. General anesthesia was applied to the patient who was taken to the operation room. After standard anesthesia induction, the mass was observed by transesophageal echocardiography. There were no intraoperative and postoperative complications. The next day, the patient underwent open heart surgery and the mass was completely excised. The patient was stable on postoperative follow-up and was discharged after 6 days of surgery. The pathology report revealed tumor thrombus due to metastatic breast cancer.
Discussion: The prevalence of primary tumors of the heart is around 0.001-0.3%, of which 75% are benign (myxoma)[1]. Secondary tumors are 15-20 times more common than primary tumors and cardiac metastasis occurs in 15% of patients with any cancer. Lung and breast cancers, melanoma and lymphomas are the most common metastases to the heart. Our patient had a history of breast cancer and showed symptoms in the last trimester of pregnancy. Preoperative careful preparation, intraoperative close and advanced hemodynamic monitoring and postoperative careful follow-up are required in these patients.
References:
1. Paraskevaidis IA, Michalakeas CA, et al 'Cardiac tumors', International Scholarly Research Network, ISRN Oncology, Vol 2011, Article ID: 208929.
Learning points: Multidisciplinary approach and timing for cesarean decision are vital for uncomplicated discharge of both mother and baby.

4927

Systematic review and meta-analysis of the association between labour neuraxial analgesia and breastfeeding

Heesen P.[1], Halpern S.[2], Heesen M.[3], Orbach-Zinger S.[4]
[1]University of Zurich - Zurich (Switzerland), [2]Sunnybrook Health Sciences Center - Toronoto (Canada), [3]Kantonsspital Baden - Baden (AG) (Switzerland), [4]Rabin Medical Center - Petah Tikva (Israel)

Background and Goal of Study: Breastfeeding is recommended by the World Health Organization as it confers health benefits to both, mother and child (1). Some studies have shown that neuraxial anesthesia, the gold standard for labor analgesia, has a negative effect on breastfeeding (2), a finding not corroborated by others (3).
Materials and Methods: For this meta analysis we included studies that compared neuraxial analgesia to alternate analgesia (intravenous opioids or N2O) or no analgesia and assessed the success of breastfeeding after two to twelve weeks. A systematic literature research was performed across various databases to identify retrospective or prospective studies. We aggregated the retrieved data in a conventional meta analysis, using the random effects model.
Results and Discussion: We included six studies and 2314 participants. Women with neuraxial analgesia were less likely to breastfeed, odds ratio and 95% confidence interval, (95%CI) being 0.67 (0.53 to 0.85). Heterogeneity was not elevated with I2=0%. One study had a high weight and omitting these data from analysis (leave-one-out meta-analysis) then yielded no significant difference between the neuraxial and the alternate or no analgesia group: OR 0.83, 95%CI 0.58, 1.19 (Figure 1).
Conclusion: Our data suggests that neuraxial analgesia does not reduce the likelihood of breastfeeding after two to twelve weeks. Women who have chosen to deliver without neuraxial analgesia may be more inclined and motivated to breastfeed, may have had shorter and easier labors, and may be less sensitive to pain. All these factors rather than the neuraxial analgesia may influence breastfeeding maintenance.



References:
1. Available at www.who.int/mediacentre/news/statement/2011/breastfeeding_20110115/en.
2. Orbach-Zinger S et al. Anesth Analg. 2019:129:784-791.
3. Riordan J et al. J Hum Lact 2000:16:7-12.

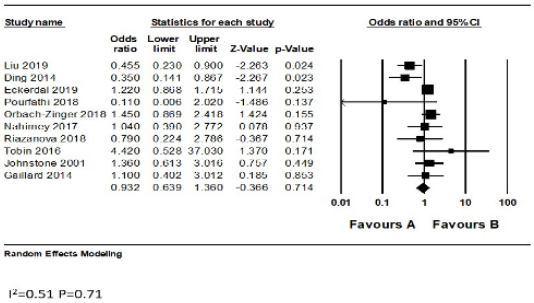
4727

Postpartum depression and labour epidural analgesia: a systematic review and meta-analysis

Heesen M.[1], Halpern S.[2], Grigoriadis S.[2], Orbach-Zinger S.[3]
[1]Kantonsspital Baden AG - Baden (Switzerland), [2]Sunnybrook Health Center - Toronto (Canada), [3]Beilinson Hospital - Petach Tikvah (Israel)

Background and Goal of Study: Postpartum depression is the common complication after childbirth, affecting about 10-15% of women and is associated with serious long-term consequences for the mother and the family. Whether or not neuraxial labour analgesia could prevent postpartum depression has been debated and remains controversial (1,2). The purpose of this systematic review and meta-analysis is to determine the effect of neuraxial analgesia on the incidence of postpartum depression.
Materials and Methods: A systematic literature search was performed in various databases to identify randomized controlled trials and observational studies reporting the incidence of postpartum depression in parturients that received neuraxial analgesia versus non-neuraxial or no analgesia. Quality of observational

studies was judged based on the ROBINS-I tool (3) by two independent reviewers. The incidence of depression was based on either clinical diagnosis or a cutoff score of the Edinburgh postnatal depression scale, a validated screening tool for postpartum depression. We calculated odds ratios (OR) and 95% confidence intervals (CI), using the random effects model.
Results and Discussion: We included 10 observational studies reporting on 5055 patients. The incidence of depression was not significantly affected by neuraxial analgesia (Figure 1); heterogeneity in this analysis was high (I2=63%).
Conclusion: Our meta-analysis did not find an association between postpartum depression and the use of neuraxial labour analgesia. As confounding cannot be ruled out further research that fully controls for confounding factors is required.



References:
1. Ding T, et al. Anesth Analg 2014;119:383-92.
2. Orbach-Zinger S, et al. Anesth Analg 2018;126:1590-7.
3. Sterne JA, et al. BMJ 2016;355:i4919.

6060

Is the size of the dural punction a risk factor to develop a post-dural-puncture headache?

Sanchez Royo M. E.[1], Utrilla Perez M.[1], Galve Navarro S.[1], Sanchez-Migallon Perez V.[1], Porteiro Mariño L.[1], Manrique Muñoz S.[1]
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Background and Goal of Study: Accidental dural puncture (ADP) is the most common complication related to anesthesia in the obstetric patient. An ADP causes a temporary leak of cerebrospinal fluid and may produce a typical headache pattern 1. Therefore, the risk to develop a PDPH following an ADP should depend on the needle size 2,3. The goal of this study is to stablish the differences between ADP secondary to a Tuohy needle and an epidural catheter.
Materials and Methods: We retrospectively reviewed 61 pregnant patients who suffered an ADP during labour at our department from December 2017 to November 2019. Data were collected from medical records. We evaluated data for type of puncture, clinical presentation, treatment and maternal outcomes.
Results and Discussion: The patients' mean age was 31 years. ADP were secondary to a Touhy needle (18G) in 69% and to an epidural catheter in 31%. There were no significant differences between Touhy needle and epidural catheter regarding the incidence of headache. In the patients that developed a PDPH there were no significant differences between these two groups regarding time of headache setting, need of blood patch as a treatment, time from dural punction to blood patch and days of hospitalization.
Conclusions: The size of the dural punction may not be a risk factor to develop a post-dural-puncture headache. It may just depend on the mere fact of puncturing the dura mater. Further studies are required to conclude this association.
References:
1. Front Neurol. 2019; 10: 700.
2. Cochrane Database Syst Rev. 2017 Apr; 2017(4): CD010807.
3. AMA Neurol. 2015 Mar 1; 72(3): 325–332.

5327

Predictive factors associated with postoperative pain after caesarean section under combined spinal-epidural anaesthesia: a retrospective observational study in Japan

Takayanagi M.[1], Kondo H.[1], Terada R.[1], Kato G.[1], Inamura M.[1], Katagiri M.[1]
[1]Itabashi Chuo Medical Center - Tokyo (Japan)

Background and Goal of Study: Effective control of postoperative caesarean pain is important. Identifying patients at higher risk for severe pain can promote personalized anaesthetic care. We evaluated the relationship between clinical factors and postoperative pain after caesarean section (C/S) under combined spinal-epidural anaesthesia (CSEA).
Materials and Methods: Data were obtained retrospectively from the medical and anaesthetic records of consecutive 120 patients underwent C/S under CSEA between January and November 2019 at Itabashi Chuo Medical Center in Japan. Postoperative pain was managed with patient-controlled epidural analgesia, which consisted of 0.167% levobupivacaine. We started scheduled acetaminophen administration (1000mg every 6 hours) from April. Postoperative NRS scores were recorded at 15 and 30 minutes, and 1, 2, 6, 12, 18 and 24h after surgery. The analgesic satisfaction degree during first 24 h was evaluated on the day after surgery, and was divided into 4 grades (1: very satisfied, 2: satisfied, 3: not very satisfied, and 4: not satisfied). We examined associations between clinical factors and pain scores by using a multivariate regression model. Correlation between pain scores and analgesic satisfaction degree was also examined.
Results and Discussion: Fifty-six patients were included for analysis. The average of pain scores between 2 and 24 h after surgery and the highest pain score was 2.9±1.3 and 5.0±2.0, respectively. The median value of analgesic satisfaction degree was 2. The average of pain scores between 2 and 24 h after surgery was significantly associated with past C/S and no scheduled acetaminophen ($p<0.05$). The highest pain score was significantly associated with past C/S, no scheduled acetaminophen and young age ($p<0.05$). No significant correlation between pain scores and analgesic satisfaction degree was observed ($p=0.75$).
Conclusion: This study revealed that past C/S, no scheduled acetaminophen and young age were risk factors of postoperative pain after C/S under CSEA. Analgesic satisfaction degree could not be explained only by pain scores.

5577

Incidence of pruritus induced by neuraxial opioids and the effectiveness of chlorphenamine for post cesarean section patients

Karlicka D.[1], Gunasekara D.[2], Mahoko G.[2], Singh V.[2]
[1]University Hospital Krakow - Krakow (Poland), [2]Our Lady of Lourdes Hospital - Drogheda (Ireland)

Background and Goal of Study: Intrathecal opioids are widely used in combination with local anesthetics as a part of multimodal postoperative analgesia1. However, this approach poses a risk of various adverse effects; of them pruritus is one of the most common reported, accounting for over 80% of cases in some studies1. Pruritus after neuraxial opioids is multifactorial but MOP receptors in the spinal cord are responsible for its central mechanism. We performed a prospective audit to find the incidence of itching among pospartum patients who received neuraxial Morphine [100mcg] along with Fentanyl [average dose of 20.75mcg] for cesarean section both elective and emergency. We also checked for compliance of anti-histamine prescription and administration.
Materials and Methods: Prospective data collection (itching score 0-10) was performed over 3 months among 100 patients in day one post cesarean section. Questionnaire was approved by local audit committee.
Results and Discussion: Patients who experienced pruritus accounted for 89% and 58% of them had an itching score over 4 out of 10. Over a third of women admitted that it limited their sleep or availability for a baby. There was a moderate positive correlation between strength and duration of itching (correlation coefficient: 0.53). Most patients were not aware of that possible side effect and over a third of them did not report it. Chlorphenamine was charted only in 63% of cases resulting in less than half of parturients who received it. Subjective relief of more than 70% was observed in 55% of cases. Multiple pharmacological therapies such as ondansetron, droperidol, propofol and NSAIDS have been studied for management of opioid induced pruritus without any strong evidence of relief. Optimistic results have been obtained for opioid partial agonists (buprenorphine, nalbuphine) in nonhuman primates2.
Conclusion: Pruritus is a common side effect of intrathecal opioid. Chlorphenamine administration gives only a partial relief and small dose of naloxone could be considered as an alternative3.

References:
1. Kumar K, Neuraxial opioid-induced pruritus: An update. Anaesthesiol Clin Pharmacol,2013;29(3): 303–307.
2. Neuraxial Opioid-Induced Itch and Its Pharmacological Antagonism, Mei-Chuan Ko. Handb Exp Pharmacol. 2015;226:315–335.
3. Intrathecal morphine for post caesarean section analgesia: does naloxone reduce the incidence of pruritus? J.A. Luthman, Intern Journal of obst anaesthesia;1(4):191-194.

4523

Chronic pain following caesarean section: a prospective observational study of prevalence and risk factors

Rodriguez Roca M. C.[1], Brogly N.[2], Gredilla E.[2], Zurita S.[2], Alvar E.[2], Guasch E.[2]
[1]La Paz University Hospital - Madrid (Spain), [2]Hospital Universitario La Paz - Madrid (Spain)

Introduction: Caesarean section (CS) has been linked to chronic postsurgical pain (CPSP). The reported incidence of CPSP after CS ranges from 0 to 56%1. The aim of this study was to detect the incidence of CPSP after CS at a Spanish tertiary referral Hospital and to describe its characteristics.
Materials and methods: A prospective observational descriptive monocentric study was conducted (September 2017 –December 2018) at La Paz University Hospital –Madrid (Spain). Consenting consecutive parturients were included after urgent or scheduled CS. We recorded age, obstetric history, medical and surgical history and current medication. Surgical and anaesthetic management in the operation room were assessed. Analgesia requirements and pain (using a Visual Analogue Scale (VAS) and DN22 questionnaire) were evaluated in the postoperative period and 3 months after surgery. Results were analysed with parametric tests for quantitative variables, while Fisher's test or Chi-square test were used for Qualitative variables. P<0,05 was considered statistically significant.
Results and discussion: 597 consecutive patients were included, with anincidence of Chronic post-surgical pain (CPSP) at 3 and 12 months was 6.2% and 1% respectively. Most of the women with CPSP experimented mild pain at rest and mild-moderate pain at movement. Risk factors for CPSP were: a Numerical Rating Scale (NRS) for pain > 5/10 at movement one week after caesarean section (OR: 2.5 (95% CI: 1.26-4.91) p=0.009); a uterine exteriorization (OR: 2.97 (95% CI:1.075-8.202) P=0.046); a neurophatic pain questionnaire of 2 questions (DN2) score >3 one week after caesarean section (OR: 3.686 (95% CI: 1.577-8.615); Gestation week, at a lower gestation week more pain (p=0.008). The use of ondansetron seemed to have a protective factor (OR: 0.16 (95% CI: 0,152 - 0,997) p=0.047). Compared with other studies and meta-analysis, the incidence of CPSP after CS at our hospital was found to be lower (6%) than in other centres1.
Conclusions: PSCP after CS affected 6% of patients in our cohort. Predictors for CPSP included higher average intensity score of one-week postoperative pain on movement, uterine exteriorization, less gestation week, closure of the peritoneum and higher height. Use of intravenous ondansetron is a protective factor. Preventive strategies should target these risk factors to improve recovery in parturient.

5641

Can we treat persistent postoperative nausea and vomiting after spinal anaesthesia on a C-section? a successful treatment in a two-case report

Pato R.[1], Figueiredo J.[1], Rocha T.[1]
[1]Centro Hospitalar de Lisboa Central, Hos - Lisboa (Portugal)

Background: Postoperative nausea and vomiting (PONV) is a problem in any anaesthetic procedure. Although specially related to general anaesthesia, PONV for elective caesarean delivery can occur in up to 66% of pregnant women. Appfel score tries to predict its occurrence and relation of antiemetic need, however pregnant women are a risk group, not only because they match 2 factors (women and non-smokers status) but also by the reduced tone of the esophagogastric junction and an increased intraabdominal pressure. It is important to balance the three antiemetics used in prophylaxis (dexamethasone, droperidol and ondansetron) together with their side effects but also to have knowledge of options for treatment when triple prophylaxis fails.
Case Report: Two pregnant women in the age of 30 years old, ASA II, proposed to elective caesarean. Both had no previous pathological medical history however both declared motion sickness. They both received sequential anaesthesia with 8 mg bupivacaine plus 0,002mg sufentanyl and 150µg morphine, after duple PONV prophylaxis with dexamethasone 4mg and ondansetron 4mg. On the recovery room, parturients had complains of serial vomiting episodes with no improvement after rescue anti-emetics. As a final attempt to provide comfort, a low dosage naloxone infusion 0,25mg/h was started, considering intrathecal opioid the origin of the persistent symptoms. After 2h parturients referred improvement of the symptoms and in 3h of perfusion tolerated food ingestion. There was no register of pain aggravation.
Discussion: Persistent postoperative nausea and vomiting is common among parturients as a physiologic response of pregnancy status. It is the anaesthesiologist function to provide comfort to the parturients and find new options of treatment. When all rescue antiemetic solution isn't effective, low dosage naloxone infusion is a successful treatment when intrathecal opioids are used for analgesia, with no prejudice on the analgesic effect.
References:
1. Sposito, JA et al - «Low-dose naloxone infusion for the treatment of intractable nausea and vomiting after intrathecal morphine in a parturient» - Int. Journal of Obstetric Anesthesia, 2010.
Learning points: Low dosage infusion is an effective treatmente for persistent PNVO in case of faillure of rescue antiemetics.

6188

Incidece and outcome of conservative vs interventional (ebp) management of pdph

Sher A.[1], Matreja P.[1], Lal S.[1], Singh V.[1], Muronzi G.[1]
[1]Our Lady of Lourdes Drogheda - Drogheda, Louth (Ireland)

Background and Goal of Study: Epidural analgesia is sited in around 30% of labouring women in Lourdes hospital, a regional hospital in Drogheda,Ireland. We compared the incidence of conservative VS epidural blood patch (EBP) and their outcome for managing post-dural puncture headache.
Materials and Methods: Data was reviewed retrospectively over a period of ONE year (1 October 2018 to 31 September 2019), and included all patients diagnosed with PDPH
Results and Discussion: 890/2976 patients received labour epidural/spinal anaesthesia respectively during this period. Diagnosis of PDPH was established in 13 patients following accidental dural puncture and 04 patients after spinal anaesthesia. Epidural/Spinal were performed by anesthesiologists with various degree of experience in years. There was higher incidence of accidental dural puncture at out of office hours. 53% (9/17) got conservative management with fluids, caffeine, codeine, paracetamol and non-steroidal anti-inflammatory drugs. 35.29% (6/17) patients received an epidural blood patch following no relief after conservative management for 48 hours. None of the patient required second EBP. 11.76% (2/17) patients requested EBP despite of mild symptoms of PDPH due to fear of severe headache should conservative management fail.
Conclusion: The incidence of conservative and EBP is comparable.
References:
1. Oedit R, van Kooten F, Bakker SL, Dippel DW . Efficacy of the epidural blood patch for the treatment of post lumbar puncture headache BLOPP: arandomised, observer-blind, controlled clinical trial [ISRCTN 71598245] BMC Neurol. 2005;5:12.
2. Bolden N, Gebre E. Accidental dural puncture management: 10-yearexperienceatanacademic tertiary care center. Reg Anesth Pain Med. 2016;41:169–174.
3. Sachs A, Smiley R. Post-dural puncture headache: the worst common complication in obstetric anesthesia. Semin Perinatol. 2014;38:386–394.

6303

Prevention of postdural puncture headache: retrospective analysis of 12 years experience in a tertiary obstetric referral center

Leite-Moreira A.[1], Marques J.[1], Novo J.[1], Antunes M.[1], Sampaio C.[1], Faria A.[1]
[1]Centro Hospitalar Universitário São João - Porto (Portugal)

Background and Goal of Study: Post dural puncture headache (PDPH) following accidental dural puncture (ADP) is a common complication of neuraxial anaesthesia and represents a relevant cause of short term morbidity in parturients. The aim of our study was to evaluate factors influencing headache incidence, duration and intensity following accidental dural puncture in obstetric patients.
Materials and Methods: We conducted a retrospective study in a tertiary referral center between January 2007 and December 2018. During this period, 26711 neuraxial blocks were performed: 437 spinal, 21953 epidural and 4321 combined spinal-epidural. Record sheets of all patients who experienced either ADP or PDPH were reviewed. Headache intensity was stratified as absent, mild, moderate or severe and duration classified in four groups (<24h, 24-48h, 48-72h, >72h). Descriptive analyses of variables were used to summarize data and chi-square, Fisher's exact or Mann-Whitney U tests were performed (significance $p<0.05$).
Results and Discussion: There were 87 ADPs (0.3%), 63 (72.4%) observed and the remaining cases being PDPH following suspected/unrecognized ADP. Conservative prophylactic measures (bed rest, adequate hydration, caffeine, oral analgesics) were immediately initiated in 44 (50.6%) ADPs. Seventy (80.5%) women developed PDPH. Prophylactic measures significantly reduced PDPH incidence (68% vs 93%, $p=0.003$) and intensity ($p<0.001$), but increased duration ($p=0.03$). After detected ADP, re-siting epidural catheter at a different lumbar interspace was associated with decreased incidence (68.6% vs 100%, $p=0.03$) and intensity ($p=0.02$), but did not influence the duration ($p=0.58$) of PDPH when compared with catheter insertion in the same space. PDPH incidence and character was not significantly influenced by maternal age, body mass index and parity, gestational age, neither by neuraxial technique type, performance in sitting vs lateral decubitus position, interspace level or spinal/epidural needle caliber.
Conclusion: Incidence of PDPH was similar to previously published reports. After suspected or witnessed ADP, immediately prophylactic measures and epidural catheter re-siting at different lumbar interspace may help to prevent or alleviate PDPH symptoms.

6334

Treatment of post dural puncture headache: review of 26,711 obstetric cases at a single centre

Novo J.[1], Leite-Moreira A.[1], Marques J.[1], Antunes M.[1], Sampaio C.[1], Faria A.[1]
[1]Centro Hospitalar São João E.P.E. - Porto (Portugal)

Background and Goal of Study: Accidental dural puncture (ADP) and post-dural puncture headache (PDPH) remains a disabling outcome in the obstetric population. We aimed to evaluate its management among obstetric anaesthesiologists.
Materials and Methods: We conducted a retrospective review of all ADP cases at a tertiary obstetric referral center. Between January 2007 and December 2018, 26,711 neuraxial blocks were performed: 21,953 epidural, 437 spinal and 4,321 combined spinal-epidural. Descriptive analyses of variables were used to summarize data.
Results and Discussion: There were 87 ADPs (0.3%), 42 (72.4%) observed and 16 (27.6%) in which PDPH followed unrecognized/suspected ADP. Seventy (80.5%) women developed PDPH in total. Conservative management (bed rest, adequate hydration, caffeine, analgesics) was performed in all patients. An epidural catheter was advanced to the subarachnoid space and left in place for up to 24h in 7 women (8%) but this was not significantly associated with decreased incidence of PDPH ($p=0.10$). Epidural blood patch (EBP) was performed in 24 (38%) of women after known ADP and 14 (58%) of initially unrecognized ADP always after at least 48h of PDPH installation with a median volume of 20 mL of blood. A different vertebral space to the one where ADP happened was chosen in 57,7%. Repeat EBP was needed in 2 (5.3%). Median duration of hospitalization was 4 days (interquartile range 2-5). Twelve women (17,1%) were readmitted due to persistent symptoms, with a median duration of second hospitalization of 4 days.
Conclusion: Incidence of ADP, PDPH and EBP was similar to the literature. In our series, the EBP was only performed as the conservative measures failed and occasionally mandated a second procedure. PDPH is associated with an increased length of stay and post partum readmissions.

5206

Inferior cava venous filter as a solution to an unexpected and severe complication in a term pregnancy

Subirà González A.[1], Raynard Ortiz M.[1], Sánchez Royo E.[2], Boliart De San Félix Y.[1]
[1]Hospital Universitario Dexeus - Barcelona (Spain), [2]Hospital Vall d'Hebron - Barcelona (Spain)

Background: The thromboembolic event incidences are increased during pregnancy due to anatomical and physiological changes. Consequently, the risk of deep vein (DVT) and pulmonary thrombosis (PT) are higher and there are associated with elevated maternal mortality1.
Case Report: A 40-week pregnant woman sought medical consultation for pain and increase of temperature in lower extremities without other symptomatology. The eco-Doppler study showed a femoral and popliteal bilateral thrombosis with thrombophlebitis of the right internal saphenous vein. Due to the risk of PT and also the risk of bleeding with anticoagulation during the delivery, an inferior vena cava (IVC) filter was placed and a continuous perfusion of unfractionated heparin at 900 UI/h was initiated. We worked on a plan in case of an emergency involving anticoagulant reverser, laboratory testing and an anaesthetic strategy. After 12 hours the patient's labor started, we were able to stop the heparin perfusion 4 hours before caesarean section that was performed under general anaesthesia without significant blood loss. In the postoperative period she had a surgical hematoma and after its resolution the removal of the IVC filter was done with extreme difficulty but without incident.
Discussion: The standard treatment for DVT is anticoagulation but during pregnancy, especially in term gestations, it is associated with an unacceptable risk of bleeding. Taking into account this fact and comparing with other possible treatments, we decided to use an IVC filter. Studies have reported that the complications rates among pregnant patients with an IVC filter are comparable to those in non-pregnant population although an increased risk of filter migration has been found2. An elective caesarean section is recommended to avoid contractions and reduce the possible IVC filter migration. The management of DVT in a term pregnancy patient is complex and an algorithm could help us act more effectively.
References:
1. Harris SA. Inferior Vena Cava Filters in Pregnancy: A Systematic Review. J Vasc Interv Radiol. 2016;27(3):354–60.e8. doi:10.1016/j.jvir.2015.11.024.
2. Duffett L. Inferior vena cava filters. J Thromb Haemost. 2017;15(1):3–12. doi:10.1111/jth.13564.
Learning points: In the case of a DVT in a term pregnancy patient we must not only prevent TP, but also possible bleeding associated with delivery. In these extreme situations a temporary IVC filter should be considered as a possible safety solution.

6019

The hidden enemy strikes in the obstetric emergency: spontaneous subcapsular hepatic hematoma in a pregnant patient

Calvo A.[1], Monge E.[2], Gonzalez Carranza J. E.[2], Palacio F.[2], Bermejo L.[2]
[1]Fundación para la Investigación Biomédica Hospital General Universitario Gregorio Marañon. - Madrid (Spain), [2]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Spontaneous subcapsular hepatic hematoma (SSHH) with or without preeclampsia and/or HELLP syndrome is a very rare condition in pregnancy and postpartum with high mortality for the mother (39%) and newborn (42%) [1]. In this report we present a case of SHSH conservatively managed with vital support, fetal extraction by caesarian section and hepatic packing through median laparotomy.
Case Report: Pregnant patient of 42 + 1 weeks and 33 years old without any previous disease was admitted to the ED due to abdominal pain of several hours. Cardiotocographic record and abdominal ultrasound evidenced poor variability and intra-abdominal free fluid. An emergent c-section under general anesthesia was practiced followed by alive fetal extraction. After delivery, in the presence of hemoperitoneum with an unbroken uterus, a medium laparotomy was performed showing a left SSHH without active bleeding. Therefore, a hepatic packing was placed.Twelve hours after admission in the ICU, the abdominal cavity was examined and closed. In the following days, she was diagnosed of HELLP syndrome. After 6 days in the ICU, she presented a left lobar pulmonary thromboembolism, hence an inferior vena cava filter was placed.
Discussion: HSH is observed as a complication of preeclampsia which cannot be present at the moment of the diagnosis. The most frequent symptom is persistent abdominal pain, but it also can debut as hemorrhagic shock [1]. The management of HSH remains discussed. After emergent c-section, the therapeutic attitude on

SHSH depends on hemodynamic stability and hematoma integrity. Unbroken SHSH allows conservative management with ICU monitoring whereas broken SHSH or hemodynamic instability require a median laparotomy [2]. Special attention should be paid to the presence of thromboembolic events. Insertion of an IVCF may be considered when anticoagulation is contraindicated.

References:
1. Pavlis T, Aloizos S, Aravosita P, Mystakelli C, Petrochilou D, Dimopoulos N, et al. Diagnosis and surgical management of spontaneous hepatic rupture associated with HELLP syndrome. J Surg Educ 2009;66:163-167.
2. Ditisheim A, Sibai BM. Diagnosis and management of HELLP syndrome complicated by liver hematoma. Clin Obstet Gynecol. 2017; 60(1):190-197.

Learning points: SSHH is a very rare complication of preeclampsia that should be managed depending on hemodynamic stability and hematoma integrity. Special attention should be paid to the presence of thromboembolic events.

5919

Acute standford type b aortic dissection in a puerperal patient with borderline marfan syndrome (MS)

González Benito E.[1], Lema Tomé M.[2], Higuero F.[2], Palacio Abizanda F.[2], Bermejo Albares L.[2], Monge Cid E.[2]
[1]Gregorio Marañon General Hospital - Madrid (Spain), [2]Gregorio Marañon General Hospital - Madrid (Spain)

Background: Cardiovascular morbidity is the main cause of maternal complications during pregnancy. Aortic disease is its main contributor, although connective tissue disorders are becoming an increasing etiology. We report the case of a patient with borderline MS criteria that developed an acute type B aortic dissection (AAD) in the postpartum period.
Case Report: A 43-year-old pregnant patient, with a medical history of recurrent miscarriages and borderline criteria for MS, was admitted for labor in 38 week. She had been followed up by the high-risk obstetric and cardiology unit. There were no relevant echocardiographic findings except for a minimal aortic root dilation-37mm- that did not contraindicate vaginal delivery, which went uneventful. Eight hours later the patient developed progressive chest and back pain as well as dyspnea. Antihypertensive treatment was established and CT scan revealed a type B AAD, distal to the left subclavian artery reaching the iliac artery bifurcation. Conservative treatment and delayed surgery were considered the optimal therapeutic approach. The patient was safely discharged and uneventful surgery was performed two months later.
Discussion: MS is the most frequent cause of aortic dissection during pregnancy. It is caused by a mutation in the fibrillin gene and has got a high variability in its phenotypic expression. Common features include a proximal aortic dilation, the most important risk factor for dissection. Absence of dilation does not exclude this complication, which tends to take place in third trimester and postpartum period due to the elevated cardiovascular demand. It is essential to perform an individual risk assessment which includes prepregnancy complete aortic imaging. Pregnancy is discouraged and aortic replacement advised if aortic diameters exceed 40-45mm. Follow-up includes periodic echocardiography and betablockers to delay aortic growth rate. Vaginal delivery is considered a safe option in low-risk patients.

References:
1. Kim SY, Wolfe DS, Taub CC. Cardiovascular outcomes of pregnancy in Marfan's syndrome patients: A literature review. Congenital Heart Disease. 2017;00:1–7.

Learning points: Pregnant patients with MS have an increased incidence of aortic dissection, even when lacking risk factors. Complete individualized cardiological assessment and multidisciplinary management should be established in order to avoid any potential complications that may occur throughout pregnancy and postpartum period.

6365

Spontaneous pneumothorax in pregnancy: a case that makes any anesthesiologist hold their breath

Teixeira C.[1], Amorim A.[2], Luís M.[2], Freitas S.[2]
[1]Centro Hospitalar Lisboa Central - Lisbon (Portugal), [2]Hospital Central do Funchal - Funchal (Portugal)

Background: Spontaneous pneumothorax (SP) is defined by the presence of air in the pleural cavity in the absence of a known pulmonary pathology and is a rare condition during pregnancy. Usually it's caused by rupture of undiagnosed pleural plebs or bulla. There are less than 100 cases reported in the literature.(1) It can lead to serious consequences for mother and fetus requiring a prompt diagnosis and treatment.(2)
Case Report: We report a case of a SP in a healthy non smoker 22-year-old primigravida at 34 weeks with chest pain and dyspnea. The physical examination suggested a right side pneumothorax confirmed by x-ray. The extension of the pneumothorax and the emergence of a progressive subcutaneous emphysema led to a chest drain. The total lung re-expansion occurred progressively, and elective cesarean section was performed 4 weeks later after multidisplinary decision. A combined spinal-epidural technique was used, with the chest tube in situ and continuous oxygen administration at 4L/min via nasal cannula. The subarachnoid block was performed at L3/L4 space with 1,6mL of 0.75% ropivacaine and 2,5µg of sufentanil. The surgery proceeded without complications and a healthy newborn was delivered. A postoperative chest computed tomography showed a brochopleural fistula and pleurodesis was scheduled.
Discussion: SP should be excluded in any pregnant woman with chest pain and dyspnea. The x-ray confirms this entity. The multidisciplinary involvement and the presence of thoracic surgeon during the surgery were essential. The cesarean section is not the preferable mode of delivery, but it was unavoidable. The spinal anesthesia was performed, avoiding a positive pressure ventilation which may exacerbate the pneumothorax.

References:
1. Pneumothorax: A rare entity during pregnancy, Onder Kavurmaci, Turkish thoracic journal, 2019, Jul; 20(3): 206-208.
2. Spontaneous pneumothorax during pregnancy, Palácios et al, Clínica e Investigación en Ginecologia y Obstetricia, 2012, Nov; 39(6): 260-264.

Learning points: These cases need a close cooperation between obstetrician, pulmonologist, thoracic surgeon and anesthesiologist. The anesthesiologist should be able to manage the chest drain, the analgesia/anesthesia for delivery, cesarean and thoracic surgery. Less maternal effort is required during delivery, therefore the delivery should be assisted. The spinal analgesia/anesthesia is preferable to a general anesthesia.

5202

NOVOSEVEN® in single dose for realization of epidural technique in twin gestant with slight deficit of Factor VII

López V.[1], Cortez C.[1], Echevarria C.[1], Salcedo M. L.[1], Tebar M. I.[1]
[1]Hospital Universitario 12 de Octubre - Madrid (Spain)

Background: Patients with coagulation disorders are at risk of developing spinal or epidural haematoma secondary to neuraxial anaesthesia (NA).This potential complication can lead to permanent neurological damage. Thus, women with inherited coagulation defects are commonly denied epidural analgesia during labour. However, epidural is the most effective way of managing and allows to carry out caesarean section if needed.
Case Report: 33 year-old woman, twin pregnant of 38 weeks, with slight deficit of Factor VII (levels 24-30%). She presents mild gingival bleeding, menses of 7 days with important bleeding and facial equimosis with minimal trauma. She had an ovaric puncture without incidences. She was followed by hematology. Last Factor VII level was 55%, which was considered in hemostatic range. Hematologist indications were to administrate 0,5 mg of novoseven 30 minutes before epidural analgesia. If needed caesarean section(CS),they recommend to administrate other 0,5 mg after 4 hours of the first dose.Finally, CS was done by altered fetal pH. Uterine contraction was achieved with syntocinon at usual dosis and misoprostol. No excessive bleeding ocurred, and transfusion was not necessary.
Discussion: The use of NA in individuals with coagulation disorders is contentious. The benefits of avoiding general anaesthesia have to be balanced over the risk of epidural haematoma, which can lead to permanent neurological damage, but it has been shown that NA can be safely performed if the coagulation defect is normalized by adequate haemostatic cover. Very few cases in scientific literature have been reported, so a consensus for profilaxis does not exists. For prophylactic use, it does not exist any clear recommendation about the specific dose and the duration of treatment; in general, it is employed the same dose suggested for haemorrhage

treatment and the choice to use or not the prophylaxis is at the discretion of the caregivers, considering fVII level and bleeding tendency. Pregnancy doesn´t requires any specific considerations.

References:
1. Loddo A. Prophylaxis of peripartum haemorrhage using recombinant factor VIIa (rfVIIa) in pregnant women with congenital factor VII deficiency: A case report and literature review. Eur J Obst Gynecol Reprod Biol.2019; Apr 235:77-80.

Learning points: The prophylaxis with NOVOSEVEN is effective and safe and should be always available in an obstetric clinic. It would be ideal to monitorize coagulation with rotational thromboelastometry.

4486

Sometimes HELLP is not just a HELLP. A case report

Rodríguez Roca M. C.[1], Rodríguez C.[1], Alonso Yanci E.[1], Brogly N.[1], Schiraldi R.[1], Guasch Arévalo E.[1]
[1]Hospital Universitario La Paz - Madrid (Spain)

Background: HELLP syndrome is a multisystemic disorder related with preeclampsia which remains an important cause of maternal and perinatal mortality and morbidity1. We present the management of a patient with HELLP syndrome admitted at our tertiary hospital for the delivery of a twin gestation.
Case Report: This 21-year-old primiparous patient was admitted to the hospital for preeclampsia at 36+4 week of gestation, with high blood pressure associated with epigastralgia, photopsias and edema. Induction of labour was indicated and an epidural catheter was inserted for labour analgesia. Magnesium sulfate perfusion was initiated. The persistence of abdominal pain permitted to diagnose a placental abruption, and a category 1 caesarean section was performed: the foetus was delivered with good vitality signs. The patient presented uterine atony and required the intravenous administration of 10 IU oxytocin, 0.2 mg methylergometrine and 1 mg of intrarectal misoprostol. She needed a transfusion of 2 units of RBC, 1 gr fibrinogen and 1gr tranexamic acid. She was transferred to the ICU. In the ICU, she developed a multiorgan failure associated with acute oliguric renal failure which required renal replacement therapy for 10 days. Slight ventricular dysfunction was diagnosed and hemodynamic lability required a 24 hours infusion of Noradrenaline 0.05-0.1 mcg / kg / min. After haemodynamic stabilization, she developed a refractory hypertension to intravenous labetalol and required the adjunction of intravenous Clevidipine that finally allowed therapeutic progression to oral route. A progressive anemia, associated with a decreased platelets count and prolonged renal failure made us suspect an atypical uremic hemolytic syndrome, which was confirmed by a decrease in C3. A total of 6 plasmapheresis sessions were performed with good response. Finally the patient was discharged 16 days after admission with recovery of renal and ventricular functions and was only treated with Enalapril 10 mg / 12 hours.
Discussion: HELLP syndrome can be confounded with other microangiopathic syndromes, and a careful differential diagnostic evaluation is required, especially when the disease has an unusual course2.

References:
1.Obstet Gynecol. 2019; 133.
2.Therapeutic Apheresis and Dialysis. 2019; 23(1).

Learning points: Preeclampsia is an obstetric disease that requires early treatment, especially when serious symptoms appear. Teamwork is essential to an optimal management.

4815

Eisenmenger's syndrome with congenital heart defect in pregnancy

Shiba S.[1]
[1]Hawler teaching hospital - Erbil (Iraq)

Background: Pulmonary hypertension is a devastating and refractory disease. it is rarely reported in pregnant women, but it is associated with significant morbidity and mortality of both mother and baby. The maternal mortality rate during pregnancy or puerperium is 30-70%.[1]
Case Report: A 24-year-old pregnant woman, she is a known case of Eisenmenger's complex at 36 weeks of gestation she presented to the emergency room with cyanosis, dyspnea,Spo2-75%on room air, BP=130/90mmhg & HR=90bpm.Her Echo showed a large VSD with right to left shunt, pulmonary hypertension, mild MR, moderate pericardial effusion and EF-54%. Hb-12.2g,PCV-40%. ABG on room air was pH-7.21, PaCO2-54mmhg, PaO2-60mmhg, and SaO2-76%. In the operation theatre, standard monitors, an arterial line and a central venous catheter were placed. Milrinone and phenylephrine were considered to avoid elevations in PVR and maintain SVR. After pre-oxygenation, SpO2 increased up to 90%. The pre-induction CVP was 11mmHg. Anaesthesia inducted by slow titration of ketamine and Etomidate to limit hemodynamic changes, Lidocaine was considered with rapid sequence induction and cricoid pressure. Maintenance of anaesthesia with 0.5% sevoflurane and neuromuscular blockade was achieved with vecuronium. Post-operative patient was admitted to ICU for recovery and monitoring as there is high risk for sudden death. Epidural anesthesia used for post-operative analgesia.
Discussion: The main anaesthetic goals are to avoid a fall in the arterial blood pressure by maintaining both cardiac output and SVR, and to prevent elevations in PVR.[2] Epidural anaesthesia must be used cautiously as it causes sympathetic blockage and reduce SVR without a concomitant decrease in PVR as the amount of right-to-left shunt depends in part on the PVR:SVR ratio.

References:
1. Kandasamy R,Koh KF,Tham SL,Reddy S.Anaesthesia for Caesarean section in a patient with Eisenmenger's syndrome.Singapore Med J.2000;41:356–8.
2. Ray P,Murphy G,Shutt:Recognition and management of maternal cardiac disease in pregnancy. British Journal of Anaesthesia 2004;93:428-439.

Learning points: Pregnancy must be discouraged in women with Eisenmenger's syndrome, it could be successful. Safe anaesthetic management of these patients requires meticulous preparation. General anaesthetic can be used with maintenance of haemodynamic stability, low Vt with low PEEP could be helpful, with adequate pain control and early initiation of thromboprophylaxis for successful management.

4831

Caesarean section in a parturient with concomitant V-Leiden thrombophilia and HELLP syndrome

Tzima M.[1], Bilali P.[1], Panteleou K.[1], Zemou S.[1], Katsanoulas K.[1], Katsika E.[1]
[1]Hippokrateion General Hospital Thessalon - Thessaloniki (Greece)

Background: V-Leiden thrombophilia, a common thrombotic disorder, characterized by poor anticoagulant response to activated protein C, may lead to deep venous thrombosis or pregnancy loss. The preferred treatment during pregnancy is LMWH. On the contrary, HELLP syndrome is a pre-eclamptic state characterized by elevated liver function tests, haemolysis and thrombopenia. HELLP carries a high mortality rate, both for the parturient and the neonate.
Case Report: A 37 y G3P1 woman, at the 32nd w of gestation, was admitted for a category 3 caesarean section (CS) due to intrauterine growth restriction. With 2 previous CSs, gestational diabetes and inherited V-Leiden thrombophilia, she was under LMWH & aspirin. HELLP was diagnosed by the end of pregnancy with a decreasing trend in platelet count (185·109 down to 77·109/L) and plasma fibrinogen below 2g L-1. Preoperative VHA with ROTEM® showed poor fibrinogen low clot firmness: A5FIBTEM=10mm, A5EXTEM=28mm, CTFIBTEM=67sec, CTEXTEM=81sec, MCFFIBTEM=12mm, MCFEXTEM=54mm. Fibrinogen concentrate, 3g, was given, resulting in relative better firmness, i.e.: A5FIBTEM=14mm, A5EXTEM=30mm, CTFIBTEM=51sec, CTEXTEM=68sec, MCFFIBTEM=17mm, MCFEXTEM=55mm. Just before surgical cut, 1 g fibrinogen concentrate was given resulting in: A5FIBTEM=13mm, A5EXTEM=36mm, CTFIBTEM=51 sec, CTEXTEM=30sec, MCFFIBTEM=17mm, MCFEXTEM=62mm. Worsening thrombopenia excluded regional anaesthesia; general anaesthesia with invasive BP monitoring was performed with remifentanil at induction, labetalol and restricted fluids. The neonate's Apgar scores was 7 and 7 and no acidosis in cord ABGs. The caesarean was completed with no blood or platelet transfusion. In the following days progressive amelioration of liver tests and platelet count was noted.
Discussion: VHA individualized haemostatic approach contributed to safe coagulation disorder management of this case, keeping a delicate balance between thrombophilia and thrombopenia and avoiding unnecessary platelet transfusion and its relative dangers.

References:
1. Goerlinger K et al. The role of evidence-based algorithms for rotational thromboelastometry-guided bleeding management. Kor J Anesth 2019, 72(4):297-322.
2. Crochemore et al. Thromboelastometry-guided hemostatic therapy: an efficacious approach to manage bleeding risk in acute fatty liver of pregnancy: a case report. J Med Case Reports (2015) 9:202.

Learning points: Apart from PPH, conflicting coagulation disorders may be well managed by VHA with ROTEM.

4834

Anaesthetic management of a parturient with Hereditary Hemorragic Telangiectasia

French M.[1], Saraiva R.[2], Lança F.[2]
[1]Centro Hospitalar Lisboa Norte - Lisboa (Portugal), [2]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: Hereditary Hemorragic Telangiectasia (HHT), also known as Osler-Weber-Rendu Syndrome, is an autosomal dominant disorder with variable penetrance which is characterized by multiple arteriovenous malformations (AVMs) in skin, mucosal surfaces and internal organs. Pulmonary AVMs seem to increase during pregnancy, mostly during the 2nd and 3rd trimester.1 Pregnancy in patients with HHT is considered high risk since physiologic changes of gestation may cause significant disease progression and life-threatening complications.
Case Report: A 27y, G1P0, 37w+3d pregnant woman with diagnosis of HHT presented for an anaesthetic consultation prior to delivery. She had positive family history for HHT, diagnosis confirmed by genetic screening and also evidence of pulmonary AVMs on previous computerized tomography (CT) chest. A magnetic resonance imaging (MRI) of the brain and spine ruled out any possible cerebral AVMs. During pregnancy she presented with daily abundant epistaxis with haemoglobin dropping and iron infusions were required. After extensive multidisciplinary team discussion, it was decided that vaginal birth would be the most appropriate form of delivery. The parturient was offered an induction of labour and an epidural catheter was used for analgesia. Her delivery was unremarkable and forceps were used to avoid prolonged expulsive efforts. The epidural catheter was removed after delivery. Her post-partum period was uneventful.
Discussion: Pregnant woman with HHT should be appropriately counselled and a multidisciplinary approach is crucial. Morbidity and mortality are increased due to potential pulmonary AVM haemorrhage and strokes. Recommendations include prenatal screening of pulmonary and brain AVMs. Exclusion of spinal AVMs by MRI during pregnancy should be done to allow regional anaesthesia.
References:
1. Crawford M, Burns R, Cooper S, Mackay T. Hereditary haemorrhagic telangiectasia in pregnancy: regional and general anaesthesia. Int J Obstet Anesth. 2018;33:84-86.
Learning points: Although there are few cases described in literature, prognosis is usually good. However, is important keep in mind that severe complications such as haemorrhage and emboli, are possibilities. A multidisciplinary approach and anaesthesia consultation prior to delivery are essential to improve outcome. Both regional and general anaesthesia have significant risks associated and the decision to proceed with one or the other will depend on the patient's clinical status.

4949

Anesthetic management of a patient with VACTERL Association during labor, a case report

Ferraroni A.[1], Gil Sanchez J. M.[1], Merten A.[1], Guadalupe Fernandez N.[1], Montoliu Torruella R.[1], Moral Garcia M. V.[1]
[1]Hospital de la Santa Creu i Sant Pau - Barcelona (Spain)

Background: VACTERL Association combines the presence of at least three congenital malformations among the following: vertebral defects, anal atresia, cardiac malformations, tracheoesophageal fistula with esophageal atresia, radial or renal dysplasia and limb abnormalities. It can be a manifestation of several disorders rather than a distinct anatomic or etiologic entity. Its incidence it's 1/10'000-40'000 live-born infants, with 70% male preponderance. This makes it a rarity in the obstetric population. Patients with this condition require a solid anesthetic plan in the OR and delivery room due to their challenging peculiarities.
Case Report: We present a 31 year old primigravida, allergic to latex and metamizol, known case of VACTERL cluster with a history of spine surgery due to ToracoLumbar Cifosis, a LumboPeritoneal Derivation due to Syringomiely and Medullar Fixation, a Colocystoplasty due to Neurogenic Bladder and a right Heminefrectomy due to a Horseshoe Kidney. Elective labor induction was scheduled at 37+6 weeks with the objective of a vaginal delivery and the possibility of a rescue C-section by a combined Obstetrics-Urology team. A multidisciplinar assessment included an anesthesiology evaluation two weeks before the induction, where no ECG alterations and no criteria for difficult ventilation or intubation were found. Neuraxial anesthetic techniques were discarded due to spinal alterations. Our team offered labor analgesia with inhaled N2O or Remifentanil iv perfusion, and general anesthesia in case of c-section. The patient underwent the induction and a well tolerated labor with N2O analgesia. A rescue C-section was indicated due to failure of labor progression. The anesthesiology team was ready and performed a balanced general anesthesia without incidents. The surgery led to the delivery of a vital newborn without mayor complications.
Discussion: The implementation of prenatal multidisciplinary assessment is essential in these cases of polimalformative syndromes. The rarity of this conditions in the obstetric population and the potential challenging airway, ventilatory, cardiac and neuraxial problems oblige to create an individualized plan for the anesthetic management of labour and delivery.
Learning points: VACTERL Syndrome could imply airway, ventilatory, cardiac and neuraxial problems. A prenatal individualized and multidisciplinary plan helps the anesthetic management of labour and delivery and could avoid preventable incidents.

6064

Subcapsular hepatic haematoma: The (not so) usual suspect

Saraiva R.[1], Costa M.[2], Araújo R.[2], Barros F.[2]
[1]Centro Hospitalar Universitário do Porto - Porto (Portugal), [2]Centro Hospitalar Universitario do Porto - Porto (Portugal)

Background: This subcapsular liver haematoma case report describes a complication of preeclampsia, an emergent obstetrical problem, associated with severe morbidity and mortality.
Case Report: A 41-year-old pregnant woman with a gestational age of 26 weeks and 6 days and history of hepatic haemangioma was admitted to study an intrauterine growth restriction. During hospitalization, due to the onset of hypertension and proteinuria, she was diagnosed with preeclampsia. On the 10th day of hospitalization, she reported severe epigastric and right shoulder pain, associated with nausea and vomiting. Heart rate was 120bpm and blood pressure 156/89 mmHg. Laboratory results were normal, including platelet count and liver enzymes. Due to the development of severe preeclampsia, an emergent caesarean section was performed under general anaesthesia. After uterine closure, a hemoperitoneum was observed but the bleeding source was not identified. General Surgery team collaboration was requested and an extensive subcapsular hepatic hematoma was identified as the bleeding cause. Perihepatic packing was performed. During surgery, massive haemorrhage protocol was activated. Although the sustained haemodynamic stability, a blood loss of 2,5 litres was estimated. The patient was transferred to the Intensive Care Unit in the postoperative period. The premature newborn weighted 660 grams and had an APGAR score of 7, 9, 9 at the first, fifth and tenth minute. 24 hours after the procedure, a rise in liver enzymes AST (667 IU/L), ALT (763 IU/L), associated with a platelet count of 94000/mm3 and an elevated level of LDH (505 IU/L) was documented. Two surgical interventions were performed for packing revision. The patient was discharged on the 36th day after caesarean section.
Discussion: Subcapsular liver haematoma is a rare complication of severe preeclampsia. The clinical symptoms and signs are nonspecific and may vary from epigastric, right upper quadrant abdominal or shoulder pain, to nausea, vomiting and abdominal distension. (1) It represents a life-threatening complication because it may result in hepatic rupture, as shown in this case.
References:
1. Anyfantakis, D. et al. "Postpartum Spontaneous Subcapsular Hepatic Hematoma Related to Preeclampsia." Case Reports in Emergency Medicine.2014.
Learning points: Physicians should be aware since a high level of suspicion and vigilance is key. Early diagnosis could decrease morbidity and mortality for both the mother and child.

4376

Eclampsia as the cause for post-operative agitation – an uncommon diagnosis

Viegas Ribeiro M.[1], Ribeiro J.[1], Xavier C.[1], Lança F.[1]
[1]Hospital de Santa Maria - Lisbon (Portugal)

Background: Eclampsia, a rare hypertensive disorder of pregnancy, is a medical emergency characterized by seizures in association with pre-eclampsia. A caesarean section under general anaesthesia (GA) must be performed to prevent maternal and fetal morbimortality. We describe a case of an emergent caesarean section for eclampsia accompanied by post-operative alteration in mental status.
Case Report: 18 year-old, pregnant woman, G1P0, had her pregnancy monitored in a primary care unit with no reported pregnancy-related complications. At 38 weeks and 5 days of pregnancy she developed tonic-clonic generalized seizures. A new-onset grade 2 hypertension was noted and the diagnosis of eclampsia assumed and managed accordingly by the emergency team and the patient transported to our central hospital. An emergent caesarean section under GA was performed, with no complications. After extubation and emergence, the patient revealed severe psychomotor agitation. The more frequent diagnosis were excluded and given the sustained agitation, a cerebral computer tomography was performed revealing

focal, hypodense, cortical-subcortical areas in the bilateral parietal and occipital cerebral areas. Based on the aforementioned clinical features and neuroradiological findings, the most probable cause for the change in mental status was posterior reversible encephalopathy syndrome (PRES). The woman was admitted in the intensive care unit for vigilance and discharged to the ward 2 days after.
Discussion: PRES is characterized by acute neurological symptoms accompanied by brain imaging features related to vasogenic cerebral oedema.1 The condition is usually reversible with a favourable prognosis.1 We describe a woman with sudden onset of seizures and hypertension. After caesarean section, the psychomotor agitation made the anaesthesiologist suspect of something else. A brain imaging exam was ordered, proving the final diagnosis of PRES in association with eclampsia, an association that may often be overlooked in our clinical practice.
References:
1. Fugate, Jennifer E, Alejandro Rabinstein, Posterior reversible encephalopathy syndrome: clinical and radiological manifestations, pathophysiology, and outstanding questions, Lancet Neurology, 2015.
Learning points: Patients with pre-eclampsia and eclampsia must be closely monitored throughout the whole perioperative period, including after the caesarean section. PRES diagnosis requires a high level of clinical suspicion.1

4330

Icterus in peripartum

Naili A.[1], Herireche M.[2]
[1]Eph Sidi Ghiles - Cherchel (Algeria), [2]CHU Blida - Blida (Algeria)

Background and Goal of Study: In peripartum, jaundice is a symptom rarely encountered, it can be dependent on several etiologies of different gravity. The rarity of this condition should not ignore the etiological diagnosis that remains essential and conditional to the quality of care and maternal and fetal prognosis
Materials and Methods: Retrospective and descriptive work spread over a 3-year period from January 2016 to December 2018, including all patients admitted to the obstetric resuscitation unit who presented mucosal and integumentary jaundice with hyper-bilirubinemia> 15 mg / l, hepatocellular insufficiency, a cytolysis syndrome at admission or after hospitalization* For all these patients, characteristics of pregnancy, medical and obstetric ATCDs, clinical signs of pre-icteric and icteric phases, clinical and biological course, termination of pregnancy, complications and treatment were noted. Established.
Results and Discussion: We collected during these three years 24 cases of severe jaundice occurred in peripartum, the mean age is 33 years (with extremes of 24 -41 years), no patient had medical background of known liver diseases or taking hepatotoxic drug, the cause of jaundice in 4 patients was PE, hellp syndrome in 3 patients, viral hepatitis in 2 patients, cholestasis in 4 patients and SHAG in 11 patients.* 8 cases of in utero deaths are recorded in this series of which 5 during the SHAG and the 3 others during PE. * The complications were multiple represented by the haemorrhage of the delivery (18 cases), the digestive haemorrhage (10 cases) the visceral failures: IRA (22cas), hepatic encephalopathies (4cas), CIVD (11cas). * In this series, there are 5 maternal deaths (4 SHAG and 1 PE)Jaundice occurring in the third trimester may be related to accidental discovery of liver disease, chronic liver disease known before pregnancy, or pregnancy-specific liver disease. SHAG remains the only gravidic pathology responsible for hepatocellular insufficiency, its prognosis is dark especially if diagnosis and management are late
Conclusion: In our series, 80% of deaths are due to SHAG. Before the 1980s, maternal mortality due to SHAG exceeded 80%; these figures are currently significantly improved by early diagnosis and resuscitation associated with early and adapted obstetric management.

4432

Peripartum anesthetic management in women with inflammatory bowel disease, a retrospective study

Freundlich A.[1], Gozal E.[2], Grisaru-Granovsky S.[1], Shitrit A.[1], Grass A.[1], Ioscovich A.[1]
[1]Shaare Zedek Medical Center - Jerusalem (Israel), [2]Hebrew University of Jerusalem - Jerusalem (Israel)

Background and Goal of Study: Inflammatory bowel diseases (IBD) are a group of pathologies associated with an increase rate of cesarean sections and morbidity during the peripartum period. The objective of this retrospective study was to investigate the anesthetic management of the delivery of women with IBD.
Material and Methods: The records of 107 patients with IBD, who delivered at our Center, were obtained for data which included anesthetic and obstetric management as well as neonatal outcome. Five subgroups were defined based on mode of delivery, presence or absence of epidural in normal vaginal delivery (NVD) and urgency of cesarean section, each of which was compared with control groups of healthy patients in the same period. Additionally, the rate of cesarean sections and the use of epidural analgesia for NVD were compared with the general obstetric population of our center in the same period.
Results and Discussion: The rates of cesarean sections and emergency cesarean sections were significantly higher than in the general population. However, the rate of instrumental delivery and the use of epidural analgesia for NVD were similar. Among those who underwent cesarean sections, no significant differences were found in the type of anesthesia, the duration of surgery, the number of complications, the type of monitoring or postoperative management with respect to the control group.
Conclusion: The peripartum anesthetic management of patients with IBD does not differ greatly from that of patients without this pathology. Anesthetists can plan their anesthesia in a similar way as they do in healthy obstetric patients.

4577

Cardiorespiratory arrest in pregnant women: a case report

Tinoco J. R.[1], Eloy A.[1], Costa D.[1], Azevedo J.[1], Taleço T.[1]
[1]Hospital São Bernardo - Setúbal (Portugal)

Background: Cardiopulmonary arrest (CPA) in pregnant women is a rare and challenging event that requires a complex and multidisciplinary approach to both the pregnant and the fetus. The causes are numerous: anesthetic, hemorrhagic, general, cardiovascular, embolic, infectious or hypertensive. Early recognition and intervention with resuscitation maneuvers is imperative. Although the advanced life support (ALS) algorithm of the pregnant woman is similar to that of the adult, there are specific characteristics associated with pregnancy's physiological changes. If performed in time, emergent cesarean in the context of maternal CPA is the main intervention to increase maternal and fetal survival.
Case report: 28-year-old pregnant woman, 40-weeks primiparous, smoker, with no previous history and no usual medication, except for pre-pregnancy oral contraceptive. The labour was pharmacologic induced. During induction she experienced general malaise, nausea and abdominal discomfort and posterior evolution to CPA. ALS was promptly started and an emergent caesarean was performed. Spontaneous circulatory return was achieved after 3 cycles. The newborn had an apgar score of 2 but recovered quickly. The case was complicated with uterine atony, hemorrhagic shock and consumptive coagulopathy, and an emerging hysterectomy was required. In the postoperative period she was admitted to the Intensive Care Unit (ICU), and several exams were performed. Transthoracic echocardiography revealed a right intra-atrial thrombus with extension to inferior vena cava and in the angio-TC scan, an extensive venous thromboembolism was found. During the follow-up, the CT brain scan and MRI showed signs of cerebral edema and anoxic encephalopathy. During 42 days in ICU, GCS improved from 3 to a maximum of 10. After 93 days she was discharged to a Continuing Care Unit, maintaining the neurological status. The newborn was discharged, healthy.
Discussion: Despite being a rare situation, all the participants in the obstetric approach should be prepared to act on CPA, especially given the actual increase number of risk pregnancies. The need for early detection and timely establishment of ALS maneuvers in pregnant women are vital to improve morbidity and mortality.
References:
1. Circulation. 2015; 132: 1747-1773.
Learning points: Vigilance of high-risk pregnancies, early detection and timely establishment of ALS maneuvers are the main factors for the success of these cases.

4421

Pregnant patient with large AVM of tongue: Anaesthetic challenges and conduct

Haldar R.[1]
[1]*SGPGIMS - Lucknow (India)*

Background: Increased cardiac output during pregnancy increases the propensity of bleeding in Arterio Venous Malformations (AVM).
Case Report: 33 years old pregnant patient with gradual increase in tongue size causing extraoral protrusion and one episode of spontaneous torrential haemmorhage was posted for elective caeserean section. Imaging revealed large AVM causing tongue swelling and stenosed nasotracheal path rendering conventional airway management impossible.The patient was desirous of being awake during delivery. Thus regional anaesthesia was chosen.Airway securing was necessary to obviate the sudden need to administer general anaesthesia (GA), intraoperative bleeding due to surgical stress,fluid, oxytocin or during reversal. Nasotracheal path being better tolerated and straighter was chosen inspite of stenosed nasopharynx. After monitor attachment, antisialogogue administration, nebulization with lignocaine and adrenaline mixture and intranasal oxymetazoline instillation, transtracheal block was administered.Through the suction channel a thin guidewire (Teromo) was passed till it was at the level of fiberoscope's tip. The fibreoscope was introduced nasally and passed through glottis till the carina. Guidewire was pushed in the trachea and the scope withdrawn. An Airway Exchange Catheter (AEC) was railroaded over guidewire.Capnographic trace was obtained after an universal connector was attached to its end confirming its intratracheal position. A well lubricated armoured endotracheal tube (ET) was now gently railroaded over AEC into trachea. Fibrescope again confirmed ET's position.AEC was removed, cuff of ET was inflated and a T piece was connected for spontaneous respiration.Now spinal anaesthesia was administered. Postoperatively, patient was carefully extubated in ICU.
Discussion: Our challenge was to critically balance airway potection and airway instrumentation. Airway blocks aided intrumentation and allowed the ET to be tolerated by awake patient intraoperatively. Passage of equipments of sequentially larger calibers (guidewire, AEC , fibrescope) allowed subtle serial dilatation of stenosed passage and careful observation of the probability of bleeding.
References:
1. Martinez F, Immordino V.Arteriovenous malformations at the base of the tongue in pregnancy.Case report.Acta Otorhinolaryngol Ital.2009;29:274-8.
Learning points: Appropriate airway blocks allowed airway securing in awake parturent with difficult airway and prevented GA exposure to foetus.

4616

Bedside echocardiography in the rapid diagnosis of peripartum cardiomyopathy: a case report

Martinez Otero S.[1], Rodriguez Arias J. J.[1], Garcia Rojas I.[1], Muñoz Rojas G.[1], Lopez-Baamonde M.[1], Borrat Frigola X.[1]
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background: Peripartum cardiomyopathy (PPCM) is a rare but potentially life-threatening condition. Diagnosis is challenging due to alternative diagnoses and physiological changes during pregnancy. We present a case where anaesthesiologists played a central role in the diagnosis and initial management.
Case report: 28 year-old female with a history of polyarthritis on prednisone and hydroxychloroquine, and 5 spontaneous abortions. She presents twin pregnancy with an isolated episode of sinus tachycardia at gestational week (GW) 29, normal ECG and a hyperdynamic ventricle by echocardiography. A c-section is performed at GW 35. In the first hours postpartum she presents with preeclampsia and sudden dyspnea, desaturation and tachycardia. Magnesium sulphate is initiated and an angio-CT rules out pulmonary embolism (PE). She is admitted to the ICU with acute heart failure (AHF) symptoms. ECG and blood test show sinus tachycardia, NT-proBNP of 4300 pg/ml and hs-cTnI 350 ng/l with progressive decrease. Point-of-care ultrasound reveals a dilated left ventricle with moderate global hypokinesis, left ventricular outflow tract velocity time integral (VTI) of 13,7cm, estimated ejection fraction (EF) 35%, and signs of pulmonary oedema. PPCM is suspected. Treatment with nitroglycerine and furosemide is initiated with an adequate response. Before hospital release enalapril, bisoprolol, bromocriptine and enoxaparin are introduced. 4 weeks later the patient admits therapeutic non-compliance, echocardiogram shows slight improvement of ventricular function with an estimated EF of 45%.
Discussion: PPCM presents with heart failure during late pregnancy and up to 6 months postpartum. Our patient presented multiple risk factors such as an autoimmune disease, multifetal pregnancy and preeclampsia. Once initial suspicion of PE was ruled out, bedside echocardiography showing a decreased VTI was key to suspecting myocardial dysfunction as a cause for AHF. Treatment includes standard HF medication, keeping in mind contraindications in pregnancy. Benefits of bromocriptine have been described as a specific treatment in association with anticoagulation due to increased risk of thrombosis.
Learning points: Despite being a rare disease, PPCM must be suspected during pregnancy or postpartum in patients with risk factors presenting with haemodynamic instability or heart failure symptoms. Ultrasound, a non-invasive and accessible tool, has become extremely valuable in critical settings.

4655

General anesthesia for elective cesarean section in a woman with type IV Ehlers-Danlos syndrome - case report

Silva M. J. S.[1], Oliveira M.[2], Guimarães J.[3], Faria A.[2]
[1]*Portuguese Oncology Institute, IPO Porto - Porto (Portugal),* [2]*Centro Hospitalar e Universitário de São João - Porto (Portugal),* [3]*Centro Hospitalar e Universitário do Porto - Porto (Portugal)*

Introduction: Vascular Ehlers-Danlos syndrome (EDS), type IV (5-10% of EDS) distinguishes because of its risk of medium/large caliber arterial rupture, digestive and uterine rupture. Pregnancy exacerbates the risks and makes SED IV a contraindication to pregnancy. Regarding anaesthesia, airway hemorrhage, pneumothorax, and epidural hematoma are among complications. Despite the complexity, the scarcity of case reports in obstetrics translates into the absence of standard anesthetic practices in SED IV.
Case report: 22 years primigravida, with previous diagnosis of Vascular SED, proposed for elective caesarean section at 35 weeks. No other relevant pathology. Asymptomatic, under bisoprolol, echocardiography without changes. Family history of sudden death from aortic rupture. After discussion with the surgical team and the patient, general anesthesia was performed: Lidocaine 1.5mg/kg; Propofol 2mg/kg; Succinylcholine 1.5mg/kg. Monitoring; standard and anesthetic depth monitoring (BIS 40-60). Placed 2 16G peripheral venous accesses in the MSD. Deciding not to immediately insert arterial and central venous catheter, being the equipment for its placement properly prepared. Maintenance: propofol; after fetus extraction: sevoflurane, rocuronium and fentanyl. Reversal of neuromuscular block: Sugammadex 2mg/kg. Postoperative analgesia: Paracetamol 1g, Tramadol 100mg and Morphine 6mg; antiemetic prophylaxis: 4mg dexamethasone and Ondasetron. Duration of the procedure: 40 minutes no complications reported. At the end, the patient was transferred to the intermediate care unit where she remained 24h. The mother and newborn were discharged from the Obstetrics ward on the 4th day.
Discussion: In SED IV, standard obstetric neuroaxis anesthesia carries a significant risk of epidural hematoma and hemodynamic instability in case of hemorrhage, making the choice of anesthetic technique complex. Vascular fragility limits the degree of monitoring invasiveness and requires a careful airway management plan.
References:
1. ESC Guidelines on the management of cardiovascular diseases during pregnancy. European Heart Journal (2011) 32, 3147–3197.
2. K. M. Kuczkowski, J. L. Benumof. Cesarean section and Ehlers-Danlos syndrome: choice of anesthesia. International Journal of Obstetric Anesthesia (2002) 11, 222–224.
Learning points: The decision between regional and general anesthesia must be weighted on an individual basis.

5015

Systemic lupus erythematosus, kidney transplant rejection with end stage renal failure, intensive dialysis and c-section. Case Report and Anesthetic considerations

Ferré M. S.[1], Moyano P.[1], Fraidenraij U.[1], Teijido C.[1], Figar Gutierrez A.[1]
[1]*Hospital Italiano de Buenos Aires - Buenos Aires (Argentina)*

Background: Successful pregnancy in a patient with lupus nephritis (LN) and on dialysis is an uncommon event. Renal transplant in patients with systemic lupus erythematosus (SLE) do not fare as well as patients with other causes of end-stage renal disease. Intensified hemodialysis (HD) offers improved maternal and neonatal outcomes.1 Pregnancy should be carefully planned in renal transplant recipients to reduce risk for graft loss, optimize pregnancy outcomes, and ensure immunosuppression regimes are nonteratogenic. SLE flare during pregnancy predicts adverse fetal outcomes. Pregnancy should be delayed until the disease has been in remission for 6 months.2
Case Report: We present a case of a 32 years old woman at 36+1 weeks gestation, primigesta, ASA IV, scheduled for a c-section. She had a renal transplant in 2011 due to end stage lupus nefritis and she was on intensive dialysis (6 times per week, 4

hours sessions) because of transplant rejection with acute and chronic renal failure. She was receiving prednisone, hydroxychloroquine, labetalol, acetylsalicylic acid (suspended before surgery). She had a dialysis session without heparinization the day before surgery. Spinal anesthesia with 26 g pencil point needle was performed at L3-L4 with hyperbaric bupivacaine (10 mg) and fentanyl (20 mcg). Phenylephrine target controlled infusion was used to prevent hypotension. A healthy baby was born, Apgar 8/9. Dialysis sessions were resumed on first day postoperatively, along with hydrocortisone stress dosis (50 mg).
Discussion: Regional anesthesia may be preferred in the first place for pregnant women with renal transplantation, unless there is any contraindication. SLE pregnant patients are considered to be high risk and coordinated care with effective communication between anaesthesiologist, nephrologists, obstetricians, haematologists, rheumatologists and clinicians is mandatory.
References:
1. Hladunewich, M. Hemodial. Int. 20,339–348 (2016).
2. Kwok, L. Lupus 20, 829–836 (2011).
3. Bramham, K. Semin. Nephrol. 37, 370–377 (2017).
Learning points: Better outcomes are expected if pregnancy is delayed until a 6 month remission period. Intensified hemodialysis offers improved maternal and neonatal outcomes. Regional anesthesia may be preferred in the first place for pregnant women with renal transplantation.

6006

Rare case of supraventricular tachycardia post administration of sublingual misoprostol in the management of postpartum haemorrhage

Gouveia B.[1], Silva M.[2], Amaral C.[3]
[1]Centro Hospitalar Universitário de São João - Porto (Portugal), [2]Instituto Português de Oncologia do Porto - Porto (Portugal), [3]Centro Hospitalar Universitário de São João - Porto (Portugal)

Background: Postpartum haemorrhage is the leading cause of mortality in childbirth (1). Misoprostol can be used in its treatment (1). Misoprostol has adverse effects, which are dose dependent (1). Very little is known about the relation between misoprostol and the development of supraventricular tachycardia (SVT).
Case Report: A 33-year-old woman, 36 weeks of gemelar gestation (G1), was admitted for induction. An epidural catheter was placed. In the immediate post-birthing (instrumented delivery), the patient presented genital bleeding (800mL) with hypotension (75/50mmHg). She was treated with oxytocin infusion, bolus of crystalloids and ephedrine and sublingual misoprostol (800mg), with blood loss and hemodynamic control. A few minutes later, the patient was pyretic (40ºC) and tachycardic (HR 200 bpm). 1gr paracetamol was administered with no response. The temperature dropped by 2ºC after 2 gr metamizole. A 12 lead ECG revealed SVT. Carotid sinus maneuvers did not low heart rate. Three intravenous bolus of adenosine (6+12+12mg) were given, with little effect (170bpm). The heart rate was controlled (100bpm) with labetalol (50 mg). The patient was transferred to a level II unit for a day. She was discharged 3 days after delivery.
Discussion: Misoprostol is an alternative for managing postpartum haemorrhage, despite concerns about its side effects profile (1). The most common are shivering and fever, which increase following sublingual administration (1). In this case, we saw a temperature rise associated with a SVT after sublingual misoprostol. We hypothesise that the SVT may also be a side effect. SVT is one of the commonest benign arrhythmia in women of reproductive age and most will respond to vagal stimulation (2). However, a minority of SVT's require further treatment (2).
References:
1. Fabio H., Claudia B. "Case report and literature review: Hyperpyrexia as side effect following the administration of sub-lingual misoprostol in the management of post-partum hemorrhage". Rev colomb anestesiol, 2013: 65–68.
2. Bircker C., Gada R. "Supraventricular tachycardia presenting in labour: A case report achieving vaginal birth and review of the literature". Obstet Med, 2016: 9:96-97.
Learning points: With this clinical case we intend to warn anesthesiologists on the risk of SVT's with the use of misoprostol and advise on the measures to take in such occurrences, for, if untreated or poorly so, they are life-threatening.

5982

Dyspnea in a third trimester pregnancy. Anything to worry about?

Rubio Murias P.[1], Lema Tomé M.[1], Perea Fernández M. S.[1], Bermejo Albares L.[1], Monge Cid E.[1]
[1]Hospital Gregorio Marañon - Madrid (Spain)

Background: Dyspnea is a frequent symptom during pregnancy, generally benign and secondary to gestational changes. Recognizing pathological dyspnea in pregnancy and being able to establish a correct diagnosis is crucial for an adequate treatment and therefore to avoid maternal and fetal morbidity.
Case Report: A 35 year old woman in her 34th gestational week, previously healthy except for ulcerative colitis, was admitted from A&E where she consulted for sudden dyspnea. The patient was conscious and normotensive, without signs of cardiac ischemia nor pulmonary edema, with heart rate 155 bpm, oxygen saturation 88% and normal cardiotocographic register. On call anesthesiologist team was consulted, resulting in a high suspicion for pulmonary embolism (PE). A transthoracic echocardiography revealed right ventricular dilatation with dysfunction. Computed tomography pulmonary angiography confirmed the existence of a bilateral PE. The patient was anticoagulated with unfractioned heparin and transferred to the ICU. In the following days she progressively recovered her pulmonary and ventricular function, with normalization of analytical biomarkers (cardiac troponin, NT-ProBNP). A caesarean section (CS) was scheduled for the 36 gestational week.
Discussion: A sudden-onset dyspnea is highly suggestive of PE, even in the absence of classic clinical signs of deep vein thrombosis. However, it can be the first symptom common to a myriad of severe diseases such as arrythmias, pulmonary edema, peripartum myocardiopathy, asthma, or mediastinal mass above all. In the reported case, after confirming the diagnosis, a multidisciplinary team birth plan was set up. The patient's anticoagulation became the main concern, which, dependent on her clinical development, would be weighed in order to choose the most appropriate timing for a CS while monitoring fetal wellbeing. Diagnostic tests and therapeutical decisions should be determined by hemodynamic status and respiratory function.
References:
1. Dado CD, et al. Pregnancy and Pulmonary Embolism. Clin Chest Med. 2018 Sep;39 (3):525-537.
Learning points: Dyspnea may mask severe cardiac and pulmonary diseases; hence, accurate differential diagnosis is mandatory. PE in pregnancy is a life-threatening condition. As long as the patient is hemodynamically stable, anticoagulation is the therapeutical milestone. A multidisciplinary birth plan should be discussed, according to the mother's and fetus' clinical condition.

5979

Factor V deficiency and pregnancy

Berdai M. A.[1], Lahlou A.[1], Doughmi D.[1], Benlamkadem S.[1], Harandou M.[1]
[1]Hassan II University Hospital - Faculty of Medicine and Pharmacy - Mohamed Ben Abdellah University - Fes (Morocco)

Background: Factor V (FV) is a rare but challenging bleeding disorder. We report a multidisciplinary management of delivery of a parturient presenting a FV deficiency. Case Report: A 26-year-old woman was diagnosed with constitutional FV deficiency during severe post-partum hemorrhage in her first pregnancy. She was admitted to our hospital for programmed cesarean section at 38 weeks of amenorrhea of her second pregnancy. Her laboratory tests showed a prothrombin time (PT) of 23% and activated partial thromboplastin time (APTT) of 60 seconds representing double of the reference value. The FV level was 4%. We performed a thromboelastometry that showed a prolonged INTEM and EXTEM tests. Our pre-operative management was based on the perfusion of a prophylactic fresh frozen plasma (FFP) 20 ml/kg/12 hours for one day with close monitoring of volemia. The hemostasis tests improved, with normal APTT and PT at 52%. The FV level increased to 22.3%. Thromboelastometry showed normal INTEM and EXTEM tests. The cesarean section was performed and the perioperative course was uneventful. We continued the FFP perfusion at 20 ml/kg for the first day and 5 ml/kg/12 hours for 7 days with close monitoring of hemostasis by thromboelastometry. The patient was discharged home without any complications.
Discussion: For risky situation like cesarean section, the goal of treatement is to maintain FV activity above 20% [1]. No purified FV concentrate exists, FPP represents then the therapy of choice, although the risk of volume-overload. The recommanded strating dose before delivery is up to 20 ml/kg of FFP, it should be repeated daily as long as we target hemostatic levels of FV [1]. Other authors advise a perfusion of a lower dose of 5 ml/kg/12 hours of FFP during 7 days in post-partum [2]; we have followed this attitude associated with daily monitoring of hemostasis by thromboelastometry, which allowed adequate management of duration and volume infusion of FFP.

References:
1. Maeda K et al. Pregnacies with factor V deficiency: a case report and review of the litterature. Clin Exp Obstet Gynecol. 2017;44:299-300.
2. Ayedi M et al. Factor V deficiency and pregnancy: a case report. Ann Biol Clin 2011;69:336-8.
Learning points: Women with FV deficiency are at increased risk of post partum hemorrhage. Prophylactic FFP should be administrated prior and post delivery to ensure adequate hemostasis. Thromboelastometry can improve management of this condition.

6157

Patient controlled analgesia in labour using remifentanil in trombocytopenic pregnant

Aragones Quintanero L.[1], Ibañez Lorente C.[1], Aguado La Iglesia I.[1], Montero Saiz O.[2], Iglesias Guitián R.[1], Muñoz Alameda L. E.[1]
[1]Fundacion Jimenez Diaz - Madrid (Spain), [2]Fundacion Jimenez Diaz - Madrid (Spain)

Background: The prevalence of thrombocytopenia during pregnancy is around 10%, in which less than 1% has a platelet count below 100000 µL−1. Immune thrombocytopenia (ITP) represents the most common cause of thrombocytopenia during the first trimester of pregnancy. Although ITP does not affect fetal growth, it must be taken into account for the potential risk of thrombocytopenia (<50000 µL−1) that affects 15 % of the cases.
Case report: A 34-year-old woman, at 36 weeks of gestation, affected by ITP was admitted for labour induction. She had a personal history of Systemic Lupus Erythematosus and corticosteroid-resistant ITP. Her platelet count was monitored during her pregnancy. The day expected to give birth platelet count had increased from 25000 to 50000 µL−1 after being treated with IV globulin (1g/ kg), for two days. We considered epidural analgesia unsafe in this particular case, and after considering its benefits and risks, we offered her remifentanil IV using a Patient Controlled Analgesia device. We programmed the pump, following our protocol, to deliver a bolus dose of 0,2 mcg/kg with a lockout time of 2 min. Blood pressure, pulsioxymeter and capnography were monitored. Patient expressed optimal analgesia without negative side effects. Apgar score was 10.
Discussion: Epidural analgesia is a safe and effective technique for labour but there are risks that need to be managed. Remifentanil is a short-acting opioid with appropriate properties: to be metabolized by non-specific esterases to an inactive form and to be quickly eliminated from the blood plasma in such a way that accumulation does not occur. It should be noted that remifentanil is a plausible alternative for labour analgesia in patients with thrombocytopenia, in whom neuroaxial analgesia might be inappropriate.
References:
1. Bernstein J, et al. Neuraxial Anesthesia in Parturients with Low Platelet Counts. Anesthesia and Analgesia. 2016 Jul;123(1):165-167.
2. Tanaka M, et al. Regional Anesthesia and Non-Preeclamptic Thrombocytopenia: Time to Re-Think the Safe Platelet Count. Rev Bras Anestesiol 2009;59:142-53.
Learning points: Trombocytopenia is considered a relative contraindication to neuraxial anaesthesia, being still under debate the optimum platelet count at which it can be practiced in a safe way. Remifentanil supposes an adequate and safe analgesic technique when neuraxial anaesthesia is contraindicated. More studies in pregnant women with thrombocytopenia are needed.

6163

Audit of Remifentanil Patient Controlled Analgesia (PCA) for Labour analgesia

Al Nahdi S.[1]
[1]The Rotunda Hospital, Dublin 1. - Dublin (Ireland)

Background and Goal of Study: Remifentanil is an ultra-short acting opioid. The role of remifentanil in labour analgesia as an alternative, but not equivalent, to epidural analgesia is well documented albeit controversial. The main concern with remifentanil use is risk of apnoea, and significant adverse maternal outcomes reported in the literature pertains to unsupervised or inappropriate use. This audit is to compare how the electronic system (MN-CMS) improved remifentanil prescription, monitoring and safety practice in 2018, with old paper documentation in 2016.
Materials and Methods: This is a retrospective audit for the year 2018 of all patients who received remifentanil PCA for labour analgesia. Patient data for the year 2018 was retrospectively collated to: 1) Review any adverse outcomes (fetal+maternal) associated with remifentanil PCA use. 2) Review recorded observations by midwifery staff during remifentanil PCA use in labour. 3) Review anaesthesia prescribing practice. Data regarding compliance with practice and recording of maternal/fetal outcomes was sourced from MN-CMS. Example of indications for remifentanil PCA in this period : Failed epidural, thrombocytopenia, bleeding disorders, clotting factors deficiency, sepsis and brain tumour.
Results and Discussion: Between the beginning of January and the end of December 2018, 32 patients availed of this service, compared to 26 patients in 2016. Adverse outcomes/side effects: Maternal: Five (15.6 %) patients experienced nausea and vomiting during remifentanil PCA use and received anti-emetics, in comparison with only (12.5%) in 2016. No patient had a respiratory rate less than 10 / min. No patients had oxygen saturation recorded ≤ 93% or received naloxone.
Conclusions: Further education on prescribing practice and documentation by Anaesthesiologist and Midwifery staff is required. Initiate a care plan on MN-CMS for remifentanil documentation for the Anaesthesiologist which includes the indication. Entonox and Oxygen should be prescribed as any other drug given to the patient. A coloured illuminated card attached to all remifentanil PCA pumps with all safety measures to be followed by Midwifery staff. Upgrade Spo2 monitors in the labour ward and to be integrated into the electronic system.

6319

Epidural analgesia versus combined spinal-epidural analgesia in labor - maternal satisfaction and complications - retrospective analysis

Rakanovic D.[1], Sobot Novakovic S.[1], Susnjar S.[1], Banicevic-Ceric A.[1]
[1]University Clinical Centre of the Republic of Srpska - Banja Luka (Bosnia and Herzegovina)

Background and Goal of Study: The combined spinal-epidural (CSE) technique is an established method for providing labour analgesia with advantages over standard epidural analgesia (EA) such as speed of onset and better sacral analgesia. Goal of study is comparation of maternal satisfaction and complication between CSE and EA.
Materials and Methods: We conducted retrospective survey on parturients at or beyond 36 weeks gestation, who received EA (between May and November 2018) or CSE (between May and November 2019) during labor at Clinic for Gynecology and Obstetrics UCC of the Republic of Srpska.
Results and Discussion: The EA group included 100 parturients and CSE included 92 patients. 57% were nulliparous in EA group and 60% in CSE group. Fear of epidural analgesia before procedure had 24% in EA and 25,6% in CSE group. Frequency of itching during and after delivery were 11% in EA and 28,42% in CSE group. Nausea and vomiting were 4% in EA and 10% in CSE group. 2% in EA group parturients experienced breakthrough pain the duration of labor and 1% in CSE group, pronounced motor block had 2% in EA and 2% in CSE, unilateral block 4% in EA and 1% in CSE group. 4% had urinary retention requiring catheterization of the bladder in both groups. 5% experienced a headache in both groups. 83% in EA group and 93,5% in CSE group of mothers did not feel any symptoms after delivery. Total satisfaction with EA was in 97% of patients in EA group and in 98,92% in CSE group.
Conclusion: The results of this analysis serve to further improve the quality of epidural anesthesia in our hospital, with particular reference to maternal satisfaction. The level of overall satisfaction of our patients with the EA and CSE process was very high.

6259

Midnight challenge: labor analgesia in an operated Scoliosis Patient

Silva M.[1], Ribeiro C. R. R. D.[1], Carvalho A. F.[1], Costa V.[1]
[1]Centro Hospitalar Vila Nova de Gaia/Espinho - Vila Nova de Gaia (Portugal)

Background: Scoliosis is found in nearly 2% of the population.1 That patients or who have history of back surgery are significant challenges and have a higher rate of epidural failure.1,2 Although is controversial the best approach for labor analgesia, some anesthesiologists consider epidural analgesia to be relatively contraindicated.2
Case Report: A 21-year-old nulliparous woman, ASA 2, was admitted at 38 weeks of gestation with abdominal and lower back pain. She had idiopathic scoliosis with surgical correction 3 years before. Her medical records revealed a posterior spinal instrumentation and fusion from T2-L4 vertebrae (fig 1). According to examination she was in 1st stage of labor. Following aseptic preparation and local anesthesia, an 18G Tuohy needle was inserted into L4-L5 epidural space, in the sited position using loss of resistance to saline technique, at first attempt. A 22G epidural catheter was placed 11cm depth from skin. Epidural analgesia was an initial combination of ropivacaine 0.1% 8mg and sufentanil 10mcg followed by programmed intermittent epidural bolus of ropivacaine 0.2%. A healthy baby was born through normal spontaneous delivery 3 hours after. No maternal or fetal complications were reported.
Discussion: The epidural space in patients with corrective scoliosis may be distorted because of instrumentation, bone graft material or scar tissue. This can lead to impossible epidural space finding, misplaced catheter insertion or affect the normal spread of the local anesthetic, resulting in a patchy blockade. There's also a higher likelihood of unintentional dural puncture.2 Patients with back surgery have a 91% rate of success versus 98.7% of patients not operated.2 A careful pre-operative assessment should be taken and the epidural should be placed early to make eventual adjustments.
References:
1. International Anesthesia Research Society. December 2009, Vol. 109, No. 6.
2. Katherine Arendt et al. Rev Obstet Gynecol. 2008;1(2):49-55.
Learning points: Patients with history of back surgery have a higher rate of epidural failure. Scoliosis shouldn't be considered a contraindication to epidural analgesia.

5519

Finding the middle ground: Food in labor practices & perceptions in the labor & delivery unit of Tel-Aviv Medical Center

Fiszer E.[1], Weiniger C.[1], Ebrahimoff M.[1]
[1]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel)

Background and Goal of Study: Improvements in labor analgesia and airway management have created conflict regarding restrictive fasting policies during labor. The ACOG/ASA/ISA discourage oral intake, however the WHO recommends "non-interference". As a result, liberal food policies have become widespread. Our goal was to assess practices and opinions in our labor and delivery unit (L&D) regarding oral intake during labor.
Materials and Methods: Following IRB approval in our 13,000 annual delivery L&D, an anonymous survey on practices and opinions regarding oral intake during labor was sent to anesthesiologists, midwives and gynecologists at our tertiary medical institution.
Results and Discussion: 77 responded - 34 anesthesiologists, 32 midwives, 11 gynecologists. 68% correctly stated there are no institutional guidelines for oral intake. 99% and 95% respectively, reported that women at low risk for cesarean delivery (CD) may eat before and after epidural analgesia, and 62% and 65% respectively agreed with this practice. 50% stated that women at high risk for CD are allowed food, 10% and 15% (all midwives) agreed with this practice, before and after epidural analgesia, respectively. 66% allow light food, 12% impose no restrictions, 13% water only. Reasons to discourage eating include bleeding (65%), complicated obstetric history (61%), pre-eclampsia (57%), dystocia (49%), twins (48%), trial of labor after CD (40%), BMI>40 (35%), fetal weight>4kg (34%), and severe reflux (26%). 93% of anesthesiologists, 90% of gynecologists and 56% of midwives named aspiration as the primary risk associated with oral intake; 9% believed there were no such risks.
Conclusion: Use of epidural analgesia did not significantly change staff opinions on food in labor. Despite restrictive Israeli national guidelines, women at high risk for CD or aspiration are not uniformly advised to avoid food. Guidelines regarding oral intake for low and high risk laboring women are required. Permissive eating practices identified in our survey should be addressed in order to find the middle ground between restrictive and permissive policies, and minimize aspiration risk for high risk women.

5750

Patient satisfaction - intravenous patient-controlled analgesia with remifentanil versus intermittent epidural for labor analgesia

Karadjova D.[1], Sivevski A. S.[1], Ivanov E.[1], Spasovski S.[1], Zlatkova M.[1], Kjaev I.[1]
[1]University Clinic for Gynecology and Obstetrics - Skopje (Republic of North Macedonia)

Background and Goal of Study: Epidural analgesia is considered a gold standard in obstetric anaesthesia. However, in moments when it is contraindicated, unwanted by the patient or simply unavailable, remifentanil can be an excellent alternative.
Materials and Methods: 155 pregnant women were included in the study and randomized into 2 groups: a remifentanil group (RG), and an epidural group (EG). Patients in the RG (80 patients) received intravenous PCA with remifentanil, starting with 0.2 μg / kg, gradually increasing the dose by 0.1 μg / kg to maximal dose of 1μg / kg. Patients in the EG (75 patients) received epidural analgesia with programmed intermittent bolus dosing. Our primary outcome was patient satisfaction and efficacy. During labor we analized patient pain scores and satisfaction scores through 2 VAS scales in different time points. 8 – 16 hours after delivery patients were asked to score complete satisfaction about labor analgesia on 10-point VAS scale. Patient and neonatal safety was monitored through complete haemodynamic monitoring.
Results and Discussion: VAS pain scores were significantly higher in the remifentanil group at all time points, the average VAS pain score in the RG was 45.94 ± 8.4, and in EG 29.13 ± 11.9 ($p < 0.0001$). On the other hand, VAS satisfaction scores were all the time almost the same in both groups, the average VAS satisfaction score during the entire monitoring period was 93.43 ± 9.1 in the RG, and 94.02 ± 9.4 in the EG, without statistically significant difference between the two groups ($p = 0.679$). Mean VAS score after delivery was 9.73±0.5 in the RG and 9.75±0.5 in the EG ($p=0.8$).
Conclusion: PCA with remifentanil is less effective for pain relief in patients during labor compared to epidural analgesia, but the satisfaction of patients is equal in both groups. Continuous respiratory monitoring and oxygen supply are mandatory.

5312

Undiagnosed intracranial tumor in a laboring woman: near misses

Gonzalez Carranza J. E.[1], Calvo A.[1], Vera-Sanchez M. B.[1], Bermejo L.1, Monge E.[1]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Nowadays, neuroaxial techniques have turned into the gold standard for obstetric analgesia and anesthesia. The existence of prepartum intracranial pathology is not always a contraindication for neuroaxial techniques1. We report a case of eutocic delivery under epidural analgesia in a pregnant woman with undiagnosed brain tumor.
Case Report: A healthy 24-year-old pregnant woman with occasional migraine was admitted to the delivery room. Lumbar continuous epidural analgesia for labor was uneventfully performed. Two days after delivery, the anesthesiologist on duty was requested to assess the patient for possible postdural puncture headache, which was excluded. The pain was described as similar to her previous migraine, with normal neurological examination. Three hours later, she suffered a sudden vomit and loss of consciousness. Consequently, the neurologist was notified and an urgent cranial computer tomography was performed. It revealed left frontal supratentorial mass with displacement of the midline and hydrocephalus. One week later, the lesion was surgically removed and identified as a pilocytic astrocytoma. Postoperative period proceeded without incidents.
Discussion: In the case reported, a potential progressive tumor growing as well as fractional administration of epidural analgesic dose could have helped the patient to achieve tolerance to the peripartum increase in intracranial pressure. However, if the brain tumor would had been previously diagnosed, a different birth plan would have been carried out. The presence of a migraine background made more difficult the recognition of a serious atypical headache. Therefore, accurate diagnosis was delayed until the patient suffered severe neurologic symptoms. Fortunately, the patient did not suffer any damage and had good clinical recovery despite the fact that the result could have been fatal.
References:
1. Neuroaxial anesthesia in parturients with intracranial pathology: a comprenhensive review and reassessment of risk. Leffert LR, Schawamm LH. Anesthesiology; 2013, Vol.119, 703-718/
Learning points: Intracranial lesions in the absence of increased intracranial pressure may not be a contraindication to obstetric neuroaxial techniques. However, an anticipated birth plan is always mandatory. We should always keep in mind that atypical postpartum headache is a "red flag" symptom that may hide a brain tumor or other serious clinical condition; hence, especial attention must be paid.

4775

Local anesthetic systemic toxicity in a pregnant woman: case report

Castro Lalin A.[1], Snachez Novas D.[1], Figar Gutierrez A.[1]
[1]Hospital Italiano de Buenos Aires - Caba (Argentina)

Background: Pregnancy is a clinical setting in which local anesthetic systemic toxicity (LAST) is inclined to occur. It can be reversed by using 20% intravenous lipid emulsion (ILE) therapy. Limited case reports have been published on the treatment of LAST during pregnancy using ILE 1; safety in this setting is still questioned.
Case Report: A 26-weeks pregnant woman presented for fetal thoracentesis under infiltration anesthesia. Anesthetic team was called for help after the patient developed shortness of breath and dizziness. She presented slurred speech, which evolved into loss of consciousness. Respiratory arrest followed. Considering the total dose of lidocaine administered (lidocaine 2% without epinephrine, 40ml, 800mg), a diagnosis of LAST was suspected. 100 ml of ILE were administered. While preparing for orotracheal intubation the patient developed a tonic-clonic seizure which stopped administering propofol and midazolam. An infusion of ILE was continued in the ICU. After the toxicity event, uterine contractions satarted and a cesarean delivery was decided. After that, the patient was woken up with ad integrum sensorium restitution.
Discussion: As safety of ILE therapy in pregnancy is still questioned and randomised controlled trials are not feasible, we consider that it is important to report all cases in which ILE therapy is used in gravid women. Although performing a fetoscopy increases the risk of preterm delivery 2, it cannot be ruled out that ILE therapy contributes to appearance of uterine dynamics. It may also be of interest to investigate if ILE therapy dosing should be the same during pregnancy than other LAST settings.
References:
1. Spence AG. Lipid Reversal of Central Nervous System Symptoms of Bupivacaine Toxicity. Anesthesiology 2007;107:516-517.
2. Sacco A, Van der Veeken L, Bagshaw E, et al. Maternal complications following open and fetoscopic fetal surgery: A systematic review and meta-analysis. Prenatal Diagnosis 2019;39:251–268.
Learning points: We highlight early detection and treatment of LAST with ILE therapy. Neurological signs and symptoms have to be assumed as prodromal and cardiovascular collapse should be expected and avoided. We also highlight the decision for advanced airway management in an early stage, since respiratory acidosis favors the development of cerebral edema and maintains ionized form of local anesthetics in the bloodstream, perpetuating neurological disorders.

5585

PCA remifentanil – alternative and effective option for labour analgesia

Iancu I. B.[1], Amza A. C.[1], Cherestes R. X.[1], Singh V.[1]
[1]Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)

Background and Goal of Study: The neuraxial techniques currently represent the most effective methods for pain control during labour and epidural analgesia is considered the gold standard during delivery with minimal side effects for mother and neonate. PCA (patient-controlled analgesia) remifentanil represent a good and effective alternative to pethidine or morphine for women who cannot receive or refuse epidural. The protocol used in our hospital for PCA Remifentanil is: dedicated intravenous line /giving set/ pump, concentration of Remifentanil 32 mcg/ml (partiurient weight < 60 kg) 40 mcg/ml (partiurient weight > 60 kg), 3 minutes lockout period, continuous monitor vitals. Our aim was to find if PCA remifentanil is a safe and effective option for pain relief during labour.
Materials and Methods: A local retrospective study. We used data from patients who used PCA Remifentanil for labour pain on a proforma sheet from January 2016 to January 2020, after approval from the local commitee.
Results and Discussion: A total of twenty-two parturients, who received PCA Remifentanil for labour analgesia during one year. The most common causes were infectious (41%), neurologic causes [disc damage, spina bifida oculta, maternal multiple sclerosis, intracranial HTN] followed by failed epidural and contraindication for epidural or patient refusal . There was no cardiovascular instability or respiratory depression noted during the use of PCA Remifentanil.The average maternal sedation and pain score was 1.27/5 and 1.54/5, respectively. Neonatal Apgar scores were recorded at 1 and 5 minutes, and the Apgar score was 9 at 1 minute and 9.95 at 5 minutes.
Conclusion: PCA Remifentanil represent a safe and effective alternative for labour analgesia with minimal maternal and neonatal side effects.
References:
1. Saunders TA, Glass PSA. A trial of labour for remifentanil. Anaesth Analog 2002.
2. Blair JM, Hill DA, Free JPH. Patient-controlled analgesia for labour using remifentanil-a feasibility study. Br. J Anaesth 2001.

4988

WhatsApp group of obstetric anesthesia in Israel

Ioscovich A.[1], Weiniger C. F.[2], Orbach - Zinger S.[3], Ginosar Y.[4], Binyamin Y.[5]
[1]Shaare Zedek Medical Center - Jerusalem (Israel), [2]Sourasky Medical Center - Tel Aviv (Israel), [3]Rabin Medical Center (Beilinson Campus) - Petah Tikvah (Israel), [4]Hadassah University Medical Center - Jerusalem (Israel), [5]Soroka University Medical Center - Beer-Sheva (Israel)

Background and Goal of Study: The use of social media has been gaining momentum in recent years; one of the most commonly used apps being the WhatsApp professional groups. We present our experience in the WhatsApp group that includes professional discussions between experts in a relatively «narrow» field such as obstetric anesthesia.
Materials and Methods: A review of all group participants and all the discussions held by the Group since its establishment was carried out. Data were produced on the discussion topic, response time, number of participants in the discussion, number of responses to the discussion and type of discussion. In addition, we passed a questionnaire among the group members.
Results and Discussion: The group was established in March 2017. The group consists of 31 expert anesthesiologists from 90% of Israel hospitals. Over two years, 193 discussions occurred; reaction time was 8.25 minutes. Average number of participants per session was 5.6 anesthesiologists. Comments average every discussion was about 9.75 comments. By segmenting the discussions by topic (Some of the discussions included 2 topics), 62 discussions were classified as clinical discussion. 52 dealt with unit organization. 16 discussions were defined as case discussion. 31 dealt with conferences. 67 dealt with articles in obstetric anesthesia. A high level of satisfaction was found in the group member's questionnaire.
Conclusion: We see that the WhatsApp group in which most of the obstetric anesthesiologists in Israel are partners is a simple, effective tool for improving work and knowledge both at the clinical level and at the organizational and management level.

5069

New evidence of clinical efficiency of sedoanalgesia with sevofluran during labor

Upryamova E.[1], Shifman E.[2], Ovezov A.[2]
[1]Moscow Regional Scientific Research Institute of Obstetrics and Gynecology (MRSRIOG) - Москва (Russia), [2]M.F. Vladimirsky Moscow Regional Research and Clinical Institute (MONIKI) - Moscow (Russia)

Background and Goal of Study: An objective assessment of the severity of pain in labor can demonstrate by biochemical diagnostic markers, among which α-amylase of saliva (AAS) and substance P (SP) are of particular interest. The study of the dynamics of AAS and SP concentrations in parturients for sevoflurane sedoanalgesia during labor, as well as the study of the relationship between the obtained values and pain assessment by visual analogue scale (VAS), will allow to assess the effectiveness of the anesthetic method.
Materials and Methods: A prospective study of the effectiveness of inhalation sedoanalgesia in labor was studied in 18 parturients. Three markers were taken: saliva amylase level (IU/ml), substance P level (pc/ml) and pain score for VAS (scores on a 100-point scale).
Results and Discussion: The duration of inhalation sedoanalgesia was 92.1 ± 28 [60-180'] minutes. The average SP level was significantly higher before sedoanalgesia compared with the initial level, however, against the background of sedoanalgesia, it steadily decreased, after 60 minutes it was below the initial level and then in fully dilated cervix, the lowest average value of SP was obtained for almost all parturients. The level of AAS and VAS scores demonstrate a different trend in the dynamics of their average values. Decreasing 60 minutes after sedoanalgesia, the average values of both markers by moment of fully dilated cervix again increase. For AAS, the average values reach the level obtained before sedoanalgesia, and VAS scores even exceed the average value obtained before sedoanalgesia.
Conclusion: Thus, inhalation sedoanalgesia with sevoflurane, stopping the true pain syndrome, does not fully affect the stress component, as evidenced by a temporary decrease in AAS and VAS scores with a repeated increase in values as the childbirth to end.
References:
1. Upriamova E.Y. et al. The method of inhalation analgesia with sevoflurane during spontaneous delivery. Almanac of Clinical Medicine. 2019;47(3):196-203. (In Russ.) https://doi.org/10.18786/2072-0505-2019-47-034.
2. Guglielminotti J et al. Assessment of salivary amylase as a stress biomarker in pregnant patients. International Journal of Obstetric Anesthesia (2012) 21, 35–39.
3. Lisowska B et al. Substance P and Acute Pain in Patients Undergoing Orthopedic Surgery. PLoS One. 2016; 11(1): e0146400.

Paediatric Anaesthesiology

4418

Case Report: Battery swallow induced tracheoesophageal fistula in a pediatric patient

Nguyen L.[1], Ramanathan S.[1], Vahabzadeh-Monshie H. R.[1], Borders J.[1], de Armendi A.[1]
[1]Oklahoma University Health Sciences Center - Oklahoma City (United States)

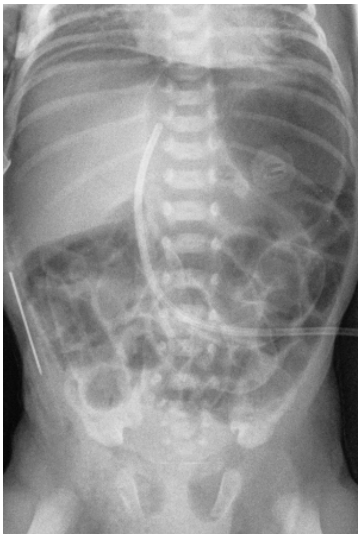
Abstract: Tracheoesophageal fistula (TEF) is an abnormal connection that presents as congenital or acquired. We discuss the diagnosis and management of a button-battery induced TEF in a pediatric patient.
Introduction: Button-battery ingestion forms an electrical circuit that eventually perforates the esophagus forming a TEF. Gas/reflux between respiratory and GI tracts via the TEF, require emergent surgical repair.
Case Report: A 13-month-old patient (8.9 kg) post-removal of a button-battery presented for surgical repair of a TEF (30% C6-T1 erosion) (Figure). NPO, IV antibiotics, CXR, CT angiography and chest MRI were ordered. The patient was intubated upon arrival to the OR. TIVA included propofol, remifentanil, and rocuronium. The neck was exposed surgically and a tracheostomy performed. Local tissue flaps were used to close the tracheal and esophageal fenestra, and the wound was closed. The patient convalesced uneventfully thereafter.
Discussion: Button-battery induced TEF has recently surfaced in pediatric patients requiring emergent surgical removal of the battery. In the acute setting, protective pH neutralization with honey, sucralfate and acetic acid limits esophageal injuries. Timely battery removal is essential as damage severity directly correlates to lodgment duration. Anesthetic risks include: ETT placement (size, position), RSI, aspiration, airway control/obstruction, bleeding, prolonged tracheal intubation and PPV. Conservative management includes endoluminal tracheal or esophageal stents. After DL-B, surgical management may involve single-stage TEF repair with cervical esophagectomy and/or gastrostomy with vascularized local tissue flaps. Post-operatively, IV antibiotics, tracheal stents, and gastrostomy feeding tubes have been used. Hematemesis may imply life-threatening aortoesophageal fistula formation.
Conclusion: In conclusion, we present a button battery-induced TEF that required emergent anesthesia for battery removal, tracheostomy, abscess drainage and TEF repair. We emphasize on essential communication between the ENT surgeon and anesthesiologist for the care of these critical airways.
References:
1. https://www.poison.org›files›battery-guideline-2018.

4491

Anesthesia for tracheoesophageal fistula repair in extremely premature newborn

Park S. H.[1], Martínez García S.[1], Prada-Hervella G.[1], Calvo-Rey A.[1], Doldán Pèrez P. N.[1], Alvarez-Escudero J.[1], Anesthesia and Intensive Care Department
[1]University Hospital of Santiago de Compostela - Santiago de Compostela (Spain)

Background: Providing anesthesia to preterm neonates may be challenging. Prematurity rate has increased over the last years: 10% of spanish infants are born premature, 90% of those older than 28 weeks survive. This report reviews our experience with a preterm newborn who required urgent trachea-esophageal fistula repair.
Case Report: A chorioamnionitis-exposed 700g and 27 weeks PMA newborn diagnosed with esophageal atresia type III on CPAP ventilation was proposed for urgent TEF correction in his first 24 hours of life after pneumoperitoneum was observed in X-ray. An umbilical venous catheter and 2 IV lines were placed and he was transferred to OR. Arterial umbilical catheter was discard owing to necrotizing enterocolitis concernes. IV fentanyl-atropine, topical lidocaine 1% and inhalational induction with sevoflurane were used preserving spontaneous breathing. A size 3 uncuffed ETT was placed successfully on the first attempt and advanced to archived one-lung ventilation; after fistula-ligation the ETT was withdrawn to obtain bilateral ventilation. High FiO2 (50-100%) was required to maintain SpO2 between 89-95% despite FABIAN HFO ventilation. Anesthetic maintenance was based on fentanyl-midazolam-rocuronium continuous infusion and intraoperative fluid therapy was based on PTN, crystalloids and fresh frozen plasma (total 90mL). Inotropes and vasopressors were started and gradually increased. After 5 hour surgery, the patient was transferred to NICU intubated on dopamine-mirlinone-adrenalin infusion.
Discussion: Advances in surgical care and neonatal management have improved survival infant with EA with TEF to 90%. ELBW infants with EA/TEF are rare and result in high morbi-mortality that is mainly related to complications not associated with EA/TEF1. Repair is delayed in patients with other major anomalies. In our case, TEF repair was considered urgent as intestinal perforation was suspected. Providing anesthesia to premature newborn requires hands of specialist. Multisystem organ immaturity underlies the differences in physiologic response to anesthetics.
References:
1. Zani A et al. A Outcome of EA/TEF in ELBW neonates. Pediatr Surg Int. 2016; 32(1):83-8.



4514

Malignant hyperthermia: guilty until proven innocent?

Martinho L.[1], Roberto A.[2], Carneiro A.[1], Cenicante T.[1]
[1]Centro Hospitalar Universitário de Lisboa Central - Lisbon (Portugal), [2]Centro Hospitalar Universitário de Lisboa Central - Lisbon (Portugal)

Background: Malignant hyperthermia (MH) is a genetically determined condition characterized by a potentially lethal response to the exposure to volatile general anesthetics or succinylcholine [1]. It is most common in the pediatric population.
Case Report: We report the case of a 5-month-old child, ASA I, with a cleft lip and cleft palate that was proposed for repair surgery. After an uneventful induction of general anesthesia and tracheal intubation without muscle relaxant, hypnosis was maintained with sevoflurane. During the maintenance phase, the patient developed a clinical picture of a malignant hyperthermia crisis, including hypercapnia, tachycardia, ventricular premature complexes, hypertension and hyperthermia. Prompt treatment was started and an adequate response was achieved after 3 doses of dantrolene. The patient was transferred for the intensive care unit and was discharged home after 3 days. Subsequent genetic testing (NGS panel) was negative for mutations of relevant genes.
Discussion: This case depicts a situation of a presumptive clinical diagnosis of MH that was not confirmed by genetic testing. Definite testing by muscle biopsy was not done due to the age of the patient [2]. It raises the question of how should be the anesthetic approach in a future anesthesia. Should we assume the diagnosis of MH or reject it?
References:
1. Kim T, Rosenberg H, Nami N. Current Concepts in the Understanding of Malignant Hyperthermia. Anesthesiology News. 2014.
2. Hopkins P, Rüffert H, Snoeck M, Girard T, Glahn K, Ellis R, Müller C, Urwyler A. European Malignant Hyperthermia Group guidelines for investigation of malignant hyperthermia susceptibility. British Journal of Anaesthesia. 2015.
Learning points: It is the authors' opinion that in situations of a clinical presumption of MH without a definite laboratory exclusion by muscle biopsy, the patient should be treated as having an established diagnosis of MH.

4772

Separation of conjoined twins: the role and challenges of anesthesiology team

Silveira C.[1], Calvano C.[2], Kohl G.[2], Kuperman R.[2], Correa V.[2], Fiorot W.[2], Case report of thoracopagus conjoined twins
[1]Hospital Estadual da Criança do Rio de Janeiro - Rio de Janeiro (Brazil), [2]Hospital Estadual da Criança do Rio de Janeiro - Rio de Janeiro (Brazil)

Background: Conjoined twins is rare (1:80,000 live births) and more frequent in females (3:1). Thoracopagus is the commonest (19%) and carries higher mortality. Almost always there is some degree of liver fusion and other malformations.
Case Report: 22-year-old woman with triplet pregnancy; twin 1 (T1) and twin 2 (T2) thoracopagus, monoamniotic-monochorionic, and twin 3 (T3) diamniotic-monochorionic, were born at 32 weeks after premature amniorrhexis. T1-T2 weighed 3600g and required CPAP. Imaging showed fusion of costal cartilages and liver. T3 got home after 22 days in intensive care unit (ICU). After 4 months, definitive separation surgery was done. The operating room was organized to accommodate 2 teams working in parallel, each with 3 anesthesiologists. A simulation had been performed few weeks before the surgery. Inhalation induction with sevoflurano was done, T1 first, then T2. They were slightly lateralized to obtain better position for orotracheal intubation (OI). Anesthesia was complemented with fentanyl, midazolam and cisatracurium. Central venous catheter and radial artery puncture was assured. It was necessary to start norepinephrine during positioning. The anesthetic procedure lasted for 8 hours and volume replacement was achieved with plasmalyte. T1 needed red blood cells transfusion, also. The critical surgical times were: sternotomy, hepatotomy (using the argon plasma scalpel to ensure minimal bleeding), sternorraphy and wall closure. The closure of T2`s wall was more difficult, resulting in ventilatory difficulty. They remained intubated for 2 weeks in the ICU. In the postoperative period, both had dehiscence of the surgical wound and severe gastroesophageal reflux (GER). Hospital discharge was obtained 4 months after surgery, and they are under outpatient follow-up.
Discussion: Complex surgery for separation of conjoined twins is challenging. Ventilatory and hemodynamic care were highlighted. OI was easy, despite hyperextension and faces proximity. The risk of dehiscence was high, but not justify the use of skin expander and they did not have life-threatening infection.
References:
1. G.M. Stuart al. The anaesthetic management of conjoined twins. Seminars in Ped Surgery 24(2015) 224-8.
Learning points: Detailed planning of the surgical and anesthetic strategy were fundamental to the success of the case. The good preoperative evaluation and the anticipation of possible difficulties to be faced increased the safety of the multidisciplinary teamwork.

4822

Update in a multidisciplinary protocol of thyroidectomy after severe hypocalcemia in a child

Romera A.[1], Sanjuan E.[2], Calvo A.[2], Barragán L.[2], Sanz M.[2], Lema M.[2]
[1]Hospital Gregorio Maranon - Madrid (Spain), [2]Gregorio Marañón General University Hospital - Madrid (Spain)

Background: Children have ahigher incidence of post-thyroidectomycomplications compared to adults.Postoperative hypocalcemia represents one of the major challenges. The Anesthesiology and Endocrinology Services of our institution designed together a protocol for pediatric thyroidectomy. This study has to goals: firstly, presentinga patient who developed severe hypocalcemia despite the protocol. Secondly, to describinghow we updated it.
Case Report: An 11-year-old girl was thyroidectomized due to MEN IIa. Intraoperative PTHs were undetectable. Calcium infusion was settled. Treatment with oral calcium carbonate (50 mg/kg/day) was iniciated 24 h after surgery; no vitamin D was given. Calcium levels were always normal. 48 hours after discharge she was readmitted with muscle cramps and spams and facial twitching; QTc was longer than 0,47 secs. All calcium measures were low. Magnesium was normal. Intravenous gluconate calcium 10% was started and she could be discharged 6 hours after, with 100 mg/kg/day of calcium carbonate and 0,25 micrograms of vitamin D.
Discussion: The original protocolconsisted of several determinations - calcium, phosphorus, magnesium, calcitonin, T4, vitamin Dand a triple intraoperative PTH analysis. All the patients were treated with a crystalloid solution with a potassium chloride and calcium gluconate for 12 hours. In case of hypocalcemia, a specific algorithm was applied. The decision for starting vitamin D was ambiguous and based in the theoretical level of parathyroidectomy and registered hypocalcemia. That serious case motivated a total update in the protocol: Preoperative levels of 25-OH-vitamin D are measured and are always optimized (> than 30 ng/ml) with colecalciferol.
Intraoperative PTH allows patients stratification according to their risk of hypocalcemia. High and medium patients receive intravenous an oral calcitriol and oral calcium. High oral calcium doses are given (up to 150 mg/kg/day). If hypocalcemia, calcium levels should be measured 72 h after discharge.
Learning points: Our patient hypocalcemia was early identified by intraoperative PHT measurements. Correct identification of the patient at risk was not accurate enough to prevent hypocalcemia. It is necessary to study the preoperative levels of vitamin D, to implement a hypocalcemia prevention protocol while in hospital, and to treat - with both vitamin D and high doses of calcium - patients at risk after discharge.

4669

Intranasal Phenylephrine in the Operating Room - How Many Drops Are Too Much?

Almeida J.[1], Sá A.[2], Vasconcelos L.[2], Machado H.[2]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal), [2]CHUP - Centro Hospitalar Universitario do Porto - Paramos (Portugal)

Background: ENT (Ear, Nose and Throat) surgeries commonly use topical vasoconstrictors (TV) to control bleeding in nose, throat or ear. These drugs are used in a variety of concentrations, and the total dose of administered drug often is unmeasured and not documented on the medical record. This case describes an anesthetic complication and its management after topical phenylephrine use in a bilateral turbinectomy surgery.
Case Report: A 13 years old boy, ASA I, was proposed for bilateral turbinectomy. The airway was secured with orotracheal tube and anesthesia was maintained with sevoflurane. Surgery was perfomed without complications. In the end of the procedure surgeons packed both nostrils with cotton balls soaked in phenylephrine 2,5% and normal saline fluid. 5 minutes later, cardiac frequency decreased for 44 bpm, with a BP of 119/68 mmHg (mean 88 mmHg). Atropine 0.5mg was given, resulting in an increase of the CF to 138 bpm and of BP to 220/150 mmHg. At this time, we started vagal manouvers and labetalol 2.5mg was administered with persitence of tachycardia and high blood pressures. Hemodynamic changes only reverted after nasal packing removing with CF and BP returning to normal ranges. Patient was extubated and was discharded the day after surgery.
Discussion: It is important for all anesthesiologists to be aware of the clinical problems associated with TV. There are some reported cases of severe hypertension with reflex bradycardia, acute pulmonar edema, cardiac arrest and death after topical use of phenylephrine. Phenylephrine overdose preferentially distributes blood to the pulmonar vascular beds. The natural protection of the pulmonar vascular overload is to maintain cardiac output. Since β 1 receptor blockades reduces cardiac output, treatment of phenylephrine-induced hypertensive crisis with β-adrenergic blocking is contraindicated. Despite the potencial problems caused by use of TV, neither surgeons nor anesthesiologists know the exact quantity of drug administered in each procedure. There are some studies that suggest safe inicial doses for children and adults - 20 µg/kg and 0.5mg - four drops of a 0.25% solution, respectively.
Learning points: Phenylephrine is one of the most commonly used TV and could be an underrecognized source of perioperative complications. Identify the minimal amount of phenylephrine needed to achieve the outcome. The anesthesiologist should be aware of the drug dosage and side effects.

5114

2y old girl with bidirectional Glenn procedure for transposition of great arteries suffers ileus and pneumoperitoneum

Ivanova E.[1], Andonova R.[1]
[1]UHATEM «N. I. Pirogov» - Sofia (Bulgaria)

Background: TGA is rare, but life-threatening congenital malformation tath needs urgent surgical treatment. Bidirecitonal Glenn procedure connects superior vena cava and pulmonary artery providing temporary improvement of cardiac function. Nevertheless, chronic hypoxemia leads to tissue suffering, organ disfunction, including state of ileus and gastrointestinal malfunction.
Case Report: 2y old girl with situs inversus and TGA, undergone BDGP at the age of 4m, was presented to the clinic with ileus and pneumoperitoneum- somnolet, reduced tonus and reactivity, capillary refill >5s, T (rectal) 35C, peripheral vasposasm, acrocyanosis, tachypnea 50/min, Sa02 83%, tachycardia 220/min, BP 51/28mm Hg, extremely ballooned abdomen, miserere, melena. She was immediately intubated, a CVL was inserted in v. jug. int. sin., rehydrated, put on catecholamine support: Dobutamine 15mcg/kg/min, Dopamine 15mcg/min,

Noradrenaline 0,5mcg/kg/min. Urgent surgery was held: Laparotomy- peritonitis totalis (chemical), perforatio ventriculi (10cm), epiploitis gangrenosa; Revisio. Sutura. Omentectomia. All intestines were livid, pneumatic, with reduces pulsation of mesenteric vessels. Extremely severe postoperative period with high oxygen demand and catecholamine needs, unstable hemodynamics, tachycardia, arterial hypotension, tachypnea, oligo-anuria, hemorrhagic syndrome despite medications. 24h after surgery, exitus letalis was registered.
Discussion: Congenital heart diseases may cause severe chronic hypoxemia and hypoxia, damaging various tissues and organs. It may lead to gastrointestinal malfunction, intestinal congestion, thinning of ograns'walls, resulting in spontaneous perforation or rupture.
References:
1. «Anesthesia for congeniatl heart diseases», 3rd edition, Andrapolous.
2. «Handbook of clinical anesthesia», 7th edition, Barash.
3. «Smith's anesthesia for infants and children», 7th edition, Davis.
Learning points: An isolated but significnat malformation of one organ or structure may lead to disorders in other organs or systems, causing deterioration of a patient, even after palliative treatment of the underlying disease. Patients with congenital heart diseases and its consequences are highly complicated and challenging to diagnose and treat, taking in mind their abnormal circulation, slow thriving, permament supportive medication (including anticoagulants) and chronic lack of oxygen to tissues. Approach should be extended, complex and multidisciplinary.

5005

Management of a patient with Ullrich syndrome: a case report

Roberto A.[1], Martinho L.[1], Valente F.[1], Peixer I.[1]
[1]Centro Hospitalar Lisboa Central - Lisboa (Portugal)

Background: Ullrich syndrome (US) is a rare congenital hypotonic-sclerotic miodistrophy in which affected children develop progressive scoliosis, disabling contractures of the neck and trunk muscles, and joint limpness. Affection of respiratory muscles is frequent and ventilatory support may be required intermittently or permanently. Recurrent pulmonary infections can complicate the clinical course. Typical facial stigmata, micrognathia and a high arched palate can lead to a difficult airway scenario. Altogether, US patients are usually a challenge for the anesthesiologist.
Case Report: We present the case of a 17-year-old female US patient, ASA IV, with acute febrile neutropenia related to chemotherapy for Hodgkin lymphoma, scoliosis, respiratory failure requiring BiPAP therapy during sleep and when laid down, severe malnutrition and wheelchair dependency for locomotion; that was proposed for a central venous catheter (CVC) placement. Considering the patient fixed posture, left lateral decubitus was the only possible positioning with attention to pressure point padding. Conscious sedation was performed with alfentanil and propofol on a bolus regimen, with maintenance of spontaneous ventilation assisted by pressure support at her usual parameters. Ultrasound-guided CVC placement in the right internal jugular vein was executed and the patient completed the postoperative period in the ward uneventfully.
Discussion: US patients typically have generalized muscle weakness and contractures, as well as a debilitated general status. Careful positioning is crucial in order to avoid fractures, pressure ulcers and nerve entrapment syndromes. Airway management and ventilation can be challenging. Proper planning is necessary, and lung function tests and blood gas analysis should be available. The anesthesiologist plays a central role in the perioperative evaluation and optimization of these patients.
References:
1. Vandenberghe W, et al. Anesthesia and perioperative management for a patient with Ullrich syndrome undergoing surgery for scoliosis. Acta Anaesthesiol Belg 2010;61(1):43-7.
2. Orphananesthesia. Anaesthesia recommendations for patients suffering from Collagen VI-related myopathy 2015.
Learning points: US patients often present multiple challenges to the anesthesiologist, in relation to positioning, airway management and ventilation support. Careful planning is essential for a safe and successful perioperative care of these patients.

5340

Immediate resuscitation & management of anaesthesia for the newborn with laryngotracheoesophageal cleft associated with laryngeal web

Chavan D.[1]
[1]Jupiter Hospital - Thane (India)

Background: A laryngo-tracheo-esophageal cleft (LC) is a congenital malformation characterized by an abnormal, posterior, sagittal communication between the larynx and the pharynx, possibly extending downward between the trachea and the esophagus. We report the case of Laryngotracheoesophageal cleft in a preterm newborn associated with laryngeal web.
Case Report: Newborn presented with respiratory distress immediately after birth. In attempt to intubate , found to have type-IV congenital laryngeal web. Initially emergency tracheostomy was done with LMA under sevoflurane and local infiltrate and later diagnosis of laryngo-tracheo-esophageal cleft type IV was made via oesophagoscopy. As saturation was not maintained even after tracheostomy insitu laryngo-tracheo-esophageal cleft repair was done. The patient's family reviewed the case report and gave written permission for the authors to present / publish the report.
Discussion: Though, a not so common finding, this shows the importance of thorough clinical examination of newborns, especially preterm, keeping in mind congenital abnormalities. Early diagnosis and proper repair of laryngeal cleft are essential to prevent pulmonary damage and associated morbidity. Child should be assessed properly, and the surgical approach should be individualized based on the symptoms, other associated findings on airway endoscopy, and type of cleft.
References:
1. Roth B, Rose KG, Benz-Bohm G, Gunther H. Laryngotracheoesophageal cleft: clinical features, diagnosis and therapy. Eur J Pediatr. 1983;140:41-46.
2.Armitage EN. Laryngotracheo-esophageal cleft. Anaesthesia. 1984;39:706-713.
3.Pinlong E, Lesage V, Robert M, Mercier C, Ployet MJ. Type III-IV laryngotracheoesophageal cleft: report of a successfully treated case. Int J PediatrOtorhinolaryngol. 1996;36:253-262.
Learning points: Good Clinical Examination. Use of Supraglottic airway device. Opioid free regional anesthesia.

5544

Anesthesia for rhinoseptoplasty in patient with Friedreich's ataxia

Barbosa T.[1], Matias B.[1], Ribeiro R.[1], Tofani G.[1], Antonini R.[1], Hatasa C.[1]
[1]Instituto Materno Infantil de Minas Gerais - Nova Lima (Brazil)

Background: Friedreich's ataxia (FA) is an autosomal recessive genetic disease affecting 1 in 50,000 people with symptoms starting on the first or second decade of life. It develops with progressive ataxia, dysarthria, muscle weakness, areflexia, hypopalesthesia and proprioception alteration, in addition to non-neurological signs such as hypertrophic cardiomyopathy, diabetes mellitus and changes in ventilation. People with FA are also susceptible to malignant hyperthermia[1] and show increased sensitivity to neuromuscular blockers (NMB)[2]. The case presented is relevant and challenging nature is due to the scarcity of similar case reports in literature and the anesthetic risks inherent to the characteristics of the disease.
Case Report: J.F.Q.O., 16-year-old female. Proposal of rhinoseptoplasty under general anesthesia. Diagnosed with FA since 12 years of age with genetic confirmation and symptoms of considerably diminished muscle strength, dysarthria, infiltrative cardiomyopathy and advanced obstructive sleep apnea. Submitted to total intravenous anesthesia with Propofol and Remifentanil in TCI, NMB wasn't used. Orotracheal intubation and volume-limited mechanical ventilation. Monitored with ECG, NIBP, O2sat, FeCO2, BIS and esophageal thermometer. Patient kept hemodynamic and ventilatory stability throughout the procedure (MAP ± 75 mmHg; O2sat ± 100%; HR ± 80 bpm; temperature ± 36,2ºC; FeCO2 ± 32mmHg; BIS ± 50). At the end, peaceful awakening, extubated and maintained on spontaneous ventilation under nasal oxygen catheter, uneventful.
Discussion: The significant risk of major perioperative complications during anesthesia in patients with FA justifies the discussion about the most appropriate anesthetic technique for each specific case, corroborated in this case by the good results obtained. The studies on anesthetic management in FA are rare. This case report aims to contribute to the better and safer handling of these patients.
References:
1. Actualizaciones en anestesiologia y reanimacion, Vol 17, N° 3, pp 108-115, 2007. FALCONE, Anestesia en enfermedades mitocondriales.
2. Minerva Anestesioogical, Setembro de 2000; 66 (9): 657-60. LEVENK et al, Anesthesia for Freidreich´s ataxia.
Learning points: Degenerative and progressive diseases that are subject to having their development affected by drugs used during anesthesia constitute a great challenge, making the choice for the best anesthetic technique even more delicate.

4560

Airway management (laryngeal mask airway vs. endotracheal intubation) may influence the need of postoperative respiratory support for laser coagulation treatment of retinopathy of prematurity

Hauser B.[1], Tornai T.[2], Maka E.[2], Tövisházi G.[2], Szabó M.[2], Gál J.[2]
[1]Semmelweis University - Budapest (Hungary), [2]Semmelweis University Budapest - Budapest (Hungary)

Background and Goal of Study: Laser coagulation for retinopathy of prematurity (ROP) is performed on multimorbid premature babies, where anesthesia with endotracheal intubation (ETI) may result in prolonged postoperative mechanical ventilation (MV). We studied if airway management with laryngeal mask airway (LAM) vs. use of ETI may influence the need of postoperative respiratory support.
Materials and Methods: In this retrospective audit data from 128 consecutive patient were reviewed who undergone ROP laser coagulation between 07.2014 and 12.2017. After anesthesia induction with sevoflurane inhalation airway management was performed with either LMA 1 or ETI at the discretion of anesthesiologist. Following laser coagulation patient were observed at perinatal intensive care unit and received respiratory support (supplemental O2, non-invasive respiratory support with CPAP/BiPAP/HFNC or ETI and MV) as needed at the discretion of the neonatologist. Data are presented as mean±SD and t-test or chi square test were used as indicated. P<0,05 was regarded as significant.
Results and Discussion: Airway management was performed with ETI (ETI group) in 44, and LMA (LMA group) in 84 cases, respectively. Gestation age (ETI 25,8±1,8 weeks; LMA 26,3±2,2 weeks; p=0,23), birth weight (ETI 788±293 g; LMA 875±301 g; p=0,11) and duration of previous MV (ETI 20±17 days; LMA 15±14 days; p=0,08) were comparable. Patients needed intubation were significantly younger (ETI 34,9±1,9 weeks; LMA 37,0±3,2 weeks; p<0,01) and had lower body weight (ETI 1687±432 g; LMA 2231±638 g; p<0,01) at the time of intervention. In case of endotracheal intubation duration of anesthesia (ETI 147±45 min; LMA 102±37 min; p<0,01) and surgery (ETI 100±40 min; LMA 67±29 min; p<0,01) were longer. Use of LMA was associated with significantly less frequent (LMA 30%; ETI 72%; p<0,01) and shorter use (LMA 0,6±1,5 days; EI 4,5±8,5 days; p<0,01) of any kind of postoperative respiratory support. None in the LMA group but 21 patients in the ETI group needed postoperative MV via ETI (p<0,01). Fewer patient in the LMA group developed complications (incl. apnea/desaturation/bradycardia, sepsis, necrotizing enterocolitis) during postoperative observation period (LMA 12%; ETI 30%; p<0,01).
Conclusion: During ROP laser coagulation of premature babies the use of LMA for airway management (compared to ETI) was associated with fewer cases and shorter duration of postoperative respiratory support.

4646

Midazolam vs the game 'HospiAvontuur' to reduce preoperative anxiety in children undergoing surgery. A randomized clinical trial

Verbrugge L.[1], Hermans J.[2], Vrancken J.[3], Callebaut I.[1], Berends N.[4], Stessel B.[4], Department of Anesthesiology and Intensive Care, Jessa Hospital, Hasselt, Belgium
[1]Jessa Hospital Hasselt - Hasselt (Belgium), [2]Jessa Hospital - Hasselt (Belgium), [3]Department of Healthcare, Centre of Expertise PXL Innovation, PXL University College, - Hasselt (Belgium), [4]Jessa Hospital - Hasselt (Belgium)

Background and Goal of Study: Midazolam premedication is widely used to decrease preoperative anxiety in children. However, premedication may be associated with undesirable effects. Preoperative anxiety may also be reduced by information provision about an upcoming hospital admission, anesthesia and surgery to child and parents with a serious computer game. We aimed to assess if information provision with a serious game, the HospiAvontuur, is equally effective in the reduction of preoperative anxiety compared with midazolam premedication in children undergoing ENT surgery.
Materials and Methods: In this observer-blinded randomized clinical trial, children aged between 4 and 7 years scheduled for elective ENT surgery were randomized into an intervention group, i.e. children who played HospiAvontuur at home before surgery, and a control group, i.e. children who didn´t play the game at home but received oral midazolam (0.5mg/kg) 30 min before surgery. Preoperative anxiety level was measured with the mYpas-SF (modified Yale Preoperative Anxiety Score – Short Form) first in the holding area (T1) and a second time in the OR when the anesthesia mask was introduced (T2). Emergence delirium was assessed with the PAED (Pediatric Anesthesia Emergence Delirium Scale) at the postoperative care unit (PACU) after 5', 10' and 15'.
Results and Discussion: From November 2017 to June 2019, 31 children were randomized into the HospiAvontuur group (46%) and 36 children into the control group (54%). No significant difference in preoperative anxiety in the intervention group versus the control group was observed at T1 (26.2 ± 6.2 vs 28.6 ± 10.4, p=056) or T2 (43.2 ± 25.5 vs 35.5 ± 14.2, p=087). Postoperative delirium was significantly lower in the control group compared to the HospiAvontuur group (8.2 ± 5.8 vs 10.8 ± 5.1, p=0.04) at PACU arrival. This difference disappeared during the following measurements at 5, 10 and 15 minutes.
Conclusion: Information provision with the HospiAvontuur game prior to surgery seems to be equally effective in the reduction of preoperative anxiety compared to the administration of midazolam premedication in children undergoing surgery.

5136

Endotracheal intubation using a printed 3-dimensional airway model in a patient with Pierre Robin Sequence who has history of tracheostomy

Ahn J.[1], Park S.[1], Kim H. Y.[1]
[1]Pusan National University Yangsan Hospital - Yangsan (South Korea)

Background: The Pierre Robin Sequence (PRS), called Pierre Robin Syndrome, is defined as the clinical triad of micrognathia (small mandible), glossoptosis (backward, downward displacement of the base of the tongue) and airway obstruction. Patients with PRS may require general anesthesia and endotracheal intubation for various reasons. The clinical triad of PRS can present significant challenges for the anesthesia provider including airway obstruction and difficult intubation.
Case Report: A 6.5-year-old boy with PRS required anesthesia for closure of leakage site after percutaneous endoscopic gastrostomy (PEG) removal. The pediatric patient had history of tracheostomy and subglottic fibrosis. These suspected predictors indicated two problems; the difficult intubation, and the issue related to the size of endotracheal tube. We prepared for difficult intubation, and estimated suitable size of endotracheal tube using a printed three-dimensional (3D) airway model from computed tomography (CT) 3-Dimension Chest Airway in the pre-anesthetic planning of PRS patients with history of tracheostomy.
Discussion: Difficult intubation should always be considered because of the clinical features of PRS. Fiberoptic intubation is the gold standard, but other equipments have been used successfully including video laryngoscopes and intubating LMA. When difficult intubation is expected due to anatomical abnormalities of face and airway as in this patient, simulation of intubation with a printed 3-dimensional airway model before the anesthesia helps in safe airway management, can reduce the risk of airway irritation, injury and edema by reducing the number of endotracheal intubation attempts.
References:
1. Cladis F, Kumar A, Grunwaldt L, Otteson T, Ford M, Losee JE. Pierre Robin Sequence: A Perioperative Review. Anesthesia & Analgesia. 2014;119(2):400-12.
2. Raj D, Luginbuehl I. Managing the difficult airway in the syndromic child. Continuing Education in Anaesthesia Critical Care & Pain. 2014;15(1):7-13.
3. Chao I, Young J, Coles-Black J, Chuen J, Weinberg L, Rachbuch C. The application of three-dimensional printing technology in anaesthesia: a systematic review. Anaesthesia. 2017;72(5):641-50.
Learning points: Evaluation of airway in anesthesia of pediatric patients with congenital syndrome is important, and the model is very helpful better understanding of airway structures and may have wider application in anesthesia.

5301

Effect of sugammadex and pyridostigmine bromide for reversal agent in short-term pediatric surgery: relationship of recovery time and emergence agitation

An J.[1], Lee J.[1], Kim E.[1], Lee D.[1], Kim H.[1]
[1]Daegu Fatima Hospital - Dong-gu (South Korea)

Background and Goal of Study: Sugammadex reverses rocuronium-induced neuromuscular blockade quickly and effectively. Herein, we compared the efficacy of sugammadex and pyridostigmine in the reversal of rocuronium-induced light block or minimal block in pediatric patients scheduled for elective entropion surgery. Materials and Methods: A prospective randomized study was conducted in 60 pediatric patients aged 2–11 years who were scheduled for entropion surgery under sevoflurane anesthesia. Neuromuscular blockade was achieved by administration of 0.6 mg/kg rocuronium and assessed using the train-of-four (TOF) technique. Patients were randomly assigned to 2 groups receiving either sugammadex 2 mg/kg or pyridostigmine 0.2 mg/kg and glycopyrrolate 0.01 mg/kg at the end of surgery. Primary outcomes were time from administration of reversal agents to TOF ratio 0.9 and TOF ratio 1.0. Time from the administration of reversal agents to extubation and postoperative adverse events were also recorded. Four point agitation score (FPAS) was checked at 5min after arriving postoperative care unit (PACU) and pediatric anesthesia emergence delirim(PAED) sacle and visual analogue scale(VAS) were checked at 20,40 and 60min in PACU.
Results and Discussion: There were no significant differences in the demographic variables. Time from the administration of reversal agents to TOF ratio 0.9 and TOF ratio 1.0 were significantly shorter in the sugammadex group than in the pyridostigmine plus glycopyrrolate group: 1.30 ± 0.84 vs. 3.53 ± 2.73 min (P < 0.001) and 2.75 ± 1.00 vs. 5.73 ± 2.83 min (P< 0.001), respectively. Extubation time was shorter in the sugammadex group. Adverse events, such as skin rash, nausea, vomiting, and postoperative residual neuromuscular blockade (airway obstruction), VAS were not statistically different between the two groups. Incidence emergence agitation, FPAS and PAED 20 scale were 5/30(20%), 1.57 ± 1.07, 7.57 ± 2.8 in the sugammadex group, 15/30(50%), 2.23 ±1.25, 10.50 ± 3.43 in the pyridostigmine group.
Conclusion: Sugammadex provided more rapid reversal of rocuronium-induced neuromuscular blockade in pediatric patients undergoing surgery than did pyridostigmine plus glycopyrrolate. Incidence and score of emergence agitation were lower in the sugammadex group, because of more rapid recovery and extubation compared with the pyridostigmine group.

5317

Anesthesia approach for bronchogenic cyst in an infant causing pneumothorax

Dedic Simendic L.[1], Sijercic S.[1], Ahmetasevic D.[1], Mujkic L.[1]
[1]Univesity Clinical Center Tuzla - Tuzla (Bosnia and Herzegovina)

Background: Bronchogenic cyst in infants is congenital, benign lesion of lung or mediastinum. Although congenital bronchogenic cyst can often be asymptomatic rarely in infants and small children it can cause severe and life-threatening symptoms.
Case Report: A one month and six days old infant was hospitalized to Pediatric Intensive Care Unit due to respiratory failure. X-ray showed complete right pneumothorax with a diaphragm suppressed caudaly and a heart pushed to the left. The right chest was drained and placed on continuous suction. Next five days the baby breathes spontaneously with no signs of respiratory insufficiency. But the chest x-rays showed presence of pneumothorax. Then the CT scan showed a 25x30x40mm bronchogenic cyst in the right lower lobe. The infant was scheduled for toracotomy and excision of the cyst. Induction was with sevofluran, fentanyl and propofol. During the induction of anesthesia until thoracotomy the right chest was on continuous suction. Atraumatic intubation was performed on spontaneous breathing with a 2,5 diametar cuffed endotracheal tube. Intraoperatively saturation decreased several times, surgeons were requested to stop and saturation improved spontaneously. Postoperative course was uneventful.
Discussion: Treatment of bronchogenic cyst with or without symptoms requires surgical treatment. Cosidering advantages and disadvantages of one lung ventilation in infants we decided to proceed with two lung ventilation. Due to potential risk for development of tension pneumothorax an inhalation induction with sevofluran was performed. Endotracheal intubation, on spontaneus breathing, was facilitated with fentanyl and propofol. To avoid complication multidisciplinary approach is essential in pre and perioperative management.
References:
1. Ahrens b, Wit J, Schmitt M, Wahn U, Niggemann B, Paul K. Symptomatic bronchogenic cyst in a six-month-old infant: case report and review of the literature. J Thorac cardiovasc surg. 2001 Nov;122(5):1021-3.
2. Bansal T, Kiran S, Kamal K, Bangarwa N. Anesthetic management for lobectomy of a 2-month-old infant with bronchogenic cyst: Case report along with review of literature. Saudi J Anesth. 2017 Jul-Sep; 11(3): 340-342.
Learning points: Congenital cystic lesion of lung or mediastinum are often asymptomatic. In case of respiratory failure and pneumothorax in otherwise healthy children, bronchogenic cyst should always be considered.

5614

Positive end-expiratory pressure titration during general anesthesia improves lung function in preschool children: a randomized open label clinical trial

Mandras A.[1], Milicic B.[2], Sujica M.[3], Stankovic N.[3], Paunovic Z.[3], Simic D.[4]
[1]Institute for Mother and Child Health Care - Belgrade (Serbia), [2]Faculty of Dentistry - Belgrade (Serbia), [3]Institute for Mother and Child Health Care - Belgrade (Serbia), [4]Universty Childrens Hospital - Belgrade (Serbia)

Background and Goal of Study: There are no outcome data to recommend which RM is best for pediatric population, weather is sustained inflation or positive end expiratory pressure (PEEP) titration. As experimenta data showed 2,5 fold increase in transpulmonary pressure is needed to slow derecruitment. In humans, transpulmonary pressure at FRC is 5 cmH2O and 2,5 times increase would be 11-13 cmH2O. Based on this observation we hypothezied that in clinical setting, stepwise increase and decerase of PEEP form 5 to 11 cmH2O could improve lung function in healthy children undergoing general anesthesia.
Materials and Methods: Single tertiary center open label randomized controlled clinical trial that included 70 preschool children-I group n=35, C group n=35. Inclusion criteria: age 3-7, ASA I/II, elective noncardiothoracic surgery. Exclusion criteria: cardivascular and respiratory comorbidity, current respiratory infection and contraindications to chosen anesthetics.Consenting children were randomly allocated either to recieve intraoperative PEEP titration 5-11 cmH2O 20 minutes before the end of anesthesia (I group) or to be ventilated conventionally with PEEP 3 cmH2O (C group).Boold samples were colleted 20 minutes before the end of anesthesia (TI) and before extubation (TII). Primary outcome was change in PaO2/FiO2, secondary outcomes were changes in PaCO2, dynamic compliance (Cdyn) and frequency of postoperative desaturation. Delta value (Δ) was used to evaluate effect of PEEP titration. Independent sample t test was used to test size effect differences between groups and Fishers exact test was used to test the differences in frequency of postoperative desaturation between groups.
Results and Discussion: PEEP titration improved oxygentation (ΔTI-TII PaO2/FiO2: I group-30.3 vs C group 0.52;p <0.001) and lung compliance (ΔTI-TII Cdyn: I group -3.2 vs C group 0.63,p<0.001);produced hyperventilation in I group (ΔTI-TII PaCO2 I group 2.91 vs C group 0.17,p<0.001). There was no difference in frequency of postoperative desaturation (p=0.19; 1 patient in I group vs 4 in C group).
Conclusion: Stepwise PEEP titration could be beneficial in preserving lung function in children with healthy lungs on mechanical ventilation. Other ventilator parameters should be adjusted to avoid hyperventiation.
Acknowledgements: Design and write up assisted by dr Chulananda Goonasekara via ESA 2018 metorship scheme.

5875

Anesthetic management of neonate with polymalformative syndrome

Otero Gómez P.[1], Rey González R.[1], Doldán Pérez P. N.[1], Domínguez Varela M.[1], Otero Castro F. P.[1], Álvarez Escudero J.[1]
[1]Hospital Clinico Universitario De Santiago De Compostela - Santiago de Compostela (Spain)

Background: Polymalformative Syndromes cluster a large number of syndromes characterized by multiple congenital malformations. Many of them require surgery in the first few days or weeks of life. The anesthetic management of this patients is a challenge both by age and by associated malformations.
Case report: We present a case of a 4 day old female patient (weight: 2160g) with the following diagnosis: aberrant origin of the right subclavian artery, congenital diaphragmatic hernia, cystic mass in left hemiabdomen of undetermined origin. She required respiratory support, finally proceeding to endotraqueal intubation due to respiratory failure. A percutaneous central venous catheter was inserted on the

great saphenous vein at the right ankle. The patient arrived to the operating room intubated, sedated with a intravenous fentanyl infusion, hemodynamically stable. Routine monitoring of non-invasive blood pressure, ECG, oxygen saturation and continuous temperature monitoring (rectal probe) were stablished. Intraoperative patient temperature was regulated with an air warming device and a regulated room temperature (26ºC). We used a lung protective ventilation strategy (PCV: PIP 12, FR 33, I:E 1:1.5, PEEP 5). Anesthetic induction was performed with sevoflurane, fentanyl (5mcg) and rocuronium (1mg). We exchanged the uncuffed endotraqueal tube to avoid air leak (Cormack 1). For anesthetic maintenance we used sevoflurane, intravenous fentanyl infusion and rocuronium. The surgical procedure: repair of the diaphragmatic hernia, pancreatic mass resection, appendicectomy and intraoperative cholangiography was performed with no complications. The patient remained hemodynamically stable with a dopamine infusion <5 mcg/kg/min, with minimal blood loss. After the surgery the patient was transferred to the intensive care unit, the dopamine infusion was tapered 48 hours after the surgical procedure and the extubation went uneventful on the second post-operative day.
Discussion: Providing anesthesia for neonates has peculiarities that differentiate it from the rest of the age groups. Therefore, this type of surgical interventions should be performed by anesthesiologist with specific training in neonatal anesthesia. In recent decades, the improvement in perioperative critical care management of this patients have led to an increase in survival.

5816

Anaesthesia management of patient with frontonasal dysplasia undergone craniofacial surgery

Tümer M.[1], Küçükçotur Kokurcan E.[1], Canbay Ö.[1]
[1]Hacettepe University School of Medicine - Ankara (Turkey)

Background: Frontonasal dysplasia (FND), or median facial cleft syndrome, is a very rare congenital anomaly. There are three types of FNDs caused by the ALX gene mutation. Severity of symptoms varies according to the types of FNDs. Most common symptoms are hypertelorism, wide nasal bridge, Widow's peak, bifid nasal tip and median cleft lip (1). Airway pathologies, difficulty in positioning and limited neck movement could make endotracheal intubation difficult in FND. We aimed to present the anesthesia and airway management of a patient with type 3 (most severe) form of FND undergoing craniofacial surgery.
Case Report: A 6-year-old and 18 kg male patient with type 3 FND was admitted to the operating room for cranioplasty surgery. Turricephaly, flattened nasal root, high palate, corneal opacity, microphthalmia and hypertelorism were seen in his physical examination. Difficult airway preparation was performed because of its phenotypic properties. In addition to standard monitoring, invasive arterial monitoring was performed. Anesthesia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium. There was no difficulty in two handed mask ventilation. Videolaryngoscopy was used for intubation with a 5.5mm sized endotracheal tube. Anesthesia was maintained with 50 % O2, 50 % air, and 2 % sevoflurane concentrations. 1mcg/kg fentanyl was applied in bolus. Then, 0.1 mcg/kg/min remifentanil infusion was performed. There was a total of 250 ml blood loss during operation. 100 ml fresh frozen plasma and 100 ml eritrosit suspension were administered. Hemoglobin levels were 9.4, 8.9, 8.0 and 8.5 mmHg respectively. Operation lasted in 7 hours. At the end of the operation, 4 mg/kg sugammadex was applied for reversal. The patient was extubated and transferred to the intensive care unit.
Discussion: Midline defects are one of the most challenging cases in terms of difficult airway in anesthesia practice. In our patient, both airway difficulty and the need for strict hemodynamic control due to major craniofacial surgery made our anesthesia management difficult.
References:
1. Uz, Elif, et al. «Disruption of ALX1 causes extreme microphthalmia and severe facial clefting: expanding the spectrum of autosomal-recessive ALX-related frontonasal dysplasia.» The American Journal of Human Genetics 86.5 (2010): 789-796.
Learning points: We should be aware the difficulty of airway management and hemodynamic control in children with FND syndrome, which is rarely seen in anesthesia literature.

6168

Anaesthetic management of a child with Apert's Syndrome: A case report with good outcome

Machado A. S.[1], Nogueira S.[2], Xará D.[2]
[1]Centro Hospitalar de Sao Joao, Oporto - Oporto (Portugal), [2]Centro Hospitalar de S.João, Oporto - Oporto (Portugal)

Background: Apert's syndrome is due to a rare autosomal dominant defect on fibroblast growth factor receptor gene. This leads to craniosynostosis, midface hypoplasia and symmetrical syndactyly besides cardiac, renal and gastrointestinal alterations which can be very challenging for the anaesthesiologist.1
Case Report: A 9-year-old male child with Apert's syndrome was referred to dental extraction under general anaesthesia on day surgery. Pre-operative evaluation with history of tracheostomy since his first month until 4y, craniosynostosis correction at 4 months, syndactyly release and cleft palate repair at 18 months and multiple myringotomies before 4y without anaesthetic complications. Physical examination with pectus arcuaton and scoliosis, followed on paediatric surgery, cardiology and orthopaedics consultations, without signs/symptoms of cardiopulmonary disease. Airway evaluation with midfacial hypoplasia involving maxillary and zygomatic bones with orbital proptosis, and good open mouth. Laboratory studies, electrocardiogram and echocardiogram without alterations. Intraoperatively, ASA standard monitorization was achieved. General anaesthesia was performed with inhalatory induction with O2, air and sevoflurane, followed by an intravenous (iv) access, lidocaine iv (1mg/Kg) and tracheal intubation with Macintosh laryngoscope under spontaneous breathing. Maintenance with fentanyl (1ug/Kg) and sevoflurane under spontaneous breathing, and paracetamol (15mg/Kg) and ketorolac (1 mg/Kg) for post-operative analgesia. Surgery lasts 1,5 and an early extubation was performed as the patient emerged uneventfully without complications. Postoperative follow-up occurred in level one recover unit during 3h, with discharge after that.
Discussion: Anaesthetic management of Apert's syndrome can be very challenging due to airway dysmorphism and the possibility of difficult intravenous access due to limb deformity. This case highlights that with exhaustive preparation and planned actions to deal with eventual difficulties, general anaesthesia can be performed with safety standards.
References:
1. Wenger T. L., Hing A.V., Evans K.N. (2019). Apert Syndrome. GeneReviews® [Internet].
Learning points: Knowledge of the specificities of the disease, anticipation of difficulties and performance of an action plan will lead to a good management of these patients reducing complications intra and post-operatively.

6299

Airway approach to an unexpected gigant vallecular cyst in an infant

Rocha V.[1], Pinto A. M.[1], Costa C.[1], Loução M. R.[1]
[1]Centro Hospitalar de Entre o Douro e Vouga - Santa Maria da Feira (Portugal)

Background: Vallecular cysts are a rare cause of upper airway obstruction in children and have high incidence of recurrence1. They present with respiratory or feeding complications at a small age. Depending on size and airway obstruction they can be life threatening, complicating ventilation, airway visualization and intubation2. This case report describes the airway approach of a large asymptomatic vallecular cyst diagnosed in an infant during induction of general anaesthesia for an elective ENT procedure.
Case Report: A 9-year-old male, 37 kg, ASA I, Mallampati I, with no airway symptoms besides roncopathy, proposed for elective amigdalectomy. We performed IV induction and there was difficulty ventilating with face and laryngeal mask. Direct laryngoscopy revealed a large mobile vallecular cyst obstructing the airway. We were able to insert a 5,5 cuffed tube by dislocating the cyst laterally with the laryngoscope blade. The surgeon drained the cyst and surgery was postponed. Two months later the patient was rescheduled and he presented recurrence as seen in the preoperative MRI. Intubation was similar to the previous one and the surgical team removed the cyst. There were no complications postoperatively and the patient is still followed by the ENT surgeons since it has high recurrence rate.
Discussion: Stridor, increase work in breathing, chest wall retraction, cyanosis, apnoea or failure to thrive are frequent symptoms in large obstructing airway cysts. These symptoms can also be attributed to amygdaline hypertrophy, as our case has shown. When performing airway evaluation one must anticipate difficulty and be aware of rare cases such as this. Another possible approach was fibroscopy but due to the patient's age, collaboration was expected to be low.
References:
1. J Laryngol Otol 1987; 101:833-7.
2. Eur J Pediatr 2000; 159:79-81.
Learning points: Anaesthesiologists are responsible for airway management. This

case gives insight on how to manage a rare but recurrent upper airway obstruction. These cysts occur in infants as in adults and they can be asymptomatic. Knowing about their existence can make you change your airway approach and anticipate difficulties.

6320

Ultrasound assisted midline approach of a lumbar epidural catheter insertion for a fifth redo genital hypoplasia surgery in a five-year old child

Fucak Primc A.[1], Mičić S.[1], Pavelić G.[1], Zupcic M.[1]
[1]Clinical Hospital Centre Rijeka, Croatia - Rijeka (Croatia)

Background: The use of epidural catheters for intraoperative and postoperative pain relief in children is growing each year. Because the insertion of the epidural catheter in the pediatric population is done under general anesthesia and the anatomical structures are smaller it represents a challenge to the anesthesiologist. The use of ultrasound guidance enables visibility of the ligamentum flavum, dural structures and depth of the epidural space (1).
Case Report: A five year old child, weighing 22kg, was scheduled for a fifth redo genital hypoplasia surgery. Because of the estimated long duration of surgery and postoperative analgesia,we decided to insert an epidural catheter using ultrasound assistance for intraoperative and postoperative analgesia under balanced general anesthesia using sevoflurane induction and maintaiance, opioids and rocuronium. After the induction to general anesthesia,the child was placed in a lateral position for epidural catheter placement. Ultrasound imaging was performed with a linear 5-10Hz probe which was applied to obtain a paramedian,longitudinal view of neuraxial structures. The sonographic measurements included distance from skin to dura and skin to epidural space. The epidural punture was performed at the level of L3-L4 lumbar vertebrae, using a 19G Tuohy 50mm needle and 24G catheter.
Discussion: The measurements of the distance from skin to epidural space using ultrasound and the palpation loss of resistance technique were used and compared. The incomplete ossification of the vertebra allowed ultrasound visualisation and location of the depth of epidural space (1). The difference between the palpation technique and ultrasound assisted technique in obtaining depth of epidural space was 2 mm.
References:
1. Hans-Jurgen Rapp;A Folger;T Grau Utrasound-Guided Epidural Catether Insertion in Children, Aesthesia and Analgesia 101(2).333-339, August 2005.
Learning points: Epidural anesthesia in children can provide safe and effective analgesia if the right approach is chosen. Ultrasound imaging can be helpful for localising the right puncture site, needle trajectory and measure the depth of the epidural space from the skin.

4826

Erector spinae block for thoracic pain relief in a paediatric patient. Case report

Khrapak M.[1], Honcharenko H.[1], Vodianytskyi S.[1]
[1]National Children Specialized Hospital "OHMATDIT" - Kyiv (Ukraine)

Background: Erector spinae plane block was described by Forero at all. in 2016 as a new analgesic technique in adult patients with thoracic neuropathic pain. This approach has been considered as a reasonable alternative to invasive neuraxial techniques. Further publications have opened a wide discussion on its mechanism of action, efficacy and safety profiles. However, there are only a few case reports about the use of ESPB as a method of choice of prolonged perioperative analgesia in children. Our experience shows that this novel technique can be used as an alternative to neuraxial blocks for pain management of posterior thoracic wall pain in a daily practice of paediatric anaesthetist.
Case Report: A 12-year-old boy, weight 36 kg with a history of fall from a jet ski. After admission to Emergency Unit, he was diagnosed with multiple fractures of 7-8th right ribs and closed pneumothorax, that was drained. Without any other injuries and vital signs alteration, the patient suffered from severe pain (VAS 7/10), that was intensifying (VAS 8-9/10) during deep breathing or cough. A lack of significant pain relief after prescription of standard doses of intravenous acetaminophen and ketorolac was observed. We also couldn't prescribe any opioid medication because of parental dissent. Finally, the decision to provide ESPB was taken. Prior to manipulation, the patient was given 35mcg of dexmedetomidine i.v. The block was performed under ultrasound in-plane control, inserting the needle tip to contact with Th5 transverse process. For continuous infusion 20G epidural catheter was placed between erector spinae muscle and Th5 transverse process. Immediately after a bolus of 10ml of bupivacaine 0,25%, the patient was indicated a significant decrease of pain, 2/10 according to VAS. Further continuous infusion of 0,125% bupivacaine with a basal rate of 6ml/h and boluses for 2ml every 3 hours was started. During the next 3 days of bupivacaine infusion, no additional drugs other than acetaminophen were necessary for VAS 1-3 maintenance.
Discussion: This clinical case might be an illustration of a simple and safe alternative for children with severe thoracic wall pain. Catheter technique opens wide prospects for a patient (nurse/parent) controlled analgesia for those children who are contraindicated in opioids or those who need an early rehabilitation but refuse it because of its soreness.

4867

Bilateral ultrasound guided erector spine plane block as a complementary regional technique for post-operative multimodal analgesia in neuromuscular scoliosis surgery in pediatric patient, a case report

Jaramillo Ochoa I.[1], Reyes Escobar B.[2], Bolaños Noguera I. D.[3], Parada Alvarez M. F.[4]
[1]Instituto Ortopedia Infantil Roosevelt - Bogotá (Colombia), [2]Instituto Ortopedia Infantil Roosevelt - Bogota (Colombia), [3]Universidad Militar Nueva Granada - Bogota (Colombia), [4]Universidad de la Sabana - Bogota (Colombia)

Background: Postoperative pain in scoliosis surgery is frequent, given the complexity, extent and duration of the procedure. Multiple techniques have been described to diminish pain, but recently it has been proposed that administration of local anesthetic at the deep plane of the spinal erector muscle in the thoracolumbar region can provide adequate pain relief in this procedure due to its multidermatomal dispersion. In pediatric population there is few literatures found of this innovative technique and even less in patients with previous instrumentation of the spine like this case we present.
Case Report: We describe the case of a 12-year old female patient which has a neuromuscular thoracolumbar scoliosis with Cobb's Angle of 76. The spirometry shows a moderate restrictive pattern, an echocardiogram with normal ventricular function and patient presents a history of myelomeningocele surgically corrected previously, with sequelae of neurogenic bladder and four previous surgeries for placement of the Vepter lengthening system. TIVA (total intravenous anesthesia) was given throughout the surgery, and the intraoperative analgesia administered was ketamine at the beginning and at the end, dipyrone, lidocaine and magnesium sulfate infusion with morphine before waking up. The patient did not report pain in the first two hours of the postoperative period, only 3 mg of morphine were used in the first day and 2 mg in the second day with maximal pain score of 3,5/10, the patient only reported nasal pruritus as a side effect.
Discussion and learning points: We consider that the use of the ESP block is effective as a complementary technique to an intraoperative opioid-saving regimen, postoperative multimodal analgesia with diminishing opioid consumption, reducing pain scores and adverse effects observed in this pediatric population for the first 48 postoperative hours, even in patients with previous scoliosis surgery instrumentation. We think in the future anesthesiologist can consider protocolizing this strategy for the management of the pediatric patient that will be taken to spinal fusion surgery.
References:
1. Bajwa SJ, Haldar R. Pain management following spinal surgeries: an appraisal of the available options. J Craniovertebr Junction Spine. 2015;6:105-10.
2. Benyahia NM, Verster A, Saldien V, Breebaart M, Sermeus L, Ver-cauteren M. Regional anaesthesia and postoperative analgesia techniques for spine surgery - a review. Rom J Anaesth Intensive Care.

4971

Effect of Rocuronium and Sugammadex Under Sevoflurane and Desflurane Anesthesia in Children

Pirinc Sasioglu G.[1], Kendigelen P.[1], Tütüncü A. Ç.[1], Kaya G.[1]
[1]*Istanbul University Cerrahpasa Medical School - İstanbul (Turkey)*

Background and Goal of Study: This prospective and randomized study investigated the efficacy of sugammadex and changes in peak inspiratory pressure (PIP) in reversing the block of rocuronium in children in sevoflurane/desflurane anesthesia, The effects of rocuronium on hemodynamic parameters after sugammadex and the differences in both groups were aimed to be observed.
Materials and Methods: After the Ethical Committee has approved the study (no:3425), it was conducted in 148 patients between 2-18 years of age. The patients were divided into two groups as Group S (sevoflurane, n:73), Group D (desflurane, n:75) and 2 subgroups as 2-4, 5-10 years. Hemodynamic parameters and PIP were recorded during the procedure. Acceleromyography monitoring was performed. After anesthesia induction, the TOF device was calibrated. Sevoflurane/desflurane was set 1 MAC. Rocuronium was given 0.6 mg / kg. The time of TOF value from 100% to 0 was recorded as T1 and orotracheal intubation was performed. TOF measurements were continued throughout the operation. When TOF was 25%, it was recorded as T2 and sugammadex 2 mg/kg was administered. The time from TOF 25% to TOF>90% was recorded as T3. At the same time, systolic, diastolic blood pressures, heart rate and PIP and side effects were recorded for both groups after sugammadex injection.
Results and Discussion: Time to reach TOF 0 to 25% was significantly higher in Group S. T2 duration after induction in Group S was significantly higher and T3 duration was significantly lower in Group S for 2-4 years. In addition, T1 duration was significantly longer in Group S for 5-10 years. PIP measurements were higher at 2, 5 and 10 minutes after sugammadex injection in Group D compared to 0 minutes.
Conclusion: The duration of rocuronium was longer in Group S. Time to reach TOF '90% with Sugammadex was shorter in Group S. PIP was significantly higher in the desflurane group after sugammadex but it was insignificant in clinical terms. No side effects of sugammadex were observed, and a rapid and effective recovery was achieved from a single dose of 0.6 mg/kg rocuronium.

5225

Are our paediatric airway complications comparable to other large paediatric centres? A retrospective audit of all paediatric cases in a large, Australian metropolitan teaching hospital over 12 months

Desmond F.[1], Bianco A.[1]
[1]*Austin Health - Melbourne (Australia)*

Background and Goal of Study: Serious paediatric airway complications are relatively rare in modern anaesthesia practice, but the paediatric airway can be precarious for the occasional paediatric anesthetist. Minor airway and respiratory events are common, resulting in respiratory compromise. The most common complication is as a result of laryngospasm, other aetiologies include bronchospasm, airway obstruction, unrecognized oesophageal intubation and aspiration. APRICOT (the Anaesthesia PRactice in Children Observational Trial) found an incidence of 3.1% of all paediatric anaesthestics having a respiratory complication, laryngospasm in 1.2%, bronchospasm in 1.2%, post-operative stridor in 0.7% and aspiration in 0.1%, we decided to examine all paediatric cases and ensure that we were comparable (1).
Materials and Methods: We conducted an audit of all paediatric anaesthestics over a 12-month period. We specifically wanted to establish our rate of laryngospasm, desaturations and other airway complications, and ensure that we were as favourable as APRICOT.
Results and Discussion: A total of 523 paediatric cases were performed on our centre throughout 2018. The ages ranged from 6 months - 16 years old. The cases were predominately ASA 1 and 2, needing ENT, orthopedic, plastic surgery, radiological procedures or general surgery. There were 6 documented desaturations in our paediatric population (1.14%). There were 8 cases of laryngospasm (1.53%), there was no documentation of a difficult paediatric airway, and there were 3 cases of bronchospasm needing intervention with bronchodilators (0.57%). There were a number of other airway complications such as a vomit on extubation (1 case), an endotracheal tube obstruction from mucus (this was recognised and the ETT changed) and a case of an anaesthestic machine failure during the case, with no clinical consequences to the patient.
Conclusion: We can conclude that our paediatric anaesthestic practice is as safe as other centres. There will always be some laryngospasm and desaturation in the paediatric population, which should resolve quickly in the right hands.
Reference:
1. Engelhardt T., et al APRICOT Group of the European Society of Anaesthesiology Clinical Trial Network: a prospective multicentre observational study in 261 hospitals in Europe British Journal of Anaesthesia, 2018; 121 (1), pp. 66-75.

5567

Anesthesia management of pediatric patient with Bardet Biedl syndrome and Congenital methemoglobinemia

Tümer M.[1], Küçükçotur Kokurcan E.[1], Kılıçaslan B.[1], Kanbak M.[1]
[1]*Hacettepe University School of Medicine - Ankara (Turkey)*

Background: Bardet Biedl syndrome (BBS) is characterized by polydactyly, retinal dystrophy, renal and cardiac anomalies, truncal obesity, hypogonadism and mental retardation. Difficult intubation is manifested frequently in BBS (1). Methemoglobinemia (MH) is a serious medical condition associated with cyanosis and respiratory failure. MH is more common as an acquired form caused by toxic exposure. MH might also be appeared as congenital methemoglobinemia (CMH). We aimed to present the anesthesia management of a patient with BSS and CMH undergoing polydactyly and pes equinovarus surgery.
Case Report: A 3-year-old male patient with BBS and CMH was consulted for polydactyly and pes equinovarus surgery. He had phenotypic features of difficult intubation. He was examined and consulted to Hematology Clinic due to an increased methemoglobin level (22%). He was approved the operation when his methemoglobin level decreased to 1.7% after vitamin C and methylene blue treatment. After standard monitoring and preparation for difficult airway management, anesthesia was induced with 3 mg/kg propofol and 0.6 mg/kg rocuronium. There was no difficulty in mask ventilation. Videolaryngoscopy was used for intubation with a 5.5mm sized endotracheal tube. Anesthesia was maintained with 50 % O2, 50 % air, and 2 % sevoflurane concentrations. 1mcg/kg fentanyl was applied in bolus. Then, 0.1 mcg/kg/min remifentanil infusion was performed. Vital signs were within normal limits and O2 concentration was ≥ 98% during the operation. Methemoglobin levels were 1.6 %, 1.7 %, and 1.8 %, respectively. At the end of the operation (150 min.), 4 mg/kg sugammadex was applied for reversal. Patient was extubated and transferred to the Intensive Care Unit.
Discussion: BBS is a syndrome in which difficult intubation is common. The presence of CMH differed in our case from other BBS patients in terms of anesthesia management. Consequently, avoidance of drugs that might trigger methemoglobinemia, close monitoring of methemoglobin levels, and possession of methylene blue during the operation should be considered in anesthesia management of the patients with BSS, besides preparation for difficult airway intubation.
References:
1. Urben SL, Baugh RF. Otolaryngologic features of LaurenceMoon-Bardet-Biedl syndrome. Otolaryngol Head Neck Surg. 1999;120:571-4.
Learning Points: Effective preoperative evaluation and close intraoperative follow-up is essential in anesthesia management of these patients.

5496

Anaesthesia for patient with Friedreich's ataxia and cardiomyopathy: a case report

Ozmumcu E. A.[1], Bezen O.[1], Kafalı H.[1]
[1]*Istanbul Bilim University - Istanbul (Turkey)*

Background: Friedreich ataxia (FA) is a rare autosomal recessive disease which is characterized by ataxia which is marked in the lower limbs and may be accompanied by dysarthria,nystagmus and skeletal muscle weakness.The disease may also cause cardiomypathy, diabetes and restrictive lung disease.1 Since these factors affect anaesthetic management, special care is required.
Case Report: Twelve year old male patient who was diagnosed with FA, hypertrophic cardiomyopathy, scoliosis was scheduled for posterior spinal fusion. The patient was transferred to the operating room after 8h of fasting. After standart monitorization and sedation with intravenaous (IV) midazolam 0.025 mg/kg, train-of-four (TOF) monitor for neuromuscular monitorization with 5 min intervals was placed on the left forearm. Anaesthesia was induced with IV propofol 2 mg/kg, fentanyl 1 µg/kg and rocuronium 0.6 mg/kg. The patient was intubated with a 6.5 Fr cuffed reinforced endotecheal tube approximately 150 sec after the administration of neuromuscular blocking agent (NMBA). Propofol and remifentanyl infusion were used for anaesthesia maintenance. Additional 0.1 mg/kg rocuronium was adminestered 115 min after the first dose. TOF was observed from the moment of first NMBA administration until the full recovery. The total duration of the operation was 5h and 15 min. No complications occured and the patient was stable hemodinamically during the operation. After the first hour of the operation patient had spontaneos respirations and at the end of the operation had a TOF raito of 0.90. An uneventful extubation was achieved without administration of reversal agents and patient was discharged after a successful postoperative period.
Discussion: The main challenges in the anaesthetic management of FA are myocardial problems and neuromuscular blockade. Limited number of studies have been conducted and there is no consensus on anaesthetic management of these patients. We show that safe anaesthesia is possible in patients with FA, even in the

presence of cardiomypathy, with careful monitorization and close follow-up.
References:
1. Alper G, Narayanan V. Friedreich's ataxia. Pediatr Neurol. 2003;28(5):335-341.
Learning points: The patients with Friedreich's ataxia presenting for surgery should be screened for accompanying pathologies. It should also be kept in mind that although it is safe to use non-depolarizing NMBA's, proper neuromuscular monitorization is mandatory in patients with FA.

6234

Tube or no tube? A subglottic challenge

Branquinho P.[1], Conde R.[2], Bernardo R.[1], Neves I.[1]
[1]Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal),
[2]Centro Hospitalar Universitário Lisboa Norte - Lisboa (Portugal)

Background: Around 85% of cases of glottic stenosis in children are acquired, mostly related to prolonged tracheal intubation. Endoscopy is an essential diagnostic and therapeutic technique, and endoscopic dilation of airway stenosis is expanding as a treatment option due to its minimal invasiveness and good outcomes. A multidisciplinary approach involving Anesthesiologists, Interventional Pneumologists and ENT surgeons is needed to avoid possible serious consequences.
Case Report: Male infant, 22 months old, with a diagnosis of sickle cell anemia and previous history of prolonged intubation and subsequent need for tracheotomy due to severe respiratory infection on September of 2018. On February of 2019, tracheotomy was closed after an ENT evaluation, without immediate complications. Nonetheless, on first post operative day, stridor was observed and a diagnostic bronchoscopy revealed a 70% subglottic stenosis (Grade II) and an upper tracheal granuloma. After 2 weeks of failed conservative management, an endoscopic therapeutic approach was decided. A 3,5 rigid bronchoscope was used to dilate the subglottic stenosis under total intravenous anesthesia and high frequency jet ventilation. However, on anesthetic emergence, severe stridor and respiratory failure were noted. This clinical scenario was ascribed to airway edema related to the procedure and the patient was immediately sedated, intubated and transferred to the Pediatric ICU. 3 days after the procedure, after another failed extubation attempt, a new tracheotomy was performed in order to prevent a prolonged oral intubation. The infant was discharged 23 days later with no respiratory symptoms. An endoscopic tracheal dilations program was to be scheduled after hospital discharge.
Discussion: Prolonged intubation is associated with several complications, namely, most cases of acquired subglottic stenosis in children. Removal of the tracheotomy in infants must be done after a thorough multidisciplinary evaluation in order to prevent an emergent airway approach. Evidence is lacking on the best anesthesia conduct for endoscopic dilation of tracheal stenosis in infants in order to address challenges related to airway and anesthesia maintenance, ventilation and risk of subsequent airway edema and immediate respiratory failure.
Learning points: Subglottic stenosis is a frequent complication of prolonged tracheal intubation. Tracheal dilations can cause airway edema and an invasive airway approach might be necessary.

6061

Perioperative management of a 3-years-old infant with Pompe disease

Nogueira S.[1], Machado A.[1], Castro J.[1]
[1]Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Pompe disease is a rare autosomal recessive disease due to acid alfa glucosidase deficiency. Clinical features develop due to lysosomal accumulation of glycogen, especially in cardiac and skeletal muscle, leading to cardiomyopathy and respiratory muscle weakness.1,2
Case Report: A 3-year-old female was proposed to adenoidectomy, partial tonsillectomy and bilateral myringotomy due to significant airway obstruction. She presented history of Pompe disease, with cardiovascular and severe respiratory involvement, on enzyme replacement therapy since 2017 every two weaks. No history of previous surgeries. Preoperatively, a full blood count, blood chemistry, coagulation study, cardiac assessment (electrocardiogram and echocardiogram) and consultation with a paediatric cardiologist and a pneumonologist was obtained. Difficult airway was not anticipated. Intraoperatively, ASA standard monitoring was used. Induction was made with 50:50 oxygen and nitrous oxide, sevoflurane and fentanyl. Bradycardia ensued and was readily treated with atropine. Following tracheal intubation, 50:50 oxygen and nitrous oxide and sevoflurane were used, targeting BIS® 40-60. Muscle relaxants were not used. Surgery lasted for 2 hours and she remained haemodynamically stable, without periods of oxygen desaturation. Intravascular volume status was maintained. Emergence from anaesthesia occurred without complications. Full resuscitation equipment was always available. Postoperative period occurred in a paediatric intensive care unit without complications, with hospital discharge after 48 hours.
Discussion: Pompe disease has an incidence of 1:40000. Literature concerning perioperative period is poor with most demonstrating serious complications.2 Besides the high anaesthetic risk, this case highlights that with exhaustive preparation and proper measures, general anaesthesia can be performed with safety standards. With the introduction of enzyme replacement therapy, patient survival has increased as well as the need for surgical intervention under general anaesthesia.
References:
1. Steiner RD, Bali D, Berger K, et al. Pompe disease diagnosis and management guideline. 2006;8(5):267-288.
2. Stuart G. Anaesthesia recommendations for patients suffering from Pompe disease. orphan anesthesia 2016. 1-12.
Learning points: Proper knowledge of the disease and extensive preparation will lead to a better management of these patients with minimum complications and a good recovery.

6398

Anesthetic Management in child with the Hardikar Syndrome

Santos C.[1], Mariano F.[1], Meneses F.[1], Teixeira V.[1], CET Hospital Felicio Rocho
[1]Hospital Felicio Rocho - Belo Horizonte (Brazil)

Background: Hardikar syndrome is a multiple congenital anomaly syndrome, first characterized in 1992 by Hardikar et al. described two individuals with cholestasis, cleft lip / palate, retinal pigmentation, intestinal abnormalities and genitourinary abnormalities.[1] There are very few publications in the literature on this pathology and no information on the anesthetic management of these patients. The relevance of the case of a potentially serious patient undergoing surgery due to the syndrome is evident.
Case report: Female patient, 1 year and 9 months, with Hardikar Syndrome, submitted to anesthetic intervention for esophagogastroduodenoscopy (EGD): research of esophageal varices. Previously performed pre-anesthetic and the father informed about the syndrome and about the patient's vast anesthetic-surgical past. The hospital anesthesia team was informed about the case and scheduled elective EGD. Anesthesia was pure inhalation (8% sevoflurane) under mask and the child breathed spontaneously uneventfully.
Discussion: Hardikar syndrome is extremely rare: between 1992 and 2002, 4 people were reported in the literature.[1] Given the severity and rarity of the disease, studies are needed for better anesthetic management of these patients. Due to the presence of cleft lip and previous surgery, airway management can be challenging and the presence of difficult airway material should be left in the operating room. In addition, as the patient underwent various surgical procedures (mainly abdominal or genitourinary surgeries), she became part of the high risk group for latex allergy and a “latex free” environment can be considered. As the syndrome progresses with the evolution of liver dysfunction, it is prudent for the anesthesiologist to request evidence of liver function, as liver failure would cause several anesthetic implications, such as reduced drug metabolism and coagulation disorders.
References:
1. Aortic coarctation and carotid artery aneurysm in a patient with hardikarsy syndrome: cardiovascular implications in affected individuals. Am J Med Genet Part A 170A: 482–486.
Learning Points: Patients with rare syndromes have a large challenge for doctors. The Hardikar patient demands extreme caution and reiterates that planning and previous studies can improve postoperative outcomes.

6193

Challenges of the anesthetic management on a newborn with giant encephalocele due to Amniotic Band Syndrome

Melo W.[1], Roesberg M.[2], Lucas Passos R.[3], Bernardes De Oliveira R.[2], Cunha Ribeiro R.[2]
[1]Centro Universitario UNINORTE - Rio Branco (Brazil), [2]Hospital Vila da Serra - Belo Horizonte (Brazil), [3]Hospital das Clinicas da Faculdade de Medicina da USP - Ribeirao Preto (Brazil)

Background: Encephalocele is a protrusion of the skull content beyond its normal limits, through associated congenital bone malformation or, more rarely, through normal cranial foramen or fissures. The anatomical location of this anomaly together with other factors: such as hernial sac content, extent of malformation, associated CNS and/or systemic injuries, determine patient's treatment and prognosis.
Case Report: A 24 hours newborn, female, 2.195kg, with previous intrauterine diagnose of CNS malformation, presenting a CT compatible with giant encephalocele, with presence of extensive brain content protruding out of the cranial cavity secondary to the defective closure, was referred to the surgical center. Induction was made with 6% sevoflurane, 0.25mcg/kg sufentanil, 3mg/kg propofol and 0.5mg/kg atracurium. During orotracheal intubation, anteriorization associated with left airway deviation was observed, however, the procedure was performed uneventfully under a medium difficulty. During the surgical procedure, the patient presented massive bleeding accompanied by hemodynamic instability, requiring volume replacement guided by blood gas analysis and vasopressor (norepinephrine 0.15mcg / kg / min). After 72 hours in the neonatal intensive care unit, the patient was extubated, without the use of vasoactive drugs, stable and with no neurological changes.
Discussion: Patients with encephalocele demands a lot from the anesthetic-surgical point of view. In anesthetic management, airway care stands out as a critical point, and therefore, being prepared for a more invasive intervention is one of the possibilities to be considered. Other challenges related to venous access, imminent risk of bleeding and an uncertain prognosis make the approach of these patients complex and multidisciplinary.
References:
1. Hüsler, MR et al. When is fetoscopic release of amniotic bands indicated? Review of outcome of cases treated in utero and selection criteria for fetal surgery. Prenat Diagn. 2009 May;29(5):457-63.
Learning points: Patients with encephalocele demands a lot from the anesthetic-surgical point of view. The uncertain prognosis makes the approach of these patients complex and multidisciplinary. Airway care stands out as a critical point, so the anesthetist must be prepared for a more invasive intervention.

6376

Congenital Central hypoventilation syndrome (CCHS) - Case report and anaesthetic management

Crisóstomo J. N.[1], Bispo C.[2], Mendonça M.[1], Pires R.[1], Correia F.[1], Cenicante T.[1]
[1]Centro Hospitalar de Lisboa Central, Hos - Lisboa (Portugal), [2]Centro Hospitalar de Lisboa Central, Hos - Coimbra (Portugal)

Background: CCHS is a rare genetic autosomal dominant disease with an incidence of approximately 1 in 200 000 life births1, caused by a mutation in the PHOX2B gene characterized by autonomic dysregulation and hypoventilation, owing to lack of sensitivity of the respiratory center to hypoxia and hypercapnia, especially during sleep2.
Case Report: A 7 year-old female with clinical diagnosis of CCHS was scheduled to laryngotracheoscopy. Cyanosis and progressive worsening of hypoventilation was documented immediately after birth and invasive mechanical ventilation was ensued. Diagnosis was confirmed with PCR analysis showing the genotype 26Ala/20Ala in the alelles of the PHOX2B gene. Traqueostomy was done in the first month of life and patient was maintained under chronic ventilator support during sleep. Preanaesthetic assessment revealed no cardiac problems. Clinically she had been tolerating tracheostomy capping during the day with a PaO2 of 70,4 and pressure support ventilation during the night. No premedication was prescribed. Inalatory induction of general anaesthesia was achieved through the traqueostomy with sevoflurane. IV accesses was secured and 100 ug of alfentanyl and 40 mg of propofol were administered before suspension laryngoscopy was performed. Bradycardia was documented after induction but successfully reverted with atropine 0.4mg. Adequate depth of anaesthesia was maintained with sevoflurane and monitored using BIS. The child was transferred to the PACU with pressure support ventilation, recovering spontaneous ventilation within 15 min after surgery. No apnea or respiratory depression was observed.
Discussion: A recent systematic review regarding the perioperative management of CCHS was published1 and awareness must be raised for a successful outcome. Pharmacological agents with short duration of action should be used throughout the perioperative period to allow rapid awakening. Bradycardia after induction because of autonomic dysregulation has been reported before3. Adequate postoperative monitoring is crucial to avoid cardiopulmonary complications.
References:
1. Saptashree M. Basu, et al; Anesth Analg 2017;124:169–78.
2. Weese-Mayer, et al; Am J Med Genet. 2003;123A:267–78.
3. Sochala C, et al; Paediatr Anaesth. 1999;9:349–351.
Learning points: Anaesthetic management in CCHS requires anaesthetist's profound knowledge about pathophysiologic considerations to avoid any complication.

6390

General anesthesia without venous acess in pediatric oncological patients for external beam radiation: retrospective analysis of complications in 214 cases

Pimenta K.[1], Lemos S.[1], Baptista D.[1], Salomao L.[1]
[1]Instituto Nacional do Câncer - Rio de Janeiro (Brazil)

Background and Goal of Study: For very young patients, anesthesia is often required for radiotherapy. While the procedure itself is painless, immobilization is essential for radiation therapy. General anesthesia utilizing inhalational agents without intravenous (IV) access for minor procedures is controversial and provokes strong opinions among pediatric anesthetists. However, only limited data are available to support either side arguments. A rapid turnover system based on inhalational induction and maintenance of anesthesia without IV has been employed in our hospital. The objective of this study was to examine the complications of the procedure.
Matherial and Methods: We conducted a retrospective, observational cohort study of patients who had undergone external beam radiation therapy at National Cancer Institute performed from 2016 to 2018 to identify the incidence of adverse anesthesic events. The following epidemiological parameters were included age, sex, ASA classification, main diagnosis, anesthesia duration were recorded, complications.
Results and Discussion: A total of 214 treatment fractions were administered in 44 children undergone EBRT with inhalational anesthesia. Key eligibility criteria include absence of IV, incapacity of cooperation in staying still. 34,37% who underwent anesthesia was ≤ 6 years, all patients were ASA 2 score, procedures were performed within 30 min, 43,7% were CNS tumor. There are no adverse anesthesia events requiring emergency IV and/or intubation.
Conclusion: Although general anesthesia without IV remains controversial, very little data are available assessing the actual risk of IV access not being available during general anesthesia. It is also important to recognize the limitations of this technique, which requires experienced personal who are accustomed to work with children. Our data suggest that children undergoing general anesthesia for radiotherapy can be safely conducted without placement of IV line.

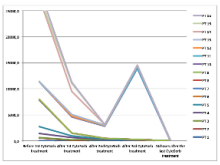
6192

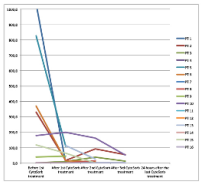
Hemoadsorption: a promising rescue therapy in the treatment of critical ill paediatric patients

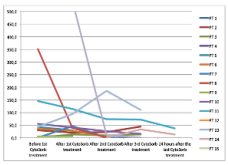
Milella L.[1], Raimondo P.[2], Lombardi N.[3], Maldera M.[4], Ficarella M.[1], Calabrese G.[1]
[1]Pediatric Department of Anesthesia and Intensive Care Unit (General and Post Cardiac Surgery) Giovanni XXIII - Policlinico di Bari (Italy) - Bari (Italy), [2]Azienda Ospedaliero-Universitaria Policlinico di Bari - Bari (Italy), [3]Department of Anesthesia and Intensive Care, University of Foggia, OORR - Foggia (Italy), [4]Department of Anesthesia and Intensive Care, School of Medicine Milano Bicocca - Milano (Italy)

Background and Goal of Study: Extracorporeal blood purification therapies are increasingly applied in the field of intensive care medicine. Compared to filtration-based methods mainly used for renal replacement therapy, newest adsorptive approaches have shown to specifically target the inflammatory cascade by the effective removal of relevant mediators. In the neonatal and pediatric setting however, the application of these methods brings with it various challenges but also profound technical difficulties. Recently, a promising extracorporeal device for cytokine adsorption (CytoSorb) was introduced. However, data for its application in critically ill pediatric patients remains sparse. We describe the use of Cytosorb in combination with standard therapy, in pediatric patients with multiple organ failures of various etiologies. The aim was to assess the effects on the inflammatory status, hemodynamics, and clinically relevant outcome parameters as well as the feasibility and safety of CytoSorb pediatric application.
Materials and Methods: The study comprised 16 critically ill pediatric patients admitted from May 2016 to October 2019 and treated in our neonatal and pediatric general intensive care unit. They underwent combined treatment with continuous renal replacement therapy (CRRT), plasmapheresis and CytoSorb as rescue choice.

Results and Discussion: We observed a marked decrease in inflammatory mediators, a reduction in catecholamine dosages and an improvement in organ functions, which was particularly pronounced in patients who survived. An early onset of treatment (at best within 24-48 hours after diagnosis of sepsis) seemed to be beneficial for eventual survival.
Conclusions: This case series is the first documentation of a set of pediatric/neonatal patients in which a combined therapeutic approach of hemadsorption and CRRT showed promising results with regard to hemodynamic stabilization, control of the inflammatory response, improvement in organ functions as well as safety and feasibility. Further prospective randomized controlled studies in the pediatric field are necessary to elucidate the full potential of hemadsorption in this set of patients.


IL-6(pg/ml)


IL-10 (pg/ml)


TNFa (pg/ml)

6183

Anaesthetic Management of a Child with Limb-Girdle Muscular Dystrophy type 2C

Cunha A.[1], Moita J.[2], Carneiro A.[3], Figueiredo J.[3]
[1]IPO Lisboa - Lisboa (Portugal), [2]Hospital São Bernardo - Setúbal (Portugal), [3]Hospital Dona Estefania - Lisboa (Portugal)

Background: Limb-girdle muscular dystrophies are a heterogenous group of genetic muscular diseases, characterized by a dysregulation between lesions and muscular repair responses. Its incidence is estimated to be 1:15.000 with either an autossomal dominant transmission (type 1) or recessive one (type 2), various subtypes being described according to the mutation (1). Most prevalent worldwide is subtype 2A (2). Manifestations can arise in childhood or adult life. Clinically, manifests as muscle weakness at pelvic/scapular areas. Anaesthetic implications are described such as malignant hyperthermia susceptibility, anaesthetic hipersensibility, cardiac disrrythmias and difficult airway. As such, regional anaesthesia remains a valid and preferable option in many cases. Given the low prevalence, few cases of anaesthetic management are described in the literature, especially regarding the rarest subtypes. In this abstract, we report the anaesthetic management of a 13-year old child, diagnosed with limb-girdle muscular distrophy type 2C, proposed for open repair of distal femur fracture.
Case Report: The child presented without focal deficits and a risk of difficult airway on our preoperative evaluation. Regional anaesthesia, with sequential spinal epidural anaesthesia was administered with 12.5 mg of intrathecal bupivacaine and, afterwards, 12mg of 0.2% epidural ropivacaine initiated 30 minutes before the end of surgery. However, due to intraoperative anxiety and agitation, sedation with propofol 6 mg/kg/h and ketamine 2 mg/kg/h was needed, preserving spontaneous ventilation. Besides this, no other complications were noted. Motor block reversal occurred 130 minutes after the sequential anesthetic technique. The postoperative analgesic regimen comprised epidural ropivacaine 0.2% for 38h and 1g paracetamol iv 8/8h.
Discussion: To our best knowledge, anaesthetic management of this condition is not reported in the literature. Regarding our clinical case, regional neuraxial anaesthesia was a suitable technique, without complications. However, intraoperative sedation required elevated doses of both propofol and ketamine, without the reported hipersensibility to these drugs described in the literature.
References:
1. Marin P. et al; Anesthetic implications of muscular dystrophies;Rev Colomb Anestesiol.2018; 46(3):228-239.
2. Chavez E. et al; General anaesthesia in two patients with Limb-Girdle muscular dystrophy; Anestezjologia i Rat 2013;(7):397-400.

6076

Anesthetic technique in a child with pallister-killian syndrome. A case report

Méndez Martínez E.[1], Lara Jiménez A.[1], Rubio Baines Í.[1], Mendoza Sorrondegui J.[1], Montero López P.[1], López Olaondo L.[1]
[1]Clínica Universidad de Navarra - Pamplona (Spain)

Background: The Pallister-Killian syndrome is a genetic affectation with very low prevalence in the world. It consists of a short arm tetrasomy of chromosome 12p, characterized by mental retardation and various dysmorphic features, including craniofacial ones.
Case Report: This report presents the case of a 6-month-old baby, with a history of Pallister-Killian syndrome who is operated on electively for a placement of bilateral tympanic drainage due to bilateral serous otitis. Among the different pathologies that children with this type of tetrasomy may present, this child presented a persistent arterial ductus with slight overload of the right ventricle, with preserved diastolic function and pulmonary pressure within a normal range, muscular hypotonia, mild developmental delay, hearing loss, uvula bifida, ogival palate, facial dysmorphia with wide forehead, flat nasal bridge and ocular hypertelorism and a non-operated left hip dysplasia. The anesthesia technique used was a moderate sedation started with inhaled anesthetics (sevofloran), and continuing with propofol (boluses up to 22 mg) because de increase of temperature, maintaining spontaneous breathing throughout the intervention. At the end of the procedure the child woke up without any complications and was transferred to the pediatric ICU for postoperative surveillance.
Discussion: Tetrasomy of chromosome 12 is syndrome with a low incidence nowadays, so there is very little literature on the anesthetic management of these children. We must be familiar with this type of syndromes because they can be an anesthetic challenge, since they involve craniofacial, cervical alterations, a marked hypotonia that can pose a risk for the development of malignant hyperthermia, in addition to cardiac malformations and involvement of other organs. In the existing literature in young children, an inhalation anesthesia was performed without complications, although monitoring is recommended throughout the intervention and the immediate postoperative period, in addition to having devices for difficult intubation.
References:
1. Pallister-Killian syndrome. Aarthi Srinivasan et al. 2014. (2) Anesthetic management of Pallister-Killian syndrome using a Bispectral Index monitor in a patient with severe seizures. Shinichiro Kira MD, PhD (Chief Anesthesiologist). 2011.
Learning points: The Pallister-Killian syndrome is a rare disease nowadays but with which we should be familiar, since it can become an anesthetic challenge.

5609

Anaesthesia and Spinal Muscular Atrophy type I under new drug treatment

Rodrigues D.[1], French M.[1], Patuleia D.[1]
[1]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background: Spinal muscle atrophy (SMA) is an autosomal recessive neuromuscular disease, characterized by progressive symmetrical muscle weakness. At SMA type I (a category of the disease in which) symptoms manifest before 6 months of age. Recently 2 new treatments have been approved. Onasemnogene abeparvovec-xioi (Zolgensma®), not yet approved by EMA, is given intravenously, requires concomitant corticotherapy and is associated with elevated liver enzymes and thrombocytopenia. Nusinersen is administered intrathecally by lumbar puncture and has been linked to reports of communicating hydrocephalus1.
Case Report: A 5mo female diagnosed with SMA type I had already received 3 treatment sessions of Nusinersen and 1 of Zolgensma®. She presented with nystagmus and ocular infraversion. Blood tests revealed transaminases elevation. CT scan suggested exuberant tetraventricular hydrocephalus in relation with Blake's Pouch Cyst (BPC), later confirmed by MRI. She was proposed for a ventriculostomy under general anesthesia. Surgery went without complications and extubation was possible. Patient was transferred to the pediatric intensive care unit, clinically stable. Since the hydrocephalus didn't resolve, she returned a week later for a ventriculoperitoneal shunt.
Discussion: BPC is linked to noncommunicating hydrocephalus but there are reports that factors that cause a change in CSF dynamic may trigger re-expansion of Blakes Pouch and associated hydrocephalus2. The administration of nusinersen has been linked to at least 4 cases of communicating hydrocephalus in children with SMA I. We hypothesize that intrathecal administration may have triggered the hydrocephalus. In contrast, there's only one case report associating SMA I and BPC, not related to this treatment or any trigger3. Additionally, anesthetic concerns of Zolgensma® are yet to be clarified.

References:
1. Drug Safety Update volume 12, issue 2; September 2018: 4.
2. Hirono S. et al. Postnatal development of Blake's pouch cyst: a case report and new insight for its pathogenesis. Childs Nervous System (2014) 30:1767–1771.
3. Shohoud, Sherien A et al. "Blake's pouch cyst and Werdnig-Hoffmann disease: Report of a new association and review of the literature." Surgical neurology international vol. 5,Suppl 4 S282-8. 21 Aug. 2014.
Learning points: SMA type I is a common cause of infant mortality. Treatment options have serious side effects and anesthetic related safety profile is not yet well stablished.

5467

Anaesthesia management of an infant with Donnai Barrow Syndrome

Izgi M.[1], Tumer M.[1], Halis A.[1]
[1]Hacettepe University School of Medicine Department of Anaesthesiology and Intensive Care - Ankara (Turkey)

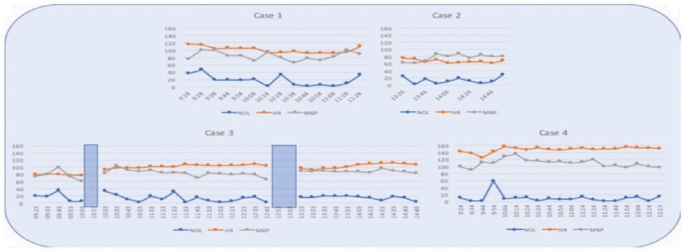
Background: Donnai Barrow syndrome (DBS) is an autosomal recessive disorder, first described in 1993 and characterized with wide anterior fontanel, hypertelorism, exophthalmos, myopia, sensorineural hearing loss, congenital diaphragm hernia or omphalocele, low molecular weight proteinuria and agenesia of corpus callosum (1). The diagnosis is based on characteristic clinical features and determination of the biallelic LRP2 pathogenic variant (2). We aimed to share our anesthetic management experience in a patient with Donnai Barrow Syndrome.
Case Report: A 2 years old 11 kg male patient with DBS was scheduled for orchiopexy surgery. He had central hypothyroidism. Even though he was prescribed with sodium valproate, levetiracetam, sultiame and levothyroxine for epilepsy and hypothyroidism, he had seizures for 1-2 times per week. The lab tests were between normal limits. In his physical evaluation, hypertelorism, exophthalmos, atypical facial features, and a mouth opening of 2 cm were seen. His physical status was ASA II. He consulted to pediatric hematology and neurology clinic in preoperative period. Before the operation, he was premedicated with oral midazolam of 1mg/kg. He was monitored in operating theatre and then IV cannula was placed. Following the induction with 3mg/kg propofol and 1mcg/kg fentanyl, a laryngeal mask of size 2 was placed. Anaesthesia maintained with an infusion of propofol of 10 mg/kg/hr and 0,07 mcg/kg/min remifentanil. The patient's vital signs were stable all along with the surgery. Postoperative analgesia provided with 15 mg/kg paracetamol. The laryngeal mask was taken out after the end of the operation with no complications. He was observed 24 hours after the operation and no seizure was reported, then he was discharged with no problems.
Discussion: To the authors' knowledge, our case report is the first about anesthesiology magement of DBS. We suggest extra caution is needed for these patients which there are no publications that will help to foresee possible complications to come.
References:
1. Donnai D., Barrow M. American Journal of Medical Genetics, 1993. 47(5):679-682.
2. Kantarci, S. et al. Nature Genetics, 2007. 39(8):957.

4446

Intraoperative evaluation of the nociception level index in paediatric patients under general anaesthesia

Ahijado Agudo J. M.[1], Martinez-García E.[2]
[1]Hospital Universitario Infantil Niño Jesús - Madrid (Spain),
[2]Hospital Universitario Infantil Niño Jesús - Madrid (Spain)

Background and Goal of Study: Anaesthetized patients cannot experience pain, since the cerebral cortex does not interpret the noxious signal, so it is more accurate to evaluate the nociception measured by the autonomic nervous system. The nociception level (NoL™) is an index of nociception based on nonlinear combination of heart rate, heart rate variability, photoplethysmograph wave amplitude, skin conductance, skin conductance fluctuations, and their time derivatives. The authors evaluated the abilities of the NoL index to discriminate between noxious and nonnoxious stimuli in pediatric patients under general anaesthesia (1).
Materials and Methods: An observational evaluation of intraoperative nociception was performed using NoL™ technology in four paediatric patients under general anaesthesia; three of them also received a nerve block (one patient an external popliteal sciatic nerve block- case 1- and two patients an epidural anaesthesia - case 2 and 3) and one patient (case 4) received total intravenous anaesthesia.
Results and Discussion: During general anaesthesia in paediatric patients, an adequate monitoring of nociception could be observed; revealing that maintaining the same harmful level and increasing the level of analgesia or performing a nerve block, an adequate level of nociception was reflected (NoL™ values between 0-25).
Conclusions: Adequate monitoring of intraoperative nociception in anesthetized patients is important for the correct use of analgesics, since insufficient use of them may favor post-operative pain and post-surgical persistent chronic pain. The NoL index changes proportionately with paediatric patients' response to various clinical noxious stimuli under general anaesthesia and discriminates noxious from nonnoxious stimuli.
References:
1. Ruth Edry, M.D., Vasile Recea, M.D., Yuri Dikust, et al. Preliminary Intraoperative Validation of the Nociception Level Index. A Noninvasive Nociception Monitor. Anesthesiology 2016; 125:00-00.



4535

Risk of neurodevelopmental disorders in children exposed general anesthesia: A National Population-Based Cohort Study

Lin P. A.[1], Chien W. C.[2], Chung C. H.[2], Yeh C. C.[2], Lu C. H.[1]
[1]Tri-Service General Hospital - Taipei (Taiwan), [2]National Defense Medical Center - Taipei (Taiwan)

Background and Goal of Study: Exposure to general anesthesia has been reported to induce neurotoxicity, impair learning, memory, attention, motor functions, as well as affect behavior in adult rodents and nonhuman primates. This study was designed to investigate the differences in risk of neurodevelopmental disorders among children exposed to general anesthesia compared to matched unexposed individuals.
Materials and Methods: A population-based cohort study was conducted with a longitudinal dataset spanning 2000 to 2015 from the Taiwan National Health Insurance Research Database (NHIRD). Procedure codes were used to identify children who received anesthesia. Neurocognitive outcome was measured by presence of ICD-9-CM codes related to neurodevelopmental disorders. Cox regression models were used to obtain hazard ratios of neurodevelopmental disorders with different exposure, duration, and frequency of anesthesia.
Results and Discussion: A total of 25550 children who received general anesthesia before six years of age, along with 25550 unexposed children (matched by gender and age) were enrolled in this study, not accounting for the 11644 individuals who met the exclusion criteria. There were 8649 who received general anesthesia before six years of age with neurodevelopmental disorders, and 7407 patients with neurodevelopmental disorders in the control group were included. Increased risk of neurodevelopmental disorders was observed in the exposure group with a hazard ratio of 1.223 (95% CI 1.184–1.264, $P < 0.001$). Children exposed to general anesthesia before four years of age showed increased risk of neurodevelopmental disorders (hazard ratios 1.420–3.987, CI 1.347–4.271, $P < 0.001$). Subgroup analysis demonstrated further elevated risks of neurodevelopmental disorders with longer (> 2 hours) anesthesia durations (hazard ratios 1.376–1.644, CI 1.172–2.645, $P < 0.001$) and multiple (> 1) anesthesia exposures (hazard ratios 1.397–1.786, CI 1.197–2.678, $P < 0.001$) compared with children unexposed to anesthesia.
Conclusion: Children exposed to general anesthesia before four years of age increased risk of neurodevelopmental disorders. This risk is further elevated with extended duration and frequency of anesthesia. The findings of this study should prompt clinical practitioners to proceed with caution when assessing young patients and planning managements involving procedures requiring general anesthesia.

4838

The factors affecting oral intake on POD1 after tonsillectomy in children

Niimi N.[1], Kataoka K.[1]
[1]*Juntendo University - Tokyo (Japan)*

Background and Goal of Study: Significant pain and severe functional limitation after tonsillectomy persist for at least 1 week postoperatively. In the US, parents tend to overestimate their child's pain and providers tend to overprescribe opioids, which introduces excess opioids into the community. In Japanese society, where parents and medical providers have negative attitudes to opioids, pain after tonsillectomy for children is usually treated only with acetaminophen. The goal of this study is to assess which factors have influence on the amount of oral intake: one form of functional limitations and to discuss about "favorable pain control" after tonsillectomy in children.
Materials and Methods: Retrospective observational study was conducted on 24 patients (16 males and 8 females, aged 3-14 years) who underwent tonsillectomy in Juntendo University Hospital from August 4th 2017 and November 1st 2019. Dividing them into two groups: Group1 (oral intake on POD1 was less than half) and Group2 (more than half), the patient backgrounds (age, sex, height, and weight) and peri-operative factors (operating time, opioid, acetaminophen, and dexamethasone) were compared between the two groups. The data were statistically analyzed with t-test using GraphPad Prism version 8.0.2 (159).
Results and Discussion: 15 patients were allocated in Group1 (whose oral intake on POD1 was less than half) and 9 in Group2 (whose oral intake on POD1 was more than half). There were no significant differences between the two groups in the backgrounds of the patients: age (p=0.31), sex (p>0.99), height (p=0.79), and weight (p=0.70). Group1 received significantly less acetaminophen intra-operatively than Group2 (p=0.030). There were no significant differences in other factors: intra-operative dose of fentanyl (p=0.27) and dexamethasone (p=0.63), post-operative dose of acetaminophen (p=0.78), and operating time (p=0.99). The amount of oral intake after tonsillectomy on POD1 is influenced by the dose of intra-operative acetaminophen but not other factors.
Conclusion: The pediatric patients who could eat more than half of their meals on POD1 after tonsillectomy received more acetaminophen intra-operatively than those who could not eat.

4881

Effect of nutritional status on induction and awakening during Sevoflurane anaesthesia in children

Singh A. K.[1], Maitra S.[1], Khanna P.[1], Saini K.[2]
[1]*All India Institute of Medical Sciences - New Delhi (India),*
[2]*Postgraduate Institute of Medical Educaiton and Research - Chandigarh (India)*

Background and Goal of Study: Malnutrition is a major problem in developing countries like India. 43% of children under 5 years of age are underweight and 48% are stunted. Modern inhalational agents like Sevoflurane provide a safe and pleasant way to induce anaesthesia in children who would not otherwise allow placement of an intravenous cannula. There are no studies till date elucidating the relationship between anthropometric measures of nutrition status and inhalational agent induction and awakening times.
Materials and Methods: 71 children between the ages of 1 to 9 years were recruited into the study between November 2017 and November 2018 at the All India Institute of Medical Sciences, New Delhi; India. Anthropometric data (height, weight, mid-arm circumference, waist circumference, hip circumference) and demographic data was noted for every child before the anaesthetic. Anaesthesia was induced using the study protocol and time to achieve various study parameters was noted. The volume of Sevoflurane was calculated using Dion's method. The primary outcome was correlation of anthropometric measurements to awakening times. Secondary outcomes were correlation between anthropometric measurements and induction time and total sevoflurane requirement.
Results and Discussion: 82 patients were recruited in the study. Median (IQR) age of patients was 4 (2- 6) y and 36 of them were female. Multiple linear regression analysis revealed that total sevoflurane consumption was dependent upon age [coefficient (SE) 0.02 (0.006); p=0.01], weight [coefficient (SE) 0.10 (0.04); p=0.01], mid-arm circumference [coefficient (SE) 0.26 (0.1); p=0.007] and waist circumference [coefficient (SE) 0.08 (0.03); p=0.01] of the patients after adjustment of total duration of anaesthesia. However, BMI (p=0.23), height (p=0.07), head circumference (p=0.09) and waist-hip ratio (p=0.67) were not significantly correlated with total sevoflurane consumption.
Conclusion: Induction time was correlated with mid-arm circumference (p=0.02) and awakening time was not correlated with any of the anthropometric parameters after adjustment for the total duration of anaesthesia.

5608

Emergence delirium in children: a Brazilian survey

Quintao V.[1], Oliveira C.[1], Morales E.[1], Carmona M.[1], Anesthesia and Cognitive Function Study Group
[1]*Hospital das Clinicas HCFMUSP, Faculdade de Medicina, Universidade de Sao Paulo - Sao Paulo (Brazil)*

Background and Goal of the study: Pediatric emergence delirium is presented as a disturbance of consciousness and attention, with disorientation and perceptual alterations, including hypersensitivity to stimuli and hyperactive motor behaviors. Many studies evaluated risk factors and pharmacological regimens to prevent and treat emergence delirium. There have been two reports on the practice of anesthesiologists concerning diagnosis, prevention, and treatment of emergence delirium. We aimed to know the practice of Brazilian anesthesiologists regarding the concept, risk factors, diagnosis, prevention and treatment of emergence delirium in children.
Materials and Methods: A REDCap® web-based survey was sent to all anesthesiologists associated with the Brazilian Society of Anesthesiology by SMS and e-mail. Considering a population of 24 thousand anesthesiologists in Brazil, a 95% confidence interval and a 5% margin of error, a sample size of 648 responders was required for this study.
Results and Discussion: We obtained 671 responses. Of respondents, 92,8% consider emergence delirium as a relevant adverse event and 39,6% reported that emergence delirium interferes "too much" in the quality of anesthesia in their institution. High levels of childhood anxiety, using sevoflurane and previous history of emergence delirium were considered as risk factors for 79.6%, 79,2%, and 72.3%, respectively. More than 90% also considered untreated postoperative pain as a risk factor. More than half of respondents reported that evaluate their patients regarding emergence delirium, but 95.1% did not routinely use a validated score tool. Sixty-seven percent reported not routinely using pharmacological strategies to prevent emergence delirium. Propofol and clonidine were the most common anesthetic given to prevent emergence delirium (15.7% and 15.4%, respectively). Midazolam, propofol, and dexmedetomidine were the most common medication given for treatment (25.6%, 34.5%, and 10.6%, respectively).
Conclusion: Although the majority of respondents considered emergence delirium as an important adverse event, many still confuse it with postoperative pain and few use pharmacological strategies to decrease emergence delirium in high-risk children. Also, as PAED is not validated in Brazilian Portuguese, diagnosis is underestimated leading to inadequate prevention and treatment.
References:
1. Huett C et al. Pediatric Drugs 19 (2017). Rosen HD et al. Pediatric Anesthesia 26 (2016).

5338

Brain and splanchnic tissue oxygenation monitoring in a newborn with an abdominal vascular malformation (VM)

Lema Tome M.[1], Romera Rabasa A.[1], Perez Ramirez Á.[1], Mantilla Martinez I.[1], Álvarez Baena L.[1], Sanjuan Lopez E.[1]
[1]*Hospital General Universitario Gregorio Marañón - Madrid (Spain)*

Background: Near infrared spectroscopy (NIRS)is a non-invasive technique which determines haemoglobin saturation and reflects the oxygen supply-demand balance. It is a useful method for monitoring not only neurological outcomes but also tissular perfusion (TP). We present a neonate with a peri-umbilical vascular malformation (MV) and vascular sequestration.
Clinical case: A 34-week-old neonate with a 28,5x16 mm periumbilical vascular lesion with arterial and venous shunts was admitted. The umbilical vein was the main venous drainage structure. Afferent vessels originated from the hypogastric, external iliac and mammary arteries were also visible. CT showed a peri-umbilical high flow arteriovenous congenital VM. This malformation had significant cardiac and respiratory repercussion; vasoactive drugs were needed. Once the patient was stable surgery was performed. We used standard monitorization and NIRS for both neural and somatic oxygenation monitoring. Upon ligating the umbilical vein and the nutritious arteries there was a clear and immediate NIRS elevation (both neural and somatic). The patient was then transferred to NICU and discharged two weeks after surgery.
Disussion: NIRS monitoring has gradually increased its indications, from neurological monitoring in major surgery to measure TP. Newborns' physiology makes it difficult to estimate oxygen needs and consumption, and NIRS allows us to determine at any given moment TP, showing its changes before they have clinical reflection. Established basal values for regional brain oxygen saturation vary depending on the presence of cardiac disease (up to38%) or in its absence (68%). Regional saturation values in the somatic area are up to 5-15% higher than in the brain's. In our case we confront an already pathological situation due to its

congenital etiology therefore basal values had to be considered bearing in mind that abnormal starting point. The evident improvement in NIRS values upon VM ligation made us expect a subsequent clinical improvement which did happen, making NIRS a helpful tool with prognostic implications.

Conclusion: Brain and somatic NIRS in paediatric patients is a non-invasive, safe and very useful tool to detect haemodynamic variations even before they have clinical significance. NIRS may also have a prognosis value.

References:

1. Kurth CD, Steven JL, Montenegro LM, et al: Cerebral oxygen saturation before congenital heart surgery. Ann Thorac Surg 2001; 72:187–192.

5376

Postoperative behavioral changes in pediatrics: an observational study

López Herrero R.[1], Gómez Pesquera E.[1], Martínez Rafael B.[1], Poves Álvarez R.[1], Sánchez Quirós B.[1], Gomez Sánchez E.[1]

[1]Hospital Clinico Universitario de Valladolid - Valladolid (Spain)

Background and Goal of Study: postoperative behavioral disturbance is common in children, although the etiology remains unclear. The incidence is wide ranging in the literature from 10% to 80% (1). It is usually a self-limited phenomenon, but can be severe. The aim of this study was to determine the incidence of behavioral changes within our institution and identify which children are at increased risk.

Materials and Methods: a prospective observational study of 198 children aged 1 to 12 undergoing elective major surgery under general anesthesia. Data collected: sociodemograhic, type of procedure, anaesthesia technique, and child anxiety. The presence of preoperative anxiety was assessed in the PACU using the m-YPAS (modified-Yale Preoperative Anxiety Scale), and the presence of negative postoperative behavioral changes (NPOBC) were assessed using the PHBQ (Post-Hospital Behavior Questionnaire), completed by parents 7-28 days postoperatively. Data were analyzed using logistic regression, with $P<0.05$ considered statistically significant.

Results and Discussion: 60.1% of children the exhibited preoperative anxiety. The incidence of NPOBC was 38,8% (77/198) on day 7 and 21,7% (43/198) on day 28. Multiple logistic regression identified the following risk factors: age, child anxiety and previous hospitalizations. There were no association between type of surgery, duration of surgery, sex and behavior changes.

Conclusion: Postoperative negative behavioral changes, such as nightmares and separation anxiety, may occur in up to 30% of all children undergoing general anesthesia and surgery. Of the children, 21.7% continued to demonstrate NPOBC 28 days after surgery. We found that preoperative anxiety, age and previous hospitalization is associated with increased occurrence of postoperative negative behavioral changes. Negative behavioral changes occur more frequently with decreasing age, previous hospitalizations and preoperative anxiety

References:

1. Stargatt, R., Davidson, A.J., Huang, G.H., Czarnecki, C., Gibson, M.A., Stewart, S.A. et al, A cohort study of the incidence and risk factors for negative behavior changes in children after general anesthesia. Paediatr Anaesth. 2006;16:846–859.

5528

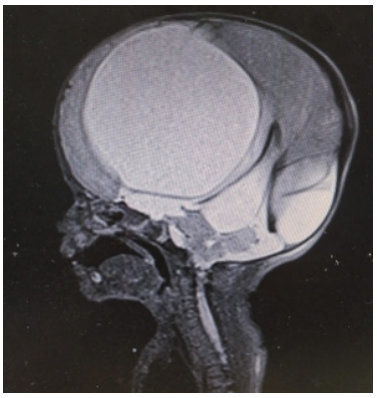
What's in a name? – Revisiting the syndromatic appearing child (SAC) for surgery, post-diagnosis

Nir E. A.[1], Aschkenasy G.[1]

[1]Shaare Zedek Medical Center - Jerusalem (Israel)

Background: Walker-Warburg syndrome (WWS) is a rare entity (~1:100,000)[1,2] and is a marginalia of this case report. Professional and ethical dilemmas arise in anesthetizing a premature neonate pre- and post- his disorder's diagnosis. We surface the original concerns of dealing with an SAC [3] and the problematics of repeat anesthetics to a recently defined pathology.

Case Report: MRR suffered prenatally from a macrocephaly, corpus callosum agenesis and retinal detachment. Genetic testing was equivocal for WWS. He was delivered by emergent Cesarean section due to bradycardias in a breech fetus with hydrocephalus. He weighed 2,200g and head circumference was 42.8cm. Apgars were 6/8 and he was admitted to the NICU apathetic and in mild RDS (on CXR). The macrocephaly, low set ears and hairline, axial hypotonia and poor suckling defined an SAC. Echocardiography showed mild TR, small PFO and MRI demonstrated bilateral supratentorial severe communicating hydrocephalus with dysplastic optic nerve, cerebellar hypoplasia and z-shaped midbrain (Fig. 1).



A VP-shunt was inserted on day three. We anesthetized him as per hydrocephalus, brain-stem insufficiency and hypotonia percautions on volatiles. He convulsed on day 7 and was put on antiepileptics, albeit negative EEG. Definitive WWS diagnosis arrived on day 29. We were scheduled to anesthetize him on day 53, for a gastrostomy insertion and were grappling with the new percautions WWS entails. We skipped possible MH triggers by TIVA, despite the 1st surgery. On day 118, MRR was sent to community nursing care.

Discussion: As we show above – what flew the first time can mean possible harm a second one. Previous case reports of WWS were uninformative as to a 'second hit' effect, post-diagnosis.

References:

1. Sahajananda H, Meneges J. Anaesthesia for a child with WWS. Paediatr Anaesth. 2003.
2. HARD Syndrome (p. 648) in Bissonnette B, et al (eds.). Syndromes: Rapid Recognition and Perioperative Implications, 2nd Ed. New York, McGraw-Hill, 2019.
3. Lubinsky M. Unusual appearance in a child: When and how to search for a possible syndrome. Postgrad Med. 1983.

Learning points: SAC genetic status must be verified ad hoc preop.

5735

Separation of omphalophagous twins with a non-viable twin immediately after birth Neonates, Anaesthesia,paediatric

Cardoso P. F. N.[1], Campanholo A. B. S.[1], Povoa P. G.[1], Silva G. M.[1], Canquerini C.[1], Carlos R. V.[1]

[1]Instituto da Crianca do Hospital das Clinicas - Sao Paulo University Medical School - Sao Paulo (Brazil)

Background: Conjoined twins are a rare malformation occurring in 1:200,000 births. In some cases, such as when there is an non-viable fetus, separation must be done immediately after birth, because the death of the non-viable twin carries a high risk of death to the other twin (1).

Case Report: A 18-year-old pregnant woman with prenatal diagnosis of imperfect conjoined twin pregnancy (omphalophagous and heterophagous fetuses) during the third trimester of pregnancy. According to ultrasound, one of the fetuses (fetus 2) had multiple malformations (non-viable twin). The babies were born of elective caesarean with gestational age of 37 weeks and 1 day under spinal anesthesia. Both live and male newborns, NB 1 with APGAR 8/9/10 and NB 2, 3/5/5 (NB 2–non-viable). Initial care performed by the neonatology team with orotracheal intubation of both. Continuity of care by anesthesia team with initiation of pressure controlled mechanical ventilation under balanced general anesthesia with sevoflurane, fentanyl and cisatracurium. After 68 minutes of birth, the great vessel (arterial and venous) from NB 2 were ligated with circulatory arrest. Complete separation of newborns occurred 148 minutes after birth. The presence of the stomach and small bowel of NB 2 was observed in the abdominal cavity of NB 1, in addition to a shared liver. Separation surgery lasted 190 minutes and anesthesia 260 minutes. NB 1 received a total of 120 mL ringer lactate and 10 mL albumin (estimated weight 2000 grams) and required continuous norepinephrine infusion for 90 minutes intraoperatively. He was referred to the neonatal ICU under mechanical ventilation after procedure, stable.

Discussion: Multidisciplinary planning is fundamental to the success of this type of procedure. The anticipation of challenges such as airway access and large vessel communication between twins is of great importance. Designated staff and materials are required for each patient, even when one of the newborns is non-viable. The clinical deterioration of one twin has repercussions on the other. The key factor in the outcome of the case was the multidisciplinary and coordinated performance of the obstetrics, anesthesiology, neonatology and pediatric surgery teams.

References:

1. Stuart, G. The anaesthetic management of conjoined twins. Seminars in Pediatric Surgery 24 (2015) 224-228.

Learning points: Multidisciplinary planning with anticipation of challenges related to the management of conjoined twins.

6084

Parental anxiety for the surgical operation and anesthesia of their children and the need of informational programs

Harana A.[1], Ioannidis R.[1], Chloropoulou P. P.[1], Vogiatzaki T.[1]
[1]University General Hospital of Alexandroupoli - Alexandroupoli (Greece)

Background and Goal of Study: Preoperative anxiety in children and their parents may lead to negative postoperative responses, which may cause long-term behavioral problems. The aim of this study was to assess the effect of specific demographic characteristics in parent's and children's preoperative anxiety and to investigate the desirable ways to control it.
Materials and Methods: Our sample was 128 Greek speaking children (1-14 years of age) who underwent routine surgery in our hospital. Before surgical operation the Spielberger State-Trait Anxiety Inventory questionnaire was completed by the parents. Children's preoperative anxiety was evaluated using the Modified Yale Preoperative Anxiety Scale.
Results and Discussion: Independent predictors of increased anxiety levels in parents were child's age (p=0.024) and gender (girls p=0.008), living in rural areas (parents: p<0.001; children: p=0.009), being a mother (p=0.046), high or low education level (p=0.031), a no premedicated child (p=0.007) and high baseline parental anxiety (p=0.003). Previous hospitalization (p=0.019), high situational parental anxiety (p<0.001), no premedication (p=0.014) and being the only child in the family (p=0.045) are found to be the main determinants of preoperative anxiety control in children. 74.2% of parents would like to be present at induction in anesthesia of their child. Mothers, younger parents (≤35 years) with younger children (≤5 years) and higher anxiety level, as well as parents whom third or older child is going to be operated express a greater desire to be present at induction in anesthesia. Other strategies that could help parents control their anxiety, according to their opinion, include a more detailed preoperative interview and informational program (69.5%), behavioral and psycho educational interventions (35.2%), clowns, toys and distraction activities (32.8%) and alternative medicine strategies like hypnosis, acupuncture and music therapy (10.2%).
Conclusion: Targeted policies of reducing preoperative anxiety should include parent's presence during induction of anesthesia, a detailed preoperative interview and informational programs, behavioral and psycho educational interventions and various distraction activities. It is needless to point out that National European Societies of Anesthesiology should take care of creating national guidelines on how to manage this situation, regarding the presence of parents during anesthesia induction.

4643

Intranasal dexmedetomidine versus oral midazolam premedication for emergence delirium in children undergoing strabismus surgery: A randomized controlled trial

Yao Y.[1], Zheng X.[1]
[1]Fujian Provincial Hospital - Fuzhou (China)

Background and Goal of Study: Dexmedetomidine is increasing popular used as a premedication in the pediatric population. We examined the hypothesis that the prevalence of emergence delirium would be lower with intranasal dexmedetomidine compared with oral midazolam premedication in children following strabismus surgery.
Materials and Methods: One hundred and fifty-six participants scheduled for unilateral strabismus surgery were enrolled. Participants were randomized in a 1:1:1 ration to receive premedication with intranasal dexmedetomidine 2 μg/kg (the dexmedetomidine group), oral midazolam 0.5 mg/kg (the midazolam group), or 0.9% saline (the saline group). The primary outcome was the incidence of emergence delirium by the Paediatric Anesthesia Emergence Delirium (PAED) scale. Secondary outcomes included inhalational induction quality, emergence time, postoperative pain intensity, length of post-anaesthesia care unit (PACU) stay, the incidence of postoperative nausea or vomiting (PONV), and parents' satisfaction.
Results and Discussion: The peak PAED scores (median, IQR) were (6, 5 to 7) in the dexmedetomidine group, (8.5, 8 to 12) in the midazolam group, and (9, 8 to 12) in the saline group (Figure 1).The incidence of emergence delirium was lower in patients given dexmedetomidine (6 of 52, 11.5%) compared with that in patients given midazolam (22 of 50, 44%; P < 0.001) or saline (25 of 51, 49%; P < 0.001). Likewise, the incidence of PONV was lower in the dexmedetomidine group (2 of 52, 3.8%) than that in the midazolam (11 of 50, 22%; P = 0.006) or saline (15 of 51, 29.4%; P < 0.001) groups. However, there was no difference between groups concerning postoperative pain scores and length of PACU stay.
Conclusion: Among patients undergoing strabismus surgery, intranasal dexmedetomidine 2 μg/kg premedication decreases the incidence of emergence delirium and PONV, and enhances inhalational induction quality and parents' satisfaction compared to oral midazolam 0.5 mg/kg.

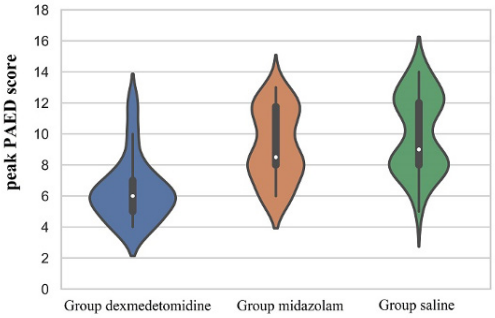


Figure Violin plots of the peak Pediatric Anesthesia Emergence Delirium (PAED) scores during the post-anaesthesia care unit.

4730

Neonatal lengthy sevoflurane exposure causes long-term deficits in microglial morphology

Chen L.[1], Zhou B.[1], Wang L.[2], Zhang J.[2], Liu J.[1], Jiang R.[1]
[1]West China Hospital Sichuan University - Chengdu (China), [2]Chinese Academy of Sciences - Beijing (China)

Background and Goal of Study: Lengthy exposure of general anesthetics causes neurobehavioral disorders in developing brain. However, the molecular and cellular mechanisms remain largely unknown. Microglia are resident macrophages in the central nervous system which play important roles in brain development. A hallmark of microglia is their highly ramified morphology and highly dynamic nature1. General anesthetics could influence microglial morphology and surveillance2. These study aims to explore the long-term effect of neonatal lengthy sevoflurane exposure on microglia morphology.
Materials and Methods: Seven-day-old C57BL/6 mice were randomly assigned to 2 groups. In the Sevo group, mice were exposed to 2.5% sevoflurane for 4 h. In the control group, mice were exposed to carrier gas (30% O2/70% N2) for 4h. Fixed brain slices from P14 mice were immunolabeled for IBA-1 to visualize microglia. Images were acquired under confocal microscope and morphological analysis was performed using ImageJ and Imaris software. Serial block face scanning electron microscopy (SBF-SEM) was performed to examine the ultrastructure of microglia and synapse in P21 mice.
Results and Discussion: Confocal images showed that microglia display altered morphology after length sevoflurane exposure. Microglia in the Sevo group displayed reduced total branches length and reduced arborization area compared to the control group. Morphological 3D reconstructions of microglia further showed that microglia in the Sevo group had larger soma volume. Consistently, SBF-SEM results showed that the Sevo group mice had lower microglia volume fraction and reduced microglia processed number. Subtle morphological changes of microglia may affect microglia–neuron interactions. The SBF-SEM results showed that the number of microglia contacted synapse number and synapse surface were decreased in the Sevo group.
Conclusions: The light and electron microscopic data together demonstrate that lengthy sevoflurane exposure disrupts microglia morphology. Microglia–neuron interactions were also altered with decreased synapses contacted by microglia after lengthy sevoflurane exposure.
References:
1. Frost JL, Schafer DP. Microglia: Architects of the Developing Nervous System. Trends Cell Biol.2016;26(8):587-597.
2. Liu YU, et al.Neuronal network activity controls microglial process surveillance in awake mice via norepinephrine signaling. Nat Neurosci.2019;22(11):1771-1781.

4896

Position of the largest cross-sectional area of the heart in pediatric patients with pectus excavatum: Implication of cardiac compression during cardiopulmonary resuscitation

Jang Y. E.[1], Park J. B.[1], Kim H. S.[1], Lee J. H.[1], Kim H. S.[1], Kim J. T.[1]
[1]Seoul National University Hospital - Seoul (South Korea)

Materials and Methods: This retrospective study investigated the position of the largest cross-sectional area of the ventricles to determine the optimal location and depth for chest compressions in pediatric patients with pectus excavatum (PE). Chest computed tomography images of 94 pediatric PE patients before and after correction surgery were compared with normal patients. The transverse level of the largest cross-sectional area of the ventricles (Vmax) was considered the optimal cardiac compression level. To evaluate caudal displacement, the length from the suprasternal notch (SSN) to Vmax (SSN-Vmax) was divided by the sternal length (SL) from the suprasternal notch to the xiphisternal joint (SSN-Vmax/SL). At Vmax, the proportional leftward deviation of the center of the ventricles from the midline versus transverse diameter of the thorax (LtDev) was calculated. The remaining internal thickness was calculated assuming the recommended chest compression depth (one-third of the anterior to posterior diameter).
Results and Discussion: Compared with the normal population (SSN-Vmax/SL, mean=81[SD=10.3]%; LtDev, 6.9[2.7]%), pediatric PE patients showed significant caudal displacement of Vmax (SSN-Vmax/SL, 98.2[15.1]% before correction, P<0.001; 100.4[13.5]% after correction, P<0.001) and LtDev (16.2[5.5]% before correction, P<0.001; 13.3[4.8]% after correction, P<0.001). The remaining internal thickness assuming chest compression was <10 mm in 57.4% and 19.1% of pediatric patients with PE before and after correction, respectively.

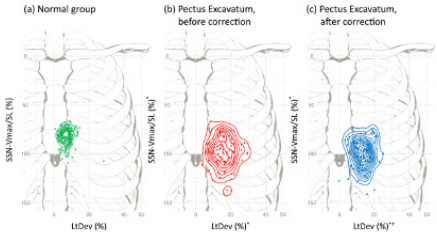


Figure 1. Proportional distance from the SSN to Vmax compared with the SL (SSN-Vmax/SL, %) and proportional leftward deviation (LtDev, %) over the sternum and rib cage (each point representing each patient). *P < 0.017 versus normal population. †P < 0.017 versus before correction.

Conclusion: Pediatric PE patients showed significant caudal and leftward deviation of the ventricles compared with the normal population despite correction surgery. In addition, the currently recommended compression depth would injure intrathoracic structures of pediatric PE patients during cardiopulmonary resuscitation.

5068

The impact of colloid loading on renal function for craniofacial reconstruction surgery in children: 6% Hydroxyethyl starch (HES) 130/0.4 vs. HES 70/0.5

Yoshino J.[1], Nakano R.[2], Ando S.[1], Okumura S.[1], Takamori S.[1], Fujimura N.[1]
[1]St. Mary's Hospital - Fukuoka (Japan), [2]Kyushu U - Fukuoka (Japan)

Background and Goal of Study: Craniofacial reconstruction is a significant challenge for the pediatric anesthesiologist. Primary concerns include blood loss and fluid management. Maintenance of normovolemia is critical during craniofacial surgery in the pediatric population, owing to the children's circulating blood volume. Third generation hydroxyethyl starches (HES) have been developed. However, only a few studies evaluated the efficacy and safety of 6% HES 130/0.4 and HES70/0.5 in children. Our analysis aimed to assess the effects of HES as the intraoperative volume therapy on renal function in children undergoing craniofacial surgery.
Materials and Methods: We reviewed the 32 children undergoing craniofacial surgery. Anesthesia was induced with air, oxygen, and sevoflurane, and followed by tracheal intubation. The maintenance of anesthesia was total intravenous anesthesia. After the induction of general anesthesia and before craniotomy, patients received approximately HES 130/0.4(n=23) or HES 70/0.5 (n=9) for about an hour. Serum creatinine, blood urea nitrogen (BUN), hematocrit, and the incidence of Acute Kidney Injury according to pRIFLE (Pediatric Risk, Injury, Failure, Loss, End-Stage Renal Disease) scores were analyzed at preoperation, at the end of the operation, on postoperative day 1-7, respectively. Our primary outcome was the changes in creatinine, BUN from before operation to highest creatinine value within 7days after surgery. Data are presented as mean ± SD. Overall comparisons between groups were made by two-factor ANOVA for repeated measures. On the other hand, overall comparisons within a group were made by one-factor ANOVA for repeated measures. Any other necessary comparisons were made by Student's t-test. A level of P<0.05 was considered significant.
Results and Discussion: The patients'demographic data did not differ between the group [2.0 ± 1.9 yrs. (HES130/0.4)vs. 1.4 ± 1.1 yrs(HES70/0.5)]. Serum creatinine and BUN after administration of HES 130/0.4 or HES 70/0.5 were within the normal range on postoperative days 1 to 3. Both BUN and serum creatinine did not significantly differ between groups on postoperative days 1 to 3 (P>0.05).
Conclusion: In this retrospective analysis of children undergoing craniofacial reconstruction, we conclude that the use of HES 130/0.4 or HES 70/0.5 based volume expansion does not impair renal function at least in the short term.

5109

The effects of shoulder roll on leak pressure and fiberoptic laryngeal view through a supraglottic airway device, i-gel, for children

Shinjoh E.[1], Yoshino J.[1], Tanaka M.[1], Arai C.[1], Nobukuni K.[1], Fujimura N.[1]
[1]St.Mary's Hospital - Kurume (Japan)

Background and Goal of Study: A folded towel is often used as a shoulder roll to cause extension of the head and open upper airway when we induce general anesthesia for children. Despite the usual advantages of shoulder roll in bag-mask ventilation, the impact of shoulder roll on i-gel was not fully elucidated. Therefore, the current study was designed to investigate the effects of shoulder roll on leak pressure, and fiberoptic view of the epiglottis in using i-gel.
Materials and Methods: Twenty pediatric surgical patients with 10 to 20 kg of weight were enrolled in this study. Before anesthetic induction, a folded towel was placed under the patient as a shoulder roll. After stepwise inhalation of sevoflurane, the size #2 i-gel was inserted in each patient (Position S). The leak pressure, tidal volume, and the fibreoptic glottis view through the proximal end of the device were simultaneously examined. The evaluations were subsequently repeated when after removing shoulder roll (Position N). The fibreoptic view through the i-gel was graded as follows; score 1=full view of vocal cords; score 2=more than 50% of the visible cords and epiglottis; score 3=less than 50% of the visible vocal cords, arytenoid cartilage, and epiglottis; and score 4=only the epiglottis was visible without vocal cords and arytenoid cartilage. Data are expressed as mean (SD) except those of the fibreoptic view (median [interquartile range]). Student's t-test and Wilcoxon-Mann-Whitney test were used to determine significance (p < 0.05), as appropriate.
Results and Discussion: The age, height, or weight of the enrolled patients was 3.7 ± 1.4 years, 98 ± 10 cm, and 16.0 ± 2.9 kg, respectively. The leak pressure was similar in both position [23±6 cmH2O (Position S) vs.22±6 cmH2O (position N) (P=0.66)]. Similarly, the tidal volume was not significantly different in both positions [17 ± 5ml kg-1 (Position S) vs. 19 ± 8 ml kg-1(Position N), p=0.35]. The fiber-optic score was significantly deteriorated in Position N [3(IQR:2-4)] than Position S [1 (IQR:1-3)](P < 0.01). Sufficient ventilation was possible in the presence or absence of shoulder roll. However, placing the shoulder roll achieved a better fiber-optic view. These results suggest that the i-gel where shoulder roll placed is a useful conduit for fiberoptic-guided intubation via the i-gel.
Conclusion: Fiber optic view through i-gel is better in shoulder roll position.

5118

Efficacy of ultrasound-guided Transmuscular Quadratus Lumborum Block in paediatric abdominal surgery. A randomized controlled trial

Guardabassi D.[1]
[1]Hospital JM Ramos Mejia - Buenos Aires (Argentina)

Background and Goal of Study: Transmuscular quadratus lumborum block (TQLB) is a novel regional anaesthesia technique that has proven to be effective for postoperative pain reduction in different abdominal surgical procedures. The present study evaluated its efficacy on pain intensity and analgesic consumption in children undergoing low abdominal surgery.
Materials and Methods: The study included forty patients, aged 1 to 6 years, ASA I-II, scheduled for low abdominal surgery (hernia repair or orchiopexy) under general anaesthesia. They were enrolled in two groups: TQLB block plus systemic analgesia (group 1; n=20) versus wound infiltration done by the surgeon plus systemic analgesia (Group 2; n=20). Informed consent was obtained from

the patients' parents. Randomization was achieved using the closed envelope technique. Exclusion criteria included known allergies to local anesthetics, infection or redness at the injection site, anatomic anomalies or coagulation disorders, liver diseases, or unwillingness to participate in the study. All blocks were performed by the same anesthesiologist after placement of a ProSeal laryngeal mask airway before surgery. Wound infiltration was done by the surgeon at the same time. Analgesic consumption (ibuprofen) within the first 24 postoperative hours, pain intensity scores (FLACC scale) at 60 minutes, 2, 6 and 24 hours after surgery, time in which the first analgesia was required, satisfaction levels of the parents (0-10), adverse events related to systemic analgesia and time to hospital discharge were evaluated and registered.
Results and Discussion: We found differences between both groups in ibuprofen consumption (80mg vs 185mg; p<0.01) and pain scores (FLACC) within the first 24 postoperative hours at each interval (p<0.02 for every point in time analyzed). Time in which the first analgesia was required was longer for the TQLB group (18 vs 10 hours; p<0.05). Satisfaction levels of the parents were also higher in the first group (p<0.05). Adverse events related to medication and time to hospital discharge showed similar results.
Conclusion: The results of this study showed that in paediatric patients undergoing unilateral inguinal hernia or orchiopexy the TQLB provided longer and more effective postoperative analgesia compared with wound infiltration and systemic analgesia, which has been in use for many years.

5284

The effect of recruitment maneuver on ventilation volume for children after anesthetic induction

Tsukamoto M.[1], Taura S.[2], Hitosugi T.[2], Yokoyama T.[2]
[1]Kyushu University Hospital - Fukuoka (Japan), [2]Kyushu University - Fukuoka (Japan)

Background and Goal of study: Atelectasis occurs in the majority of children during induction of general anesthesia. In clinical practice, the recruitment maneuver (RM) might be useful to prevent atelectasis. It has been shown to improve oxygenation and restore lung volume, and may improve ventilation perfusion ratio. Recently, a new procedure of RM was suggested; positive end-expiratory pressure (PEEP) is increased step by step to target pressure. Therefore, we assessed the effects on tidal volume (TV) and hemodynamics change before and after this RM in pediatric patients.
Materials and Methods: The pediatric patients (ASA-PS: I-II, aged 3 month to 6 yrs) underwent general anesthesia for elective dental or oral surgery. They were divided into three groups; Infant group (0-12 months), preschool children group (1-6 yrs) and school children group (7-10 yrs). Following tracheal intubation, mechanical ventilation was commenced in pressure-controlled manner with 15 cmH2O and a PEEP of 4 cmH2O. RM was performed progressively in steps by 5cm H2O every four breaths up to 35 cmH2O. Before and after RM, TV, heart rate (HR), blood pressure (BP) and SpO2 were recorded. The difference of these parameters before and after RM were analyzed statistically by Mann-whitney U test.
Results and Discussion: A total of 60 patients were included; 20 in each group. TV and HR (before vs after RM) were 60.7 ± 9.9 vs 78.8 ± 14.0 mL (p<0.001) and 142.3 ± 13.0 vs 144.5 ± 12.7 bpm (p=0.01) in Infant group, 140.1 ± 30.4 vs 168.2 ± 37.7 mL (p<0.001) and 124.5 ± 15.3 vs 127.5 ± 12.6 bpm (p<0.001) in preschool children group, 225.8 ± 56.7 vs 255.6 ± 57.0 mL (p<0.001) and 113.4 ± 19.1 vs 117.0 ± 18.4 bpm (p<0.001) in school children group. BP decreased by 5-10% after RM in all groups. There were no patients with respiratory (desaturation, barotrauma) and/or hemodynamics (hypotension) complications. RM might improve pulmonary oxygenation with hemodynamic stability, although HR increased by 2-17% after RM.
Conclusion: The RM increased TV significantly by 5-10% (17-30 mL), which might indicate reduction in atelectasis in pediatric patients after induction of anesthesia.

5313

Should we correct the fluid deficit in children fasting longer than the recent Preoperative Fasting Consensus Statement?

da Silva Quesado J. L.[1], Tabolcea I.[1], Fernandez Villarreal W.[1], Van Obbergh L.[1]
[1]Hôpital Universitaire Erasme - Bruxelles (Belgium)

Background and Goal of Study: Although the most recent guidelines recommend shortening the fasting time for children undergoing surgery [1] (which are now allowed to drink clear fluids until the last hour), some children still do not drink for a longer time. The goal of this study is to evaluate whether the correction of this fluid deficit would improve their hemodynamic. The response to fluid bolus (FBo) administration was assessed measuring the transthoracic aortic velocity-time integral (AoVTI).
Materials and Methods: Observational, prospective study. 30 patients were included, aged 3 to 6, classified as ASA I and scheduled for one-day surgery. The mean fasting time for liquids was 9h54min (Standard deviation +/- 4h13min). Anaesthetic management was standardized; maintained by inhaled sevoflurane kept at 1.0 MAC during the measurements. Heart rate, non-invasive blood pressure and the AoVTI (mean of 3 AoVTI measures) were registered 5 minutes after induction; after a passive leg-raise test (PLR); after a FBo of 20 ml/kg of a crystalloid solution. Stroke Volume (SV) was calculated by AoVTI × Area of Left Ventricular Outflow Tract. The cut-off was set at 15% increase of SV [2]. Data was analysed using Microsoft's Corporation Excel 2019® and RStudio Desktop®. Correlation coefficient was used to compare the variation of the SV and the number of hours fasting. A ROC curve was built for the correlation between SV variation and the number of hours fasting.
Results and Discussion: No differences were found on the SV before and after the PLR. A 23% increase of the SV after the FBo was found. We found no linear correlation between the number of hours fasting and the variation of the SV (p=0.0820). The ROC curve showed no correlation between the fasting duration and the variation of the SV after FBo.
Conclusion: Our study did not find a relation between the duration of the preoperative fasting period and the responder status to a FBo. Therefore, in children aged 3 to 6, a prolonged preoperative fasting does not seem to reduce intravascular volume in a significant manner and the usual habit of correcting this deficit does not seem useful.
References:
1. Disma, N., et al. Clear fluids fasting for elective paediatric anaesthesia. European Journal of Anaesthesiology. 2019. 36(3), 173–174.
2. Gan, H.,et al, J. Predicting Fluid Responsiveness in Children. Anesthesia & Analgesia 2013; 117(6), pp.1380-1392.

5320

Dexmedetomidine provides neuroprotection against hypoxia-indced neurotoxicity via the inhibition of microglial NOX2 activation in the hippocampus of neonatal rats

Chen X.[1], Zheng X.[1], Chen D.[2], Zeng W.[2]
[1]Fujian Provincial Hospital - Fuzhou (China), [2]Sun Yat-Sen University Cancer Center - Guangzhou (China)

Background and Goal of Study: Perinatal hypoxia remains a major cause of death and neurodevelopmental disability. Microglial activation contributes to hypoxic injuries in the developing brain. NOX2 (also known as gp91phox), a key isoforms of NADPH oxidase, is a predominant source of reactive oxygen species (ROS) overproduction in microglia. Dexmedetomidine (Dex) exhibits potent neuroprotection in brain injury models. However, the mechanisms of Dex for hippocampal neuroprotection remain elusive. The aim of this study was to investigate the neuroprotective effects of Dex after neonatal hypoxic brain injury and examine in vivo and in vitro whether such actions reflected modulation of microglial NOX2 activation.
Materials and Methods: Postnatal day 3 (P3) rats were subjected to hypoxia exposure (5% O2, 2 h). The effect of Dex (25μg/kg) on hippocampal microglial activation and cognitive function was evaluated up to 28 days after hypoxic injury. By using a rat hippocampal neuronal-microglial in vitro co-culture model, we further assessed Dex modulation of hypoxia (1% O2 for 12 h) - induced microglial reactivity and neurotoxicity.
Results and Discussion: Dex significantly improved spatial learning and memory ability after neonatal hypoxia. The functional improvement with Dex was associated with suppressed microglial activation, reduced pyramidal neurons loss and improved synaptic plasticity in the hippocampus. Importantly, Dex attenuated hypoxia-induced oxidative stress, as evidenced by downregulated NOX2 protein expression

and activity, as well as decreased malondialdehyde and 4-Hydroxynonenal in the hippocampus. In addition, Dex also inhibited hypoxia-induced microglial activation in vitro, with lower nuclear NF-κB p65, IL-1β, IL-6, TNF-α, ROS and NOX2. Microglial-induced hippocampal neuronal apoptosis in vitro was also markedly reversed by Dex. Moreover, the neuroprotective effect of Dex was alleviated in microglia that transfected with gp91phox siRNA, as well as in NOX2 (gp91phox-/-)-deficient mice. Conclusion: The neuroprotective effects of Dex after neonatal hypoxic brain injury appear to be mediated, in part, through the inhibition of microglial NOX2 activation.

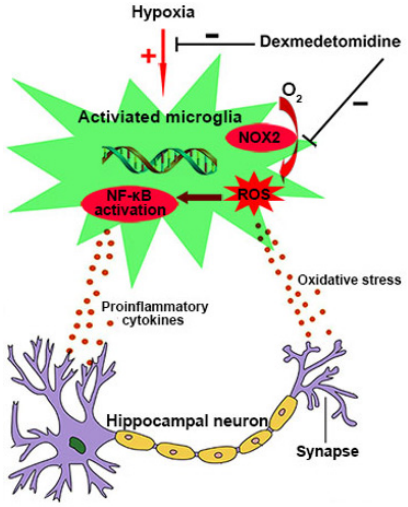


Figure 1. Schematic representation of the neuroprotecton of Dex against hypoxia-induced neurotoxicity

5346

Ultrasound-guided cannulation of the brachiocephalic vein in neonates and infants

Chavan D.[1]
[1]*Jupiter Hospital - Thane (India)*

Background and Goal of Study: Central venous catheter (CVC) insertion in neonates and small infants is a challenging and high risk procedure. Ultrasound (US) guided cannulation increases the success rate and reduces procedural-related complications. US-guided supraclavicular cannulation of the brachiocephalic vein (BCV) in–plane approach is a new approach that may be advantageous in case of difficult central venous catheterization.
Materials and Methods: After obtaining Informed Consent from parents, the study was conducted as per the protocol approved by internal review board. We performed a retrospective analysis of all CVC cannulations placed in neonates & infants who underwent cardiac surgical operation and in NICU & PICU units during calendar year 2019 in our department. For cannulation of the BCV, an in-plane technique was used to guide the needle into the target vein. The use and management of a central line was reviewed by trained nurse and Pediatric anesthesia fellows until the patient was discharged from the hospital. Analysis of the data was performed using simple comparative statistical methods.
Results and Discussion: Ninety Six patients were identified, 41 were neonates weighing <3 kg and 55 were infants weighing >3 kg. Cannulation was successful in all patients. No significant late complications like thrombosis, infection or pneumothorax occurred. Catheters were well tolerated post-operatively, with no accidental dislodgement and no removal because of discomfort like redness or fever. CVCs were withdrawn within 6-15 days.
Conclusion: The US-guided Supraclavicular in-Plane approach to the BCV is a feasible and safe alternative in neonates and infants. It has lesser chances of pleural puncture. It is also well tolerated by Neonates & Infants.
References:
1. Thompson ME. Ultrasound guided cannulation of the brachiocephalic vein in infants and children is useful and stable. Turk J Anaesthesiol Reanim 2017;45:153 7.
2. Breschan C, Platzer M, Jost R, Stettner H, Beyer AS, Feigl G, et al. Consecutive, prospective case series of a new method for ultrasound guided supraclavicular approach to the brachiocephalic vein in children. Br J Anaesth 2011;106:732 7.
3. Merchaoui Z, Lausten-Thomsen U, Pierre F, Ben Laiba M, Le Saché N and Tissieres P (2017) Supraclavicular Approach to Ultrasound-Guided Brachiocephalic Vein Cannulation in Children and Neonates. Front. Pediatr. 5:211. doi: 10.3389/fped.2017.00211.

5397

The heart rate variability derived Newborn Infant Parasympathetic Evaluation (NIPETM) Index for monitoring intraoperative analgesia in children aged 0-2 years under general anaesthesia – an observational pilot study

Neumann C.[1], Babasiz T.[2], Thudium M.[1], Wittmann M.[1], Straßberger-Nerschbach N.[1], Klaschik S.[1]
[1]*University Hospital Bonn, Dept. of Anesthesiology and Intensive Care Medicine - Bonn (Germany),* [2]*University Bonn - Bonn (Germany)*

Background and Goal of Study: Depth of anaesthesia measurement via processed EEG has become clinical standard in anaesthesia, whereas nociception is judged by indirect surrogate parameters such as heart rate or blood pressure increase. Intraoperative pain therapy may be improved by continuous measurement of the parasympathetic tonus. Recent studies have shown that monitors that derive an index through variations in respiratory sinus arrhythmia have diagnostic value for detecting surgical stimuli in children 2 years and older1, but so far only few measurement data are available in neonates and infants <2 years. With the presented trial, we would like to investigate the feasibility and reliability of intraoperative nociception measurement with this new approach.
Materials and Methods: After approval by the local ethics committee, 54 children with a total of 63 surgical procedures were analysed (weight 6,5 +/- 3,3 [mean +/- sd] kg). The derivation for the NIPE monitor (MDMS, Germany) was non-invasive via the routinely derived ECG signal and data were recorded during general anaesthesia. A NIPE value between 50 and 70 is considered to be optimal, whereas values below 50 indicate a lack of analgesia and a sign of a hemodynamic reaction. Values above 70 indicate an overdosage of analgesia. We considered the following as painful events to correlate with the NIPE value: venous access, skin incision, intubation and administration of propofol. The relative decrease of the NIPE-Index was analysed in dependence of the different noxious stimuli and correlated with an increase of the heart rate. The binomial test was used for statistical evaluation.
Results and Discussion: We could show a significant decrease of the NIPE-Index following the painful events, 19,2% after venous access, 16,5% after skin incision, 29,2% after intubation and 17,4% after propofol bolus, respectively ($p<0,05$). Analysis of heart rate variation was significantly less reliable than NIPE measurement in detecting painful stimuli.
Conclusion: The NIPE-Index reacts adequately – and more precisely than HR - to noxious stimuli of children under two years of age and might be a feasible tool for optimizing intraoperative pain management.
References:
1. Julien-Marsollier F et al., Br J Anaesth, 2018; 121(2): 462-468.
Acknowledgements: This abstract contains part of the doctoral thesis of T. Babasiz.

5426

Confirmation of an intravenous catheter placement by normal saline flush test with color doppler imaging in pediatrics

Kamata M.[1]
[1]*Saitama Medical Univercity International Medical Center - Hidaka (Japan)*

Background and Goal of Study: In recent years, the use of ultrasound (US) to facilitate intravenous (IV) access in children has increased. In addition to placement, US can also be used to confirm whether the IV cannula is properly positioned in the vein. One of the techniques used for this purpose is observation of a change of the color doppler imaging (CDI) at the proximal site when normal saline is injected. However, no previous study in adult or pediatric patients has determined the volume of normal saline that is needed for this technique. The current study evaluates the volume of normal saline for detecting the change of CDI when IV cannula is placed properly in pediatric patients.
Materials and Methods: After IRB approval, we conducted a prospective observational diagnostic study. Inclusion criteria included age < 6 years with ASA PS 1-2 presenting for general anesthesia. After inhalational induction, a 22 gauge IV cannula was placed in the forearm with US guidance. Vascular sonography was performed in the axilla at the level of the axillary artery and vein. Normal saline was injected at a speed of 1 mL/second using a 5 mL syringe while observing the vessels with CDI. We noted the amount of normal saline injected when the CDI changed around the axillary artery and vein. This was performed twice and the average was calculated. The distance from the IV puncture site at the skin to the axilla and the depth of the vessel from the skin at puncture site were also recorded.
Results and Discussion: The study cohort included 30 patients ranging in age from 0.3 to 5.5 (2.6 ± 1.6) years and ranging in weight from 4.2 to 20.5 (12.2 ± 3.7)

kg. All patients had an IV cannula placed with US. First attempt cannulation success in this cohort was 28/30 (93%). A change of CDI was noted in all the patients with injection of normal saline. The average volume of normal saline needed to detect the change was 1.4 ± 0.4 (range: 0.8 – 2.1) mL. The length from the puncture site to axilla and the depth of the vein at puncture site were 16.4 ± 3.2 cm and 0.5 ± 0.2 cm, respectively.
Conclusion: Confirmation of successful IV cannula placement by normal saline flush with CDI is simple and easy to perform with minimal cost. A volume of approximately 2 ml of normal saline provided an easy to read CDI signal.

5607

Comparison between tablet computer and nitrous oxide for decreasing anxiety related to intravenous catheterization in children: a single-center randomized controlled trial

Cools E.[1], Manon C.[2], Dongois E.[2], Pichon I.[2], Habre W.[2]
[1]Hôpitaux Universitaires Genève - Genève (Switzerland), [2]University Hospitals Geneva - Geneva (Switzerland)

Background and Goal of Study: Nitrous oxide (N2O) in an equimolar mixture of 50% oxygen (O2) is commonly used for sedation for painful procedures. However, recent concerns on the potential deleterious effect of N2O on health providers in addition to the environmental impact encourage the implementation of new tools for alleviating anxiety and pain in children. Thus, we aimed at comparing the efficacy of "active" distraction with 50% O2-N2O gas mixture during insertion on an intravenous line (iv) on anxiety (assessed by the Modified- Yale Preoperative Scale (m-YPAS), pain and parental and health care satisfaction. Ethical approval of the study (CER-2017-01557).
Materials and Methods: Children aged 3 to 9 years who needed an iv-line were included following parental consent. We excluded children with cognitive disorders, epilepsy or a contra-indication for the use N2O. All children had EMLA® cream 5% (Lidocaïne-Prilocaïne 25mg), applied at the puncture site and baseline m-YPAS score was obtained. One hour later, children were randomized to either active game playing on the tablet computer (iPad®) or inhalation of 50% O2-N2O and iv-line was placed 3 minutes afterwards. Anxiety and pain scores were assessed during the iv placement, and 1 hour afterwards. Data are presented as mean and [95% CI].
Results and Discussion: Intermediate analysis was performed on 33 children (23 boys) with 18 having the active distraction and 17 the N2O. No difference in age (71.2 [59.6-82.8] vs 79 [66.2-91.8] months), basal mYPAS (5.5 [5-6] and 6.3[5.2-7.4]) and pain scores was evidenced between children with active distraction and those having N2O, respectively. Failure in securing the iv line was similar in both groups. Time for successful insertion was shorter with the active distraction (9.5 [5.8-13.2] vs 13.9 [9.8-18.1] min). One-way analysis of variance revealed comparable changes in mYPAS within and between groups. Conversely, pain scores were significantly higher during iv-line insertion in children having active distraction (4.7 [2.9-6.4] vs 2.3 [0.6-4.0]). No difference was noted in the parental and health care satisfaction scores.
Conclusion: Preliminary results failed to demonstrate the superiority of active distraction over inhalation of 50% N2O in a mixture of 50% O2 to alleviate anxiety and pain induced by iv-line insertion in children.

5657

Right Ventricular Myocardial Performance Index as a marker of right ventricular suffering in children with Respiratory Distress Syndrome

Naumovski F.[1], Trposka A.[1], Toleska M.[1], Kuzmanovska B.[1], Kartalov A.[1], Leshi A.[1]
[1]University Clinic of TOARILUC - Skopje, University of St. Cyril and Methodius - Skopje (Republic of North Macedonia)

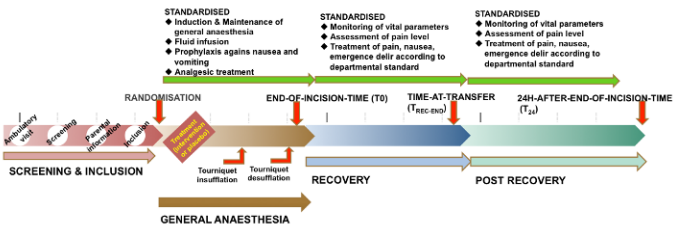
Background: As a noninvasive Doppler measurement of global ventricular function the right myocardial performance index (RVMPI) incorporates both systolic and diastolic function of the right ventricule (RV). RVMPI is defined as ratio of the sum of the isovolumic contraction time (IVCT) and isovolumic relaxation time (IVRT) divided by the systolic ejection time (ET) (1).
Case Report: We report a 6 months old male child admitted in our surgical PICU because of Ileus and respiratory insufficiency due to pulmonary infection. At the 3rd day since PICU admission the child developed ARDS. During the PICU stay we've made a few bedside echocardiographyc examinations in which we found continuously progressive rise of the RVMPI followed with right ventricular dilatation and poor gas exchange with elevated pCO2 levels and low pO2.
Discussion: RVMPI values provide comprehensive information regarding systolic and diastolic right ventricular function in real time (2). RVMPI was found to be elevated in pediatric patients with either idiopathic or secondary PAH. Development of secondary PAH in children with ARDS leads to right ventricular suffering and dysfunction. Because RVMPI measurements and trends correlated with invasive measurements of mean pulmonary arterial pressure (MPAP) it can be considered as a marker of PAH. Studies in children with RV volume and pressure overload have demonstrated the feasibility of measuring this index in the pediatric age group (1). As we've found in our case, RVMPI was increased in patients with combined pressure and volume overload according to Kobr et al. With repetitive measurements we found progressive rise of the RVMPI values which correlated with the clinical presentation, severity and progression of the disease.
References:
1. Karrie L. Dyer, MD, Linda B. Use of Myocardial Performance Index in Pediatric Patients with Idiopathic Pulmonary Arterial Hypertension. J Am Soc Echocardiogr. 2006 January;19(1): 21–27.
2. Kobr et al.: Repeated bedside echocardiography in children with respiratory failure. Cardiovascular Ultrasound 2011 9:14.
Learning points: Repeated RVMPI bedside measurement could be considered as an effective dynamic marker due to following the evolution of the right ventricular dysfunction and developing PAH in children with ARDS.

5762

Clonidine for Tourniquet-related Pain in Children (CLOTCH) -Study: a pilot study protocol

Erngaard L.[1], Clausen N. G.[2]
[1]University of southern Denmark - Odense (Denmark), [2]Odense University Hospital - Odense (Denmark)

Background: Surgical tourniquets are used in pediatric limb surgery to facilitate fine tissue handling in a bloodless field. Severe post-procedural pain due to ischemia-reperfusion-injury (IRI) is a known complication. As a consequence, infants and children are likely to require supplementary opioid analgesics and prolonged stays in recovery, delaying mobilization and feeding. Clonidine, an alpha-2-adrenoceptor agonist reducing sympathetic outflow, might alleviate IRI-induced vasoconstriction and reduce pain and opioid use. We hypothesize that administration of clonidine to pediatric patients undergoing limb surgery with the use of inflatable tourniquets will reduce post-procedural pain.
Materials and Methods: In this randomized, double-blinded clinical study we will associate a single dose of clonidine (3mcg/kg) or placebo (isotonic saline) prior to tourniquet inflation and to amount of opioid administered from anesthesia induction to 24 hours postoperatively (T24). Further, time spent at recovery, pain during recovery and occurrence of emergence delirium (ED) will be assessed. Twenty children <15 years classified as ASA I+II and scheduled for limb surgery with tourniquet in general anaesthesia (GA) will be included. On these pilot results we will base the sample size for a future trial. The study outline is illustrated in figure 1. Results: Primary outcome: morphine (mg/kg) administered from end-of-incision (T0) through T24. Secondary outcomes: total amount of morphine administered (mg/kg) from end-of-incision (T0) to transferal to the pediatric ward (TREC-END) and from TREC-END until T24. Further, duration of recovery (TREC-total), pain at Recovery by FLACC and VAS score and occurrence of ED by PAED scale will be assessed.
Conclusion: This randomized, double-blind, clinical pilot trial will be the first study to investigate the effect of single-dose administration of clonidine on opioid use and severity of pain in infants and children undergoing limb surgery with tourniquet use in GA. A positive association between clonidine and reduction of opioid use would suggest IRI as the pathophysiologic mechanism inducing tourniquet-related pain in children.



6015

Complication of Hickman catheter placement in a pediatric patient. Case report

Arellano Pulido M.[1], Hidalgo Garcia I.[2], Arellano Pulido R.[2], Grande Muñóz G. M.[2], Garcia Ramos S.[2]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [2]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: The channeling of a central venous catheter is an invasive technique, with an incidence of mechanical complications of 2% to 15%, and occasionally may became life threatening. One of the most common mechanical complications is accidental arterial puncture.
Case report: We present the case of a 11 year old child, diagnosed with Ewing costal sarcoma. He's scheduled to channel the left subclavian vein with a Hickman for anatomical references. There was no incidence. Six hours after the procedure, the child begins with hypotension, tachycardia, breathing difficulty and anemization. A concentrate of blood is transfused, and we did a thorax radiography, where we observed a massive pleural effusion and collapse of the lung. We transfer the patient to the interventional radiology room to do an arteriography identifying occlusion of the internal mammary artery.The findings suggest the possibility that venous catheter is in direct contact with mammary artery. The artery is embolized with microcoils, proximal and distal to the area of contact with the venous catheter, and subsequently a chest tube is placed in the left hemithorax. The patient remains stable during the procedure. After that, he's moved to intensive care unit for surveillance.
Discussion: Central venous catheter insertion is an essential procedure in critically ill children. In the paediatric population it is a more difficult technique due to the lower caliber of the vessels and the proximity of other structures, so the most effective and safest techniques need to be used in them. The channeling of the subclavian vein by anatomical references is associated with a higher rate of complications. Using ultrasound to channel the subclavian vein can help to decrease the complications associated with puncture by allowing direct visualization of the vascular structures, needle and pleura during the procedure.
References:
1. M.Lamperti. Evidence-based recommendations on ultrasound-guided vascular access.ICM38(2012).
Learning points: Central venous catheter insertion in small infants is a challenging and high risk procedure. Ultrasound guided cannulation increases the success rate and reduces procedural-related complications.

5918

The importance of monitoring and fluid management of acute pancreatitis in the PICU: a case report

Nedelkova I.[1], Michunovich L.[1], Gjorchevska E.[1], Jankovska A.[1], Donev L.[1], Leshi A.[1]
[1]University Clinic of TOARILUC - Skopje , University of St. Cyril and Methodius - Skopje (Republic of North Macedonia)

Background: The incidence of acute pancreatitis (AP) in children has been increasing in recent decades. According to INSPPIRE criteria, a diagnosis of AP requires 2 of the following: abdominal pain compatible with AP, ≥3 times serum amylase and/or lipase values and imaging findings consistent with AP(1).
Case Report: We present 12 –yr- old female patient admitted in the PICU with clinical presentation of acute abdomen. Laboratory analysis and contrast-enhanced CT (CECT) were inconsistent, so the surgeon decided to make exploratory laparotomy. Intraoperatively edematous pancreas and dolichocolon were found and three intra-abdominal drains were placed. The patient was hemodinamicaly stable during the operation. Postoperatively we placed central venous catheter (CVC) and epidural catheter (EDC). In the first 48 hrs we maintained IV fluid therapy as a mainstay, gastroprotectives drugs, antibiotic therapy and epidural analgesia with continuous bupivacaine. Adjuvant opioid and non-opioid analgesia were also given when needed. We closely monitored the patient with non-invasive (ECG, SpO2, NIBP) and invasive (CVP, acid/base analysis) monitoring. We followed her urine output, lab results and electrolytes including Ca++, serum amylase, urine amylase, serum lipase and glucose levels. Control chest X-ray and CECT were made. We started with parenteral nutrition on the 2-nd post-op day and with enteral nutrition on the 4-th post-op day. On the 5-th day we removed her drains and on the 12-th post-op day we transferred the patient on the pediatric surgery ward completely stable. On the 17-the post-op day she was discharged.
Discussion: Pediatric population with AP should be followed particularly closely within the first 48 hrs for respiratory, cardiac and renal status.(3) In our case we monitored the patient closely in the PICU for 12 days and managed to prevent further complications.
References:
1. Morinville VD, Barmada MM, Lowe ME.Increasing incidence of acute pancreatitis at an American pediatric tertiary care center: is greater awareness among physicians responsible? Pancreas. 2010;39(1):5–8.
2. Maisam A, Soma K., J. Antonio Q, et al.The Management of Acute Pancreatitis in the Pediatric Population: A Clinical Report from the NASPGHAN 2018; 66(1): 159–176.
Learning points: Adequate fluid resuscitation with crystalloids is very important especially within the first 24h. Appropriate monitoring of pediatric patients with AP. can provide indicators of possible complications.

5849

The Accuracy of Noninvasive Hemoglobin Monitoring in Children With Low Hemoglobin Levels

Hasanin A.[1], Elbeih S.[1], Saafan T.[1], Helmy N.[1], Maher Kamel M.[1]
[1]Cairo University Hospital - Cairo (Egypt)

Background and Goal of Study: Using non-invasive monitors for measurement of blood hemoglobin could save time and avoid excessive blood sampling especially in children. The accuracy of pulse co-oximetry-derived non-invasive hemoglobin (Sp-Hb) in children with low hemoglobin levels was not adequately evaluated. The aim of this work is to evaluate the accuracy of Sp-Hb in children with low hemoglobin levels.
Materials and Methods: A prospective observational study included children whom weight was between 3kg and 20 kg, with blood hemoglobin < 10 g/dL. Time-matched samples were obtained from the children to measure laboratory hemoglobin (Lab-Hb) with concomitant recording of Sp-Hb. Sp-Hb was measured using Radical-7 pulse co-oximeter, (Masimo corporation, Irvine, CA). Pearson's coefficient was calculated for the correlation between Sp-Hb and Lab-Hb. Bland-Altman analysis was performed for the mean bias and limits of agreement between the two monitors. Results and Discussion: Fifty-four samples were obtained from 36 children. Mean lab-Hb for all samples was 8.2±1 g/dL and mean Sp-Hb was 9.47±1.42 g/dL. The correlation between both hemoglobin measures was moderate (Pearson correlation coefficient (r): 0.673). The mean bias between Lab-Hb and Sp-Hb was -1.2 g/dL with limits of agreement: -3.3 g/dL to 0.8 g/dL. The Sp-Hb values were higher than Lab-Hb in 40 pairs (89%) of readings.
Conclusion: Referring to the large mean bias (1.2 g/dL) and wide limits of agreement (-3.3-0.8 g/dL), Sp-Hb showed limited accuracy for measurement of blood hemoglobin in children with low hemoglobin levels. However, we reported the Sp-Hb overestimated the hemoglobin level in 89% of readings. Thus, if Sp-Hb had shown a certain value, we can suggest that Lab-Hb would have, most probably, a higher value.

5802

Continuous Erector Spinae Plane (ESP) block as a therapeutic strategy for postoperative analgesia in surgery of Wilms Tumour: A case report

Ramirez Herron S.[1], Peña D.[2], Rodríguez Miranda C. D.[1]
[1]Universidad Militar Nueva Granada - Bogotá (Colombia), [2]Instituto Nacional de Cancerología - Bogotá (Colombia)

Ultrasonography (US) guided Erector Spinae Plane (ESP) block is a readily effective procedure which has demonstrated to be safe as a regional anaesthetic strategy for postoperative analgesia in varied surgical fields. Currently its use as an analgesic technique has spread to areas such as major abdominal and thoracic surgical procedures along with paediatric interventions. There are few reports of ESP block in paediatric cases undergoing nephrectomy for Wilms Tumor. We report a case of a six year old, 16 kg patient who was diagnosed with stage III, right-sided kidney mass suggestive of a nephroblastoma and therefore scheduled for unilateral nephrectomy and tumour excision procedure, in which a US guided continuous ESP block was performed at T6 level by insertion of an epidural catheter. No complaint of pain was reported on immediate postoperative period not even up to the next 48 hours and opioid requirement was diminished. Despite there is a lack of randomized multicenter clinical assays evaluating ESP block effectiveness as an analgesic technique for post-nephrectomy pain treatment in paediatric patients, this procedure profiles as a promising strategy to be considered in paediatric anaesthesia.

6012

Incidence of coagulation disorders in children undergoing surgery in an universitary pediatric hospital

Pla Bosch J.[1], Galve Navarro S.[1], Muñoz Burgués C.[1], Laurens Acevedo L. M.[1], Gomez Peñuela C. F.[1], Munar Bauzá F.[1]
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Background and Goal of Study: There is controversy surrounding coagulations test in the preoperatory study. We aimed to determine the incidence of disorders in coagulation test in patients undergoing surgery and find out the incidence of altered partial thromboplastin time ratio, prothrombin time, platelets and fibrinogen in children without previously known coagulation disorders.
Materials and Methods: This retrospective observational study included children that were studied before a surgery from January to April of 2018 in the Pediatric Hospital Vall d'Hebron. We collected demographic data, previously diagnosed coagulation disorders, altered partial thromboplastin time ratio (aPTT), Prothrombin time (PT), platelets and fibrinogen. Collected data is reported in quartiles, median and mean. Mann-Whitney U test was used to analyse the statistical significance.
Results and Discussion: 1,087 cases were reported, the mean age was 5.89 years, 43.21% were women and 58.78% were men. 2.57% (28 patients) had previously known coagulations disorders. In this group, 8 patients (28.57%; 0.73% out of all the cases) had altered Prothrombin time, 13 patients (46.42%; 1.19% out of all the cases) had an alteration of aPTT ratio, altered fibrinogen was reported in 2 cases (7.14%; 0.19% out of all the cases) and 2 patients had altered platelets (7.14%; 0.19% out of all the cases). 1,059 cases out of 1,087 had no previously known coagulation disorders. In this group the following disorders were reported: PT in 75 patients (6.9%; 6.8% out of all the cases), aPTT ratio in 133 cases (12.60%; 12.23% out of all the cases), fibrinogen in 8 cases (0.75%; 0.73% out of all the cases) and platelets in 2 patients (0.75%; 0.73% out of all the cases). There is a statistically significant higher incidence of altered aPPT ($p < 0.05$) and PT ($p < 0.05$) in patients with known coagulation disorders than in not previously diagnosed coagulation diseases. There is no statistically significant difference in altered fibrinogen or platelets between patients with or without coagulation disorders.
Conclusion: Patients with coagulation disorders have more frequently altered coagulation test than patients without coagulation related diseases. TTPA is the most frequently altered value in coagulation tests in patients without known coagulation disease.

5900

Kids are tiny, blades are mighty: Size at age blades of videolaryngoscope may be a life-saver in an unexpected difficult intubation

İnal D. G.[1], Ince I. E.[1], Yeniay H.[1], Olguner C.[2]
[1]University of Dokuz Eylul School of Medicine, Department of Anesthesiology and Reanimation - İzmir (Turkey), [2]Turkish Society Of Anesthesiology And Reanimation - Istanbul (Turkey)

Background: Difficult intubation is more prevalent in premature/low birth weight newborns and infants and cause for mortality (1). Difficult airway equipment is still not adequate to manage newborn and low weight infants. Videolaryngoscope (VL) should always be ready for pediatric anesthesia. We present our intubation experience with missmatch VL equipment in three pediatric patients, one of them in emergency situation with CPR and the other one we used adult angulated blade of VL.
Case Report: Informed consents were obtained from all patients' parents. Patients characteristics and prognosis was summarized at Table 1. Induction and intubation conditions and characteristics was summarized at Table 2.
Discussion: More than two direct laryngoscopy attempts in children is associated with higher complication rates (2). There is no consensus on difficult intubation that which is a better option for infants, DL or VL. Difficult airway trolley should be ready for newborn and infants in OR even if there is no expectation of difficult intubation. If appropriate VL blade size is not accessible thereat, size at age blades and/or adult-sized angled VL blades in hand should be employed.

Table 1: patient characteristics and prognosis *PCA,postconseptional age

	Age	Weigt (kg)	History	Prognosis
Case 1	18 months	12	• Pierre robin syndrome • Short neck,mild retro-micrognati • Difficult neck extension • ASD(+) • No previous intubation • İsole cleft palate • Elective surgery	• Discharge to home at postoperative 6 th days
Case 2	10 weeks (PCA 44 weeks)	3	• Risomelic chondrodisplasia punctata • ASD,VSD,PDA,PS • Mild rethinopathy • 17 days at PICU,7 days extubation time • Tissue defect at thorax wall • Elective surgery	• Transport to PICU, stay still PICU and tracheotomized
Case 3	3 weeks+1 day (PCA 32 weeks)	2.074	• Premature, twin born • BPD,ASD,retinopathy,ventriculomalasy, jaundice,DIC • Abdominal distantion • Accidental extubation at transport from NICU to operation theatre, intubation attempts during CPR • NEC, laparathomy • Urgent surgery	• Discharge to home at postoperative 21th days

Table 2: Patients induction and intubation characteristics

	Induction	Intubation attemps	Cormack Lehane (C/L)	ETT number (ID)	Laryngoscope/ blade
Case 1	Sevoflurane/rocuroniumatropine/fentanyl	2	3	4 cuffed reinforced	• VL Mac 2 (1 attemp) • VL angulated blade adult (1 attemp)
Case 2	Propofol/rocuronium/atropine/fentanyl	3	3	3 uncuffed	• DL Mac 1 (2 attemps) • VL Mac 2 (1 attemp)
Case 3	Sevoflurane/rocuroniumatropine/adrenalin	2	4	3 uncuffed	• DL Mac 1 (1 attemp) • VL Mac 2 (1 attemp)

References:
1. Eur J Pediatr. 2019;178:1105-1111 2. Lancet Respir Med 2016; 4: 37–48.
Learning points: Newborns and infants are always at risk for difficult intubation. VL must be present at OR. If first attempt of intubation with DL could not achieved, second attempt should be tried immediately with VL no matter what size of blade is available.

5711

Practical and Cost-Effective Vascular Detection in Neonate by Transillumination: Can Flashlight of a Smart Phone be Used?

Özdemir L.[1], Birbiçer H.[1]
[1]Mersin University, Faculty of Medicine Hospital – Mersin (Turkey)

Background: Peripheral vascular cannulation includes several difficulties for newborns and infants. In this case report, evaluation of efficiency and practicality of smartphone integrated flashlight for visualisation of peripheral veins by transillumination on a newborn with difficult vascular access is aimed.
Case Report: A two-day old, 2380 gr, term (38. gestational week) newborn with low birth weight was taken to operation theatre by Paediatric Surgery for elective colostomy opening surgery due to anal atresia. Although careful inspection of all four extremities, an apparent venous structure could not be observed (Figure 1). Upon this, flashlight of the smartphone was activated and the phone was placed from the opposite angle adjacently to the skin of the inspected extremity for venous access. Below the lateral malleolus of the right foot, an atypical area for peripheric vascular access, normally an unapparent and unpalpable vessel was highlighted horizontally via transillumination. After visualisation of the venous structure via transillumination, a 24G branule was placed to the vessel at the first attempt (Figure 2).
Discussion: Newborns and infants have extremely few peripheric venous structures available for venous access. Thus, requirement to devices that provide assistance and guidance for difficult venous access cases is gradually increasing. In conclusion; due to absence of randomized controlled trials on usage of phones flashlight for transillumination and possible technical characteristic variations between flashlights of different phone brands, it seems difficult to standardize the usage. But due its efficiency, cheapness and practicality; we believe that further studies can be helpful and provide great convenience to the operators.

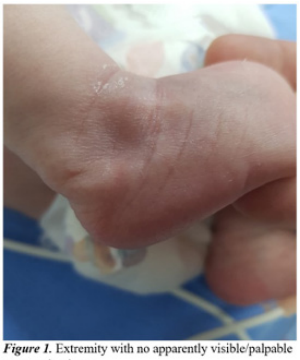


Figure 1. Extremity with no apparently visible/palpable venous structure.

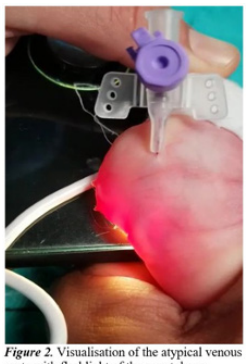


Figure 2. Visualisation of the atypical venous route with flashlight of the smartphone.

Learning points: Smart phone flashes can make peripheral veins visible in newborn infants.

5763

Prevailing practices in airway management in an Universitary Paediatric Hospital

Galve S.[1], Munar F.[1], Muro C.[1], Vilardell E.[1], De Nadal M.[1], Manrique S.[1]
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Backgroung and Goal of Study: Airway management during anaesthesia has potential difficulties and risks. We aimed to investigate the current practice of the different techniques of airway management between the anaesthetists in a children's hospital and determine the incidence of difficult intubation.
Materials and Methods: This is a single-centre retrospective observational study. All patients less than 16 years old undergoing elective and urgent surgery in 2018 in Vall d'Hebron University Hospital at the surgical area of the Children's Hospital were included. Demographic data, difficult intubation (more than two attempts to intubate) and technique anaesthetic was collected and analysed. The incidences were represented as 95% confidence intervals (CI), categorical variables were represented as percentages.
Results and Discussion: A total of 3,435 patients were included, of which 61% were male. The median age was 6.38 years (IQR 2.46 – 11.17). Six per cent of the patients were transferred from other units with endotracheal tube or tracheostomy in situ. Sedation technique without instrumentation was performed in 8% of patients. Laryngeal Mask was used as the first equipment of choice for 46% of patients compared to traqueal intubation in 40%. We recorded 1,395 encounters that underwent intubation in operating theatre. The incidence of difficult intubation was 4.66% (95%CI: 3.64 - 5.94). Incidence of difficult intubation by age group (95% CI): - Neonate: 7.31% (1.91 - 21.00); - < 1 year: 5.08% (2.50 - 9.73); - > 8 years: 3.84% (3.51 - 7.55); < 8 years: 4.34% (3.13 - 5.98). The traditional Macintosh laryngoscope was used as the first-choice equipment in 96.5% of the cohort. Videolaryngoscopes were used in 3.23%, such as Airtraq (80%), GlideScope (20%). The rate of usage of flexible bronchoscopic-assisted intubation was <1%.
Conclusion: The incidence of difficult intubation was 4.66% and the age group with high percentage was neonates. This is similar to what was obtained in other studies. The traditional Macintosh laryngoscope is the prevailing practice for intubation in our institution. The most common videolaringoscope used is the Airtraq.

5832

What is a paediatric anaesthetic fellowship and what are the key components of an advanced paediatric anaesthetic training program?

Mann C.[1], Menezes M.[2]
[1]Auckland District Health Board - Auckland (New Zealand), [2]The Children's Hospital at Westmead - Sydney (Australia)

Background and Goal of Study: Advanced paediatric anaesthetic training or 'fellowships' may vary widely. The term 'fellowship' is a particularly heterogeneous term. There is a paucity of guidance regarding the key components of fellowship training programs in paediatric anaesthesia. With no formal definition of a paediatric anaesthetic fellowship or the specific components or goals of training, it is difficult to design, evaluate or improve paediatric anaesthetic training programs. The aim of this qualitative research was to identify the key components of an effective advanced paediatric anaesthetic training program.
Materials and Methods: Focus groups and questionnaires were used to collect data from paediatric anaesthetic fellowship trainees and specialists in various Australasian tertiary paediatric centres. Deidentified data underwent rigorous thematic analysis to explore the opinions of paediatric anaesthetic advanced trainees and specialists to identify and determine the relative value of key components of an ideal paediatric anaesthetic training program. Educational methods, training goals and training expectations were discussed and evaluated. Trainees and specialists evaluated their local fellowship training program.
Results and Discussion: Trainees and specialists defined key components of a paediatric anaesthetic fellowship, with relatively similar results between groups. Trainees and supervisors identified that ideal training covered core types of surgeries, patients and procedures, with a minimum volumes and observed practice. Trainees and supervisors thought that learning by various methods was important but that effective feedback, supervised practice and increasing autonomy were most important in developing clinical skills. Trainees and specialists differed in their evaluation of their local training program.
Conclusions: A paediatric anaesthetic fellowship has widely variable definitions and components. Advanced paediatric anaesthetic training programs should ideally include clearly defined core components but also be individualised to encompass widely heterogenous training requirements by trainees. Training goals should be regularly their achievement re-evaluated during training. Regular, appropriate feedback, supervised practice and increasing clinical autonomy were considered effective educational approaches.

4530

Multimodal anesthesia in a patient with congenital insensitivity to pain with anhidrosis (CIPA): case report

Martín T.[1], Brogly N.[1], García C.[1]
[1]Hospital Universitario La Paz - Madrid (Spain)

Background: Congenital insensitivity to pain with anhidrosis (CIPA) is an infrequent (1/125.000.000 patients) autosomal recessive disorder characterized by insensitivity to pain, anhidrosis and recurrent episodes of hyperpyrexia. Patients with this disorder are more likely to develop perioperative complications, such as hyperthermia, hypotension or bradycardia, so the anesthetic management must be adequately planned.
Case Report: A 15 year-old woman was scheduled for a surgical drainage of a L5-S1 spondylodiscitis secondary to a systemic dissemination of a chronic foot infection. She was diagnosed of CIPA at the age of 6 months, and, during her childhood, she presented various infections secondary to non-treated injuries. The drainage was performed under general anesthesia, using a multimodal analgesic protocol to control the hemodynamic response to surgical trauma that included fentanyl, ketamine, lidocaine and paracetamol. Apart from a mild and transient hemodynamic response observed during tracheal intubation, the intervention ran uneventfully. Once awake, the patient was transferred to the post anesthetic care unit, where she stayed for 18 hours with no pain or complications.
Discussion: Most perioperative complications in patients with CIPA are due to autonomic nervous system dysfunction, which should be prevented. An intraoperative multimodal analgesia titration could control the surgical stress response and promote hemodynamic and temperature stability. The low incidence of this disease limits the performance of randomized controlled studies to establish the most appropriate anesthetic management.
References:
1. Rosemberg S, Marie SK, Kliemann S. Congenital insensitivity to pain with anhidrosis (hereditary sensory and autonomic neuropathy type IV). Pediatr Neurol 1994;11:50-6.
2. Sugiyama Y, Gotoh S, Urasawa M, Kawamata M, Nakajima K. Hemodynamic Response to Massive Bleeding in a Patient with Congenital Insensitivity to Pain with Anhidrosis. Case Rep Anesthesiol 2018;2018:9593458.
Learning points: Perioperative complications in patients with CIPA could be prevented or, at least, minimized, with a planned strategy. Intraoperative analgesia titration and a MMA approach could be beneficial to prevent surgical stress response. In our patient this strategy probably helped to control the autonomic response, which permitted to perform the intervention without relevant incident.

4315

The neurotoxicity of JM-1232(−): a novel isoindoline derivative

Iwanaga K.[1], Satoh Y.[1], Kawaguchi M.[1], Ikeda T.[1]
[1]*National Defense Medical College - Saitama, Tokorozawa (Japan)*

Background and Goal of Study: In animal models, neonatal exposure to general anesthetics significantly increases apoptosis in the brain with persistent behavioral deficits in adulthood. Consequently, there is growing concern about the use of general anesthetics in obstetric and pediatric patients. JM-1232(−) is an isoindoline derivative being developed as a potential intravenous anesthetic agent, which acts through γ-aminobutyric acid (GABA) receptor. The current study sought to investigate the effects of JM-1232(−) on the developing brain in the mice.
Materials and Methods: Animals: C57BL/6 mice at postnatal day 6 (P6). Anesthesia: Mice were intraperitoneally administered (IP) as follows: 0 mg/kg (vehicle), 5 mg/kg, 10 mg/kg or 20 mg/kg of JM-1232(−), 1 mg/kg, 3 mg/kg, or 9 mg/kg of midazolam, and 1%, 2%, and 3% of propofol. Loss of righting reflex assay: The loss of righting reflex was used as a measure of sedative effect of drugs. Twenty minutes after the administration, the mouse was placed in the supine position and the time taken to correct its posture was evaluated. Apoptosis analysis: Apoptosis was evaluated by western blot analysis using anti-cleaved PARP antibody. Statistical analysis: Statistical analysis was performed using R (version 3.3.1) and GraphPad Prism 8. Comparisons of the means of each group were performed using a one-way ANOVA followed by Bonferroni post hoc test.
Results and Discussion: Similar sedative effects were demonstrated by 10 mg/kg of JM-1232(−), 9 mg/kg of midazolam, and 2% of propofol. The administration of JM-1232(−), midazolam, and propofol induced significantly more expression of cleaved PARP compared with vehicle controls with dose-dependent effects (one-way ANOVA, JM-1232(−): $F=10.1$, $P=0.002$, midazolam: $F=21.8$, $P<0.001$, propofol: $F=94.9$, $P<0.001$). At the dose of the same sedative effects, JM-1232(−), midazolam, and propofol induced a 2.1, 3.2, and 2.9-fold increase in the expression of cleaved PARP over the vehicle group. The PARP expression by JM-1232(−) was significantly less than the other two anesthetics (multiple t test, vs. midazolam: $t=7.49$, $P<0.05$, vs. propofol: $t=6.25$, $P<0.001$).Our results show that JM-1232(-) has a significantly less apoptotic effect on the developing brain compared with other intravenous anesthetics.
Conclusion: JM-1232(-) is less neurotoxic than other intravenous anesthetics.

4378

Development New Model of Traumatic Brain Injury in adult rats

Frank D.[1], Savir S.[1], Kuts R.[1], Natanel D.[1], Boyko M.[1], Zlotnik A.[1]
[1]*Division of Anesthesia and Critical Care, Soroka Medical Center - Beer Sheva (Israel)*

Background and Goal of Study: A common experimental rodent model for stroke includes induction by a technique in which middle cerebral artery (MCAO) is occluded by catheterization. However, this model has prominent disadvantages which consist of the high variability of localization and size of the ischemic area, cases of intracranial hemorrhage and high mortality. Furthermore, the duration of a single MCAO operation takes about thirty minutes and requires highly trained staff. In this article, we propose an alternative method which is based on laser-induced stroke in the motor cortex. In our research, we compared the original MCAO model and novel laser model.
Materials and Methods: A total of 210 male Sprague-Dawley rats weighed 300 to 350 g each was bought for this experiment. Initially, rats were randomly assigned to laser groups (120 rats) or to control MCAO groups (90 rats).
Results and Discussion: Compared with the impact of original MCAO technique on brain tissue, the minimally invasive laser model demonstrated a decrease in variability of body temperature, infarcted volume, blood brain barrier breakdown and brain edema. Furthermore, the novel model demonstrated a prominent decrease in mortality and intracranial hemorrhage. Additionally, damage to the brain tissue in laser groups occurred only in the region of the motor cortex, without involving the striatial area.
Conclusion: Model of laser irradiation can serve as an effective method of inducible brain cortical infarction and may lead to a better understanding of the pathophysiology of ischemic stroke and the future development of new drugs and other neuroprotective agents.

4490

Assessment of three main parameters of brain injury after Middle Cerebral Artery Occlusion in Adult Rats

Frank D.[1], Yattah Y.[1], Zlotnik A.[1], Kuts R.[1], Boyko M.[1], Grinshpun J.[1]
[1]*Division of Anesthesia and Critical Care, Soroka Medical Center - Beer Sheva (Israel)*

Background and Goal of Study: One of the most common causes of morbidity and mortality worldwide is ischemic stroke. One of the animal models of simulating ischemic stroke is Middle Cerebral Artery Occlusion (MCAO). Infarct zone, brain edema and BBB brake-down are used as parameters that reflect the extent of brain injury after MCAO. At that moment, measuring these three items is only possible using three different technics applied on three different sets of rat brain sample. This represents a major limitation when it comes to economic and ethical approach for research. The following work examines an alternative way to measure these three items in the same set of rat brain, giving us a more efficient way for stroke study.
Materials and Methods: Adult male Sprague-Dawley rats weighting 350-400 gr were randomly divided in to two groups. The first group post-MCAO ($n = 26$) was used to measure infarct zone, brain edema and BBB permeability parameters. The second group was used as sham-operated control group ($n = 16$).
Results and Discussion: There was an increase in infarct volume ($p<0.01$), brain edema ($p<0.01$) and BBB breakdown ($p<0.01$) in rats following middle cerebral artery occlusion measured in the same set of rat brain sample and compared to the sham-operated control group.
Conclusion: The results of this work demonstrate that measuring the three parameters for assessing brain injury, meaning- infarct zone, brain edema and BBB permeability, using the simulating method of middle cerebral artery occlusion can accurately be used in the same set of rat brain samples. And there for this novel technic represents an important advance in ischemic stroke research and treatment.

4587

Molecular dynamics of GSH, AKT and xCT expression for Sepsis Associated Encephalopathy in Cyclophilin D KO mouse

Kobayashi T.[1], Uchino H.[1], Nakajima T.[1], Ishida Y.[1], Shibata S.[1]
[1]*Tokyo Medical University - Tokyo (Japan)*

Background and Goal of Study: Sepsis Associated Encephalopathy(SAE) is a diffuse brain dysfunction as a result of a systemic inflammatory response due to infection. Involvement with central nervous system effects and mitochondrial dysfunction has been suggested, but the mechanism is unknown. Involvement with reactive oxygen species production in mitochondrial dysfunction has been suggested. Some people suggest that Mitochondrial Permeability Transition Pore(MPTP) due to activation of Cyclophilin D(CypD) and plays a central role of cell death. This time we focused on GSH, AKT(serine/threonine protein kinase) and xCT(cystine/glutamate antiporter) to consider the onset mechanism of SAE. AKT is known as a cell growth factor signaling molecule that contributes to growth promotion and cell survival, and involved in signal transduction related to xCT activation. Moreover, xCT takes an important role on as an uptake course of cysteine which is necessary for GSH production. So we analyzed the relationship between GSH, AKT and xCT for the molecular mechanisms of SAE.
Materials and Methods: Male C57BL/6J wild mice(WTgroup) and CypD KO mice(KOgroup) at 10-16 weeks of age were anesthetized with 4% sevoflurane and performed CLP(Cecal Ligation and Puncture). Sham group underwent a middle abdominal incision to expose the cecum, but was neither ligated nor punctured. All of mice were sacrificed at each experimental time point, 0h, 6h 18h after CLP or sham procedure, and brain and liver tissue samples were obtained. ,GSH, AKT and xCT activity was measured by metabolome analysis or western blotting, and comparison of two groups was performed($p<0.05$ was considered significant).
Results and Discussion: Survival rate was significantly improved in the KOgroup($p=0.005$) and significant increase of Glutathione(GSH) in KOgroup($p=0.022$) compared to WTgroup. It is suggested that AKT is dephosphorylated by oxidative stress, in comparison of P-AKT, WT group has been dephosphorylated from 6 hours in WT group, and KO group was more prone to oxidative stress. Also, the expression of xCT tends to be slightly stronger in the KOgroup, so accelerated cysteine uptake by xCT activity promotes GSH synthesis, and it was suggested that the KOgroup might have exerted stronger antioxidant activity.
Conclusion: It was suggested that the high activity of AKT and xCT promoted GSH production in KO group which may have exerted an antioxidant effect under severe oxidative stress environment of SAE.

4895

Boswellic acid attenuates glutamate release and kainic acid-induced excitotoxicity in the rat hippocampus

Lin T. Y.[1], Lu C. W.[1], Hsu Y. H.[1], Wang S. J.[1]
[1]Far Eastern Memorial Hospital - New Taipei City (Taiwan)

Background and Goal of Study: Excessive glutamate concentration induces neuronal death in acute brain injuries and chronic neurodegenerative diseases. Natural compounds from medicinal plants have attracted considerable attention for their use in the prevention and treatment of neurological disorders. 11-Keto-beta-boswellic acid (KBA), a triterpenoid found in the medicinal plant Boswellia serrata, has neuroprotective potential. Given that glutamate plays a crucial role in neuroprotection, we investigated the effect of KBA on glutamate release in vitro and kainic acid (KA)-induced glutamate excitotoxicity in vivo in the rat hippocampus.
Materials and Methods: Isolated nerve terminals (synaptosomes) purified from male Sprague-Dawley rat hippocampus were used to examine the effect of KBA on glutamate release evoked by 4-aminopyridine (4-AP). Pharmacological activators and inhibitors of protein kinase cascades were used to investigate the possible downstream signaling pathway. We further examined whether KBA executed a protective action in a rat model of excitotoxicity induced by an excitotoxin KA.
Results and Discussion: In rat hippocampal nerve terminals (synaptosomes), KBA dose-dependently inhibited 4-aminopyridine (4-AP)-evoked glutamate release. This effect was dependent on extracellular calcium and blocked by the vesicular transporter inhibitor bafilomycin A1. In addition, KBA reduced the 4-AP-induced increase in intrasynaptosomal Ca2+ levels. The N- and P/Q-type channel blocker omega-conotoxin MVIIC and the protein kinase A (PKA) inhibitor H89 significantly suppressed the KBA-mediated inhibition of glutamate release, whereas the intracellular Ca2+-releasing inhibitors dantrolene and CGP37157, mitogen-activated protein kinase inhibitor PD98059 and protein kinase C inhibitor calphostin C had no effect. In the rat model of excitotoxicity induced by intraperitoneal KA injection (15 mg/kg), intraperitoneal KBA administration (10 or 50 mg/kg) 30 min before KA injection considerably ameliorated KA-induced glutamate concentration elevation and CA3 neuronal death.
Conclusion: These data suggested that KBA inhibits glutamate release from the rat hippocampal synaptosomes by suppressing N- and P/Q-type Ca2+ channels and PKA activity, as well as exerts protective effects against KA-induced excitotoxicity in vivo.
Acknowledgements: This work was supported by the grants from the Ministry of Science and Technology of Taiwan, ROC (MOST-108-2314-B-418-006).

5042

Neuroprotective effect of oleuropein on Alzheimer disease transgenic mice

Jeong S.[1], Bae H. B.[1], Jin B.[1], Choi J. I.[1], Lee H. G.[1]
[1]Chonnam National University Medical School - Gwangju (South Korea)

Background and Goal of Study: Oleuropein (OLE) is a polyphenolic compound present abundantly in extra virgin olive oil and believed to be the factor behind the health benefits of olive oil consumption. Several in vitro and in vivo studies reported the broad spectrum of pharmacological properties of oleuropein such as anti-inflammatory, anti-diabetic, anti-oxidant, and neuroprotective. OLE supplementation improved cognitive performance through facilitating autophagy and reduced β-amyloid deposition. Also, it has been shown that the administration of oleuropein counteracted cognitive dysfunction induced by colchicine in the hippocampal. Tau protein expression is becoming highlight in recently years. The effect of oleuropein in AD mice is under unknown.
Materials and Methods: Nine month of 5XFAD mice were grouped into three, 5XFAD control, oleuropein 5ug, oleuropein 10ug. Animals were anesthetized with seveofulrane and positioned in a stereotaxic frame. We performed the cannula (Guide cannula 26Gauge from Plastic One) into the right lateral cerebral ventricle, following coordinates from Bregma: posterior = −0.5 mm; lateral = −1.1 mm; dorso-ventral = −2.5 mm, then mounted dental cement around cannula. Make sure dental cement totally dry and stabilization. After one week rest, mice performed different concentration of oleuropein i.c.v. administration (Through internal cannula 33Gauge) with consecutive 30 days. With the aid of a pump, 5ug (2.5ul) and 10ug (2.5 µl) of oleuropein were injected at a rate of 0.5 µl/min during 5 min. Control rats were injected with DMSO. Mice were performed behavioral test after 30days. Animals were sacrificed immediately after behavior test.
Results and Discussion: Western blot showed that AT180, p-Tau 262, p-Tau 202/205, Tau-5 expression were markly increased in 5XFAD mice compared with wildtype mice. After 30 days oleuropein injection, result showed that not only 5ug oleuropein but also 10ug oleuropein were significantly decreased AT180, p-Tau 262, p-Tau 202/205, Tau-5 expression, and 10ug oleuropein injection had stronger effect on 5XFAD mice. AT180 Tau were performed in immunofluorescence experiment. AT180 expression was significantly suppressed after oleuropein treatment compared with control group.
Conclusion: Oleuropein reduced the p-Tau and Tau5 expression on 5XFAD mice.

5233

Neuroprotective effect of Retinoic acid on SH-SY5Y cells under ischemic condition

Jeong S.[1], Jin B.[1], Bae H. B.[1], Choi J. I.[1], Lee H. G.[1]
[1]Chonnam National University Medical Schoool - Gwangju (South Korea)

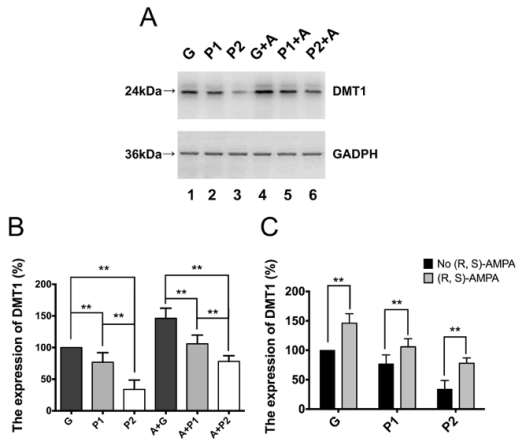
Background and Goal of Study: Retinoic acid (RA) is a morphogen derived from retinol (vitamin A) that plays important roles in cell growth, differentiation, and organogenesis. It is an essential biomolecule for embryonic development and adult body homeostasis. Retinoic acid, has a neurogenesis function on SY5Y cells which can make SY5Y cells differentiation into normal human neurons, and express a variety different makers. The aim of this study was to investigate the protection of Retinoic acid on neuronal cell line and the potential therapy mechanism under ischemia.
Materials and Methods: SH-SY5Y cells were subcultured into four groups: Sham (normal condition), Control and two Retinoic acid group (under ischemia), and three groups were subjected to 24 hours in ischemia chamber. Cells were prepared and collected after 24 hours ischemia. Western blot analysis was performed for MAPKs (Raf, Mek, JNK and ERK) and for mitochondria and apoptosis (Bax, Bcl2, Caspase 3, Cytochrome c, Parp-1). We also measured MTT for evaluation of toxin of retinoic acid on SH-SY5Y cells.
Results and Discussion: MTT results showed retinoic acid treated cells have no toxic effect under 10uM and data showed high concentration of Retinoic acid contrary effect on cells under ischemia. Appropriative concentration of Retinoic acid improved cells viability after 24hours ischemia. Ischemia decreased the expression of p-raf, p-Mek, p-JNK and p-EKR, Retinoic acid reversed these effects. Similar mechanism of Retinoic acid inhibited apoptotic protein expression (Bax, Cytochrome C, and cleaved PARP-1) and increased anti-apoptotic protein expression Bcl2 protein expression after ischemia.
Conclusion: Retinoic acid improved neuronal cells viability under ischemia, but high concentration of Retinoic acid was adverse. Appropriative concentration increased MAPKs protein expression and inhibited apoptotic protein expression.

5383

Divalent metal transporter 1 in gliomas: Association with the effects of propofol on oxidative stress and growth in vivo and in vitro

Yang C.[1], Wang H.[1]
[1]Tianjin Third Center Hospital - Tianjin (China)

Background and Goal of Study: Oxidative stress enhances tumor invasion and metastasis in brain cancer. The activation of divalent metal transporter 1 (DMT1), which is regulated by glutamate receptors, can result in the increase of oxidative stress and cancer risk. Propofol, an anesthetic with antioxidant capacity, has been shown to reduce oxidative stress in several cancers. However, the underlying mechanism is unclear. Therefore, we aimed to elucidate the mechanism underlying the suppression of oxidative stress in glioma cells by propofol. DMT1 is an iron importer protein responsible for ferrous iron influx. It is regulated by NMDA receptors in neurons. However, NMDA receptor expression in glioma cells is low. AMPA receptors are vital glutamate receptors that are Ca2+-permeable (CPARs). We hypothesized that propofol may inhibit oxidative stress in gliomas via suppressing CPARs-DMT1 signaling.
Materials and Methods: Male Wistar rats with C6 gliomas, which were established by intracranial injection of C6 glioma cells, were untreated or treated with propofol for 6 h before being terminated. The levels of AMPA receptor subunit GluR2 and DMT1 protein expression were assessed using western blotting, respectively. The relationship between CPARs and DMT1 was confirmed in vitro using the AMPA receptor activator (R, S)-AMPA. Glutathione and reactive oxygen species assay kits were used to evaluate tumor oxidative stress.
Results and Discussion: Propofol infusion at either 20 or 40 mg·kg-1·h-1 increased GluR2 levels and downregulated DMT1 expression as well as glutathione content markedly in the periphery compared with that in the glioma core. In vitro results revealed that (R, S)-AMPA increased DMT1 expression and reactive oxygen species level, which were partly reversed by propofol treatment.



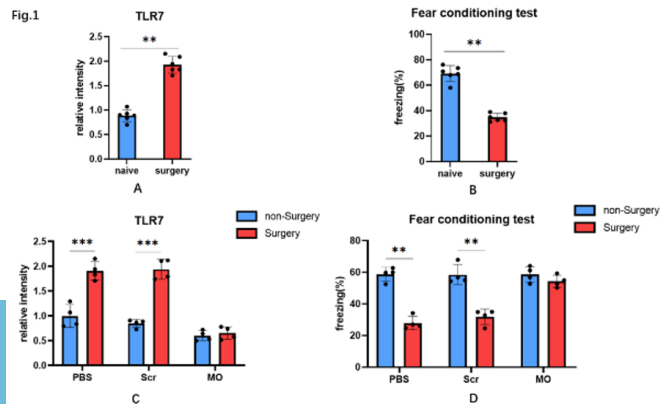
Conclusion: Propofol regulated DMT1 expression by modulating CPARs, resulting in the inhibition of tumor oxidative stress and excessive metabolism. The present study provides evidence for optimizing the selection of anesthetic drugs in perioperative management and prognosis of patients with glioma.

5392

Toll like receptor 7 contributes to cognitive decline in a mouse model of postoperative cognitive dysfunction

Lu Z.[1], Tao Z.[2], Chan C.[2], Rui G.[2], Hai C.[2], Jin L.[2]
[1]*West China Hospital of Sichuan University - Chengdu (China),*
[2]*West China Hospital - Chengdu (China)*

Background and Goal of Study: Postoperative cognitive dysfunction (POCD) refers to the serious perioperative neurological complications in which attention, concentration, visual memory, language comprehension and social skills are mainly impaired after surgery. Now POCD has become more and more common in elder people all over the world. Recently, increasing researches have shown that Toll-like receptor may be involved in POCD. The goal of this study is to assess whether Toll like receptor 7(TLR7) takes part in the process of POCD.
Materials and Methods: We established the model of POCD through anesthesia and unilateral nephrectomy using 20-22g 18 months wild-type male mice (WT) (n=6). After 3 days mice's cognition was tested through fear conditioning. TLR7 in hippocampus was tested using Western-blot and inflammatory factor was tested by qRT-PCR. To determine the role of TLR7 in POCD, mice were divided into six groups(n=4): PBS, scrambled morpholinos (Scr), vivo-morpholinos against TLR7 (MO), PBS+Surgery, Scr+Surgery and MO+Surgery. For mice belonging to MO+Surgery, they were injected MO into the hippocampus for knocking down TLR7 and subsequently underwent anesthesia and unilateral nephrectomy. Mice of PBS+Surgery and Scr+ Surgery were treated the same way. Mice of MO only received hippocampal injection of MO and mice of PBS, Scr received the same dosage. The cognition of these mice were tested 3 days later.
Results and Discussion: We found that the TLR7 of POCD model mice increased in hippocampus which initiated inflammation downstream (Figs.1A&B, **P<0.01, ***P<0.001). Interferon regulatory factor 7 (IRF7), tumor necrosis factor α (TNF-α), interleukin 6 (IL-6) also increased detected by qRT-PCR. Knocking down TLR7 in hippocampus attenuated cognition dysfunction of mice after anesthesia and surgery (Figs.1C&D, **P<0.01, ***P<0.001) with inflammatory factor decreased.
Conclusion: Our results indicate that TLR7 initiates the downstream inflammatory in the development of POCD and play an important role in POCD.



5398

Silymarin suppresses depolarization-evoked glutamate release in rat cerebrocortical nerve terminals via mitogen-activated protein kinase signaling pathways

Lu C. W.[1], Lin T. Y.[1], Wang S. J.[1]
[1]*Far Eastern Memorial Hospital - New Taipei City (Taiwan)*

Background and Goal of Study: Silymarin is the polyphenolic flavonoid extracted from dried fruit of Silybum marianum and is most commonly used for the treatment of liver diseases over several centuries. In addition to the hepatoprotective activity, silymarin has been found to possess neuroprotective effect. However, the underlying mechanisms of the neuroprotective property of silymarin have not been fully explored. Given that glutamate plays a crucial role in the pathology of many brain diseases, the goal of this study was to examine the presynaptic effect of silymarin on glutamate release and elucidate the underlying mechanisms.
Materials and Methods: Truncated nerve terminals (synaptosomes) isolated from male Sprague-Dawley rat cerebral cortex were used to investigate the effect of silymarin on glutamate release evoked by a chemical depolarizer, 4-aminopyridine (4-AP). Pharmacological inhibitors of protein kinase cascades were used to investigate the possible downstream signaling pathway.
Results and Discussion: Silymarin reduced the release of glutamate release evoked by 4-AP in a concentration-dependent manner. This inhibitory effect was associated with a reduction in the 4-AP-evoked intrasynaptosomal Ca2+ concentration elevation and was not due to an alteration of the synaptosomal membrane potential. The inhibition of glutamate release by silymarin was markedly reduced or eliminated in the presence of the Cav2.2 (N-type) and Cav2.1 (P/Q-type) channel blocker ω-conotoxin MVIIC and the mitogen-activated protein kinase (MAPK) inhibitor PD98059. The intracellular Ca2+-release inhibitors dantrolene and CGP37157, or the protein kinase A inhibitor (PKA) H89 failed to affect the action of silymarin.
Conclusion: Our results suggest that silymarin inhibits glutamate release from rat cerebrocortical synaptosomes through the suppression of presynaptic voltage-dependent Ca2+ entry and MAPK activity. These findings may delineate the possible neuroprotective mechanisms of silymarin.
Acknowledgements: This work was supported by the grants from the Ministry of Science and Technology of Taiwan, Republic of China (MOST-108-2314-B-418-007).

4335

Spinal vs general anesthesia for lumbar microdiscectomy: cost comparison analysis

Varosyan A.[1], Aghasaryan N.[1], Aghakaryan V.[2]
[1]*Erebouni Medical Centre - Yerevan (Armenia),*
[2]*Yerevan State Medical University - Yerevan (Armenia)*

Background and Goal of Study: Lumbar spinal surgery and microdiscetomies in particular can be safely performed under different anesthetic techniques including general endotracheal anesthesia (GA) or spinal anesthesia (SA) with or without sedation. A growing number of studies have been conducted to compare different aspects of both types of anesthesia, the most of them showing definite advantages of SA although the common anesthetic technique being GA. Among other advantages we hypothesized that SA would result in lower costs. The goal of this study is to compare the costs incurred in general and spinal anesthesia techniques for lumbar microdiscetomy.
Materials and Methods: A retrospective analysis of 262 patients who underwent elective lumbar microdiscetomy from 2016 to 2018 in a tertiary care university affiliated academic institution was performed. Patients were divided into 2 groups: 121 patients were operated under GA and 141 patients - under SA. To achieve the maximum possible homogeneity in both groups and to minimize the potential influence of patient and operative procedure characteristics on the costs, only American Society of Anesthesiologists (ASA) I physical class patients operated by a single faculty senior surgeon were enrolled in the study. Patients who failed intraoperative SA and were converted to GA were categorized as cases of SA (5 patients). These few conversions occurred because either SA was wearing off rapidly or it had not distributed properly due to spinal canal stenosis. We compared mean values of costs directly related to anesthesia, surgical procedure, Post-anesthesia care unit (PACU) stay and total costs in both groups. Cost data were obtained from hospital databases, while all other data were obtained from patient records. Comparisons of cost categories between two patient groups were performed with the Mann-Whitney U test for non-parametric continuous variables and a p-value of <0.05 was used to establish a statistical significance. IBM SPSS Statistics version 25 was used for data analysis.
Results and Discussion: SA was associated with 72.2% lower direct anesthesia cost (p<0.001), 12.6% lower direct operating procedure cost (p<0.001), 44.2% lower PACU cost and 43% lower total cost (p<0.001) as compared to GA.

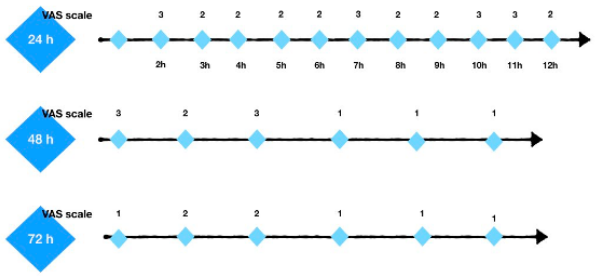
Conclusion: SA is less costly than GA when used in patients undergoing lumbar microdiscectomy, in addition, it contributes to the reduction of other non-anesthesia related costs and overall cost of treatment.

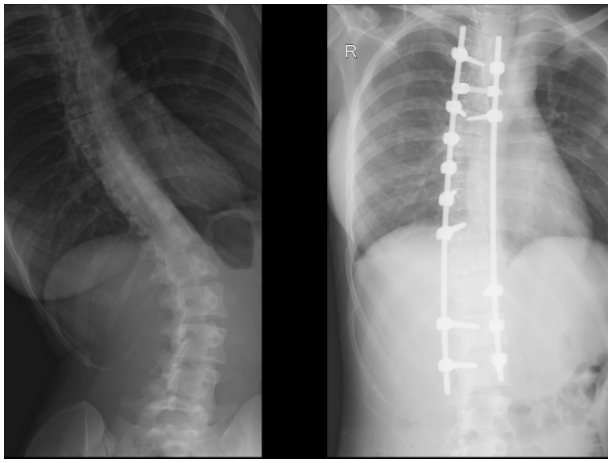
4393

Major spinal surgery without pain. This is a myph?

Plechysta Y.[1], Romanuk D.[1]
[1]Medical Center Dobrobut - Kyiv (Ukraine)

Background: Major spinal surgeries are associated with intense pain in the postoperative period (1). Adequate pain management in this period has been seen to correlate with improved outcome, early discharge and decrease rate of the complications. It is critically that pain treatment is effective with a minimum of side effects and reduce postoperative morbidity.
Case Report: 28-year-old woman with the diagnosis: idiopathic thoracolumbar scoliosis was undergoing surgical scoliosis correction (Th4-L2). Anaesthesia was performed with propofol induction and maintained with sevoflurane. Fentanyl boluses, NSAIDs were used for intraoperative analgesia. Postoperative analgesia was decided to perform with prolonged IV infusions of dexmedetomidine, morphine hydrochloride1% and paracetamol 3000 mg\day. Dexmedetomidine (0.3 mcg/kg/h) has been started 30 min before the end of the surgery without a loading dose. Morphine infusion has been started 10 minutes after extubation in the initial dose of 0.0014 mg/kg/h. Patient pain assessment (VAS) has been performed every 2h during the first 24h after surgery and every 6h during next48h after surgery.





It showed that pain level has not been more than 3 even during activization. Analgesia has been stopped 68h after surgery and the patient has been discharged 4 days after surgery.
Discussion: This postoperative analgesia strategy allowed our patient to be active, alert and felt no pain. It did not have any side effects or instability. VAS scale score was maximum 3 during the first 24h and 1-2 during 2days after surgery.
References:
1. Pain management following spinal surgeries: An appraisal of the available options Sukhminder Jit Singh Bajwa and Rudrashish Haldar.
Learning points: Combination of dexmedetomidine,opioids analgetics and paracetamol could be a new approach of postoperative analgesia for patients after major spinal surgeries.

4811

Regional cerebral oxygen saturation monitoring during spinal surgery in order to identify patients at risk for cerebral desaturation

Murniece S.[1], Soehle M.[2], Vanags I.[3], Mamaja B.[1]
[1]Riga East Clinical University Hospital - Riga (Latvia), [2]University Hospital Bonn - Bonn (Germany), [3]Riga Stradins University - Riga (Latvia)

Background: Near infrared spectroscopy (NIRS) devices, like cerebral oximeters, have been increasingly implemented in clinical practice, also intraoperatively. Interventional algorithm is used to guide patient management in order to mitigate cerebral desaturation and avoid postoperative cognitive disturbances, reduce days spent in intensive care unit, avoid kidney failure and other complications.
The goal of the study: The goal was to evaluate the usefulness of intraoperative cerebral oxygenation monitoring during spinal surgery in order to identify patients at risk for cerebral desaturation.
Materials and Methods: Patients (n=27) scheduled for spinal surgery were recruited. All patients received standard general anaesthesia. In all patients cerebral oxygenation (rScO2) was monitored using NIRS device INVOS 4100. If rScO2 dropped for more that 20% from individual baseline values or there was an absolute drop under 50%, NIRS based interventional algorithm was used. SpO2, non-invasive medium arterial pressure (MAP), end tidal carbon dioxide were noted every 5 minutes. Patients' age, sex, type of surgery, preoperative haemoglobin, haematocrit, intraoperative blood loss, duration of the operation was fixed.
Results: In 2 patients (57,54 years old) we observed intraoperative cerebral desaturation. Patients underwent spinal meningioma extirpation and microdiscectomy. In one patient rScO2 decreased under 20% from individual baseline values. In other patient rScO2 decreased under the absolute value of 50%. In both patients NIRS algorithm was initiated. After the first step, verification of correct heads position, no changes in rScO2 were seen. As a next step MAP was raised using Ephedrin boluses (5-20 mg) – rScO2 raised above threshold, no further interventions were necessary. Comparing to patients that experienced mild rScO2 fluctuations that didn't reach desaturation threshold, patients with desaturation had statistically significant longer medium time of the operation - 121±35 min in patients without desaturation compared to 200±98 min in patients with desaturation (p=0.01). Pearsnon's correlation showed a very strong negative correlation between rScO2 and duration of operation, although statistically not significant (r=-0.9, p=0.2).
Conclusion: Patients with prolonged surgery time might experience cerebral desaturation more often than other spinal surgery patients. Therefore, for this category of patients intraoperative cerebral oxygenation monitoring is very useful.

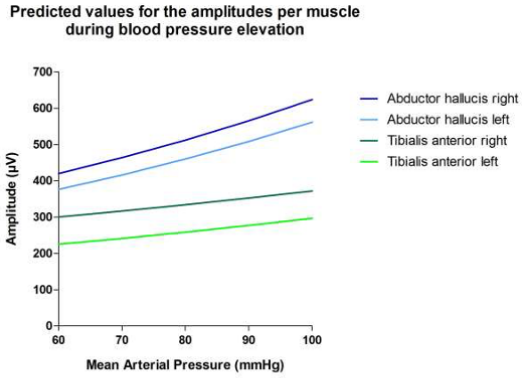
5382

The effects of blood pressure elevation on transcranial electrical stimulation motor evoked potential (Tc-MEPs) amplitudes during spinal surgery. Preliminary results of a prospective observational study

Dulfer S. E.[1], Sahinovic M. M.[2], Groen R. J. M.[1], Absalom A. R.[2], Drost G.[3]
[1]University of Groningen and University Medical Center Groningen, Department of Neurosurgery - Groningen (Netherlands), [2]University of Groningen and University Medical Center Groningen, Department of Anaesthesiology - Groningen (Netherlands), [3]University of Groningen and University Medical Center Groningen, Department of Neurosurgery and Department of Neurology - Groningen (Netherlands)

Background and Goal of Study: Tc-MEPs are widely used to monitor the motor pathways during spinal surgery. Tc-MEP amplitude decreases can be caused by surgical or by non-surgical factors. The latter include the effects of anesthetic drugs, body temperature and blood pressure. The exact influence of blood pressure has never been rigorously investigated. The aim of this study is to investigate the effects of pharmacological blood pressure elevation on Tc-MEP amplitudes.
Materials and Methods: After informed consent, 13 patients (age range 14 – 46 years) without neurological motor deficits scheduled for elective spinal surgery were included. Anesthesia was induced and maintained with propofol and remifentanil (target bispectral index 50; normocarbia), and an arterial line inserted for invasive blood pressure monitoring. After prone positioning noradrenaline infusion was used to gradually increase the mean arterial pressure (MAP) to 100 mmHg. Every two minutes Tc-MEP measurements were performed, stimulating with supramaximal voltage. The measured amplitudes were log-transformed. A linear mixed model was used to investigate the relationship between Tc-MEP amplitude and MAP, for the left and right tibialis anterior (TA), and abductor hallucis (AH) muscles.

Results and Discussion: A significant positive correlation between MAP and MEP amplitude was found for all four muscles (TA left p=0.016, TA right p=0.028, AH left p=0.002, AH right p=0.002) (see figure 1). There were however, large inter-individual differences in magnitude of the increase in amplitude during blood pressure elevation. The cause of these inter-individual differences may be explained by differences in efficiency of cerebral autoregulation. The use of a cerebral near-infrared spectroscopy monitor could help to better explain the influence of autoregulation on the effect of noradrenaline on Tc-MEP amplitudes.
Conclusion: These preliminary results suggest that pharmacological blood pressure elevation from ±60 mmHg to 100 mmHg, significantly increases Tc-MEP amplitudes of the TA and AH muscles. The causes of the large inter-individual variability in the response to noradrenaline should be further explored.



The X-axis denotes the mean arterial pressure (MAP) in mmHg and the y-axis denotes the transcranial electrical stimulation motor evoked potential (Tc-MEP) amplitude in µV. A linear mixed model was used to investigate the relationship between Tc-MEP amplitude and MAP, for the left and right tibialis anterior, and left and right abductor hallucis muscles. The predictive values for the amplitudes per muscle during blood pressure elevation are shown in the figure per muscle.

5291

The use of SpHb in pediatric patients undergoing major surgery associated with reduced morbidity

Saraçoğlu A.[1], Orhon Ergün M.[1], Sakar M.[2], Uyar E.[3], Saçak B.[4], Aykaç Z. Z.[1]
[1]Marmara University Pendik Teaching And Research Hospital - Istanbul (Turkey), [2]Marmara University Pendik Teaching And Research Hospital / Neurosurgery - Istanbul (Turkey), [3]Marmara University Pendik Teaching And Research Hospital / Pediatrician - Istanbul (Turkey), [4]Marmara University Pendik Teaching And Research Hospital / Plastic Surgery - Istanbul (Turkey)

Background and Goal of Study: To date, perioperative blood transfusion management has traditionally based on estimated blood loss and measuring hemoglobin (Hb) values by conventional methods. However, this method is time consuming and causes a delay in decision of transfusion. Hemodynamic instability can be prevented by detecting sudden decreases in Hb concentration by continuous Hb (SpHb) analysis using Rainbow1 20L probe (Masimo, Irvine, CA) connected to Radical-7 Pulse CO-Oximeter. The aim of this study was to determine the effect of SpHb monitoring on perioperative blood transfusion, mortality and morbidity in patients undergoing craniosynostosis surgery.
Materials and Methods: Following the Ethics Committee approval and parent consents, fifty-two patients aged between 2-24 months who underwent craniosynocytosis surgery were included in the study. Patients were divided into two groups; managed for transfusion therapy by intermittent blood gas sampling (Group 1, n=30) or SpHb measurement (Group 2, n=30) using the Rainbow 1 20 L probe (Massimo, Irvine, CA) connected to the Radical-7 Pulse CO-Oximeter device. Hb monitoring and pH, BE, HCO3, lactate and glucose values of the patients in both groups were recorded hourly using arterial blood gas analysis during the perioperative period. In the SpHb group, Hb values were recorded by SpHb measurement and simultaneous blood gas sampling was also performed in sudden decreases. Perioperative blood and fluid transfusion, the duration of surgery and anesthesia, urine output, vasopressor requirement, the length of intensive care unit (ICU) stay, postoperative drainage, transfusion rate, Hb values and vital signs were recorded.
Results and Discussion: The duration of ICU stay was significantly higher in Group 1 ($p < 0.05$). Lactate levels at the beginning of the operation were higher in the case group, but higher in Group 1 at the end of the operation ($p < 0.05$). Postoperative drainage, red blood cell and fresh frozen plasma (FFP) transfusion in ICU were significantly higher in the control group ($p < 0.05$). There was a positive correlation between ICU stay, FFP transfusion and postoperative drainage ($p < 0.05$).
Conclusion: Noninvasive continuous hemoglobin monitoring in major hemorrhagic surgeries in pediatric patients might be effective in reducing morbidity not only by reducing the amount of transfusion and but also leading to less metabolic and hemodynamic instability.

5446

Effects of desflurane and propofol anesthesia on cerebral oxygenation during spinal surgery in prone position

Koraki E.[1], Stachtari C.[1], Sifaki F.[1], Bagntasarian S.[1], Vasileiadis K.[1], Zarzava E.[1]
[1]Pappanikolaou General Hospital - Thessaloniki (Greece)

Background and Goal of Study: Postural change during anesthesia has a complex effect on the systemic and cerebral circulations. The goal of this study was to evaluate the effects of desflurane and propofol on cerebral oxygenation during spinal surgery in prone position.
Materials and Methods: Study was approved by Scientific and Ethics committee of G.Papanikolaou Hospital (EU PAS 16641). Fifty two patients scheduled for spinal surgery were randomly allocated to propofol (n=25) and desflurane (n=27) groups. Anesthetic agents were maintained to obtain bispectral index of 50-55. SAP,DAP,HR,SPO2,ETCO2 and right and left rSO2 were assessed at seven-time points: supine position without oxygen administration (T1), supine position with oxygen administration (T2–baseline), intubation in supine position (T3), just after prone positioning (T4), 10 minutes after prone positioning (T5), at the end of surgery in prone position (T6) and at the end of anesthesia in supine position (T7). Partial pressure of carbon dioxide, partial pressure of oxygen and hemoglobin were also recorded at T3 and T7. Statistical analysis was performed with t-test, Mann Whitney, chi-Square and two-way mixed Anova tests. P value < 0.05 was considered significant.
Results and Discussion: Demographic data, pre-oxygenation hemodynamic variables and rSO2 were comparable between groups. There was no significant difference between groups in SAP,DAP,HR,SPO2, and ETCO2 (p=0.095, p=0.061, p=0.357, p=0.088, p=0.328 respectively). PCO2, PO2 and Hb were no significant different between groups (p=0.542, p=0.394, p=0.768 respectively). rSO2 values were not significantly different between groups (rSo2: p=0.958 (T2), p=0.954 (T3), p=0.646 (T4), p=0.397 (T5), p=0.709 (T6), p=0.689 (T7). In propofol group right rSO2 was significant higher at T3 (68.7 ± 9.41 vs 66 ± 8.87, p=0.017) and significant lower at T5 (62.22 ± 6.33 vs 66 ± 8.87, p=0,019) and at T6 (63.07 ± 5 vs 66 ± 8.87, p=0,028) compared to baseline. Left rSO2 decreased significantly from baseline at T5 (63.19 ± 7.56 vs 66.22 ± 9.39, p=0.026) in propofol group. Left and right rSO2 in desflurane group decreased significantly from baseline at T5 (60.92 ± 11.32 vs 66.08 ± 10.21, p=0.0004 and 60.96 ± 11.02 vs 63.68 ± 9.14, p=0.0115).
Conclusion: In prone position desflurane and propofol were associated with significant decrease in rSO2 without differences between these anesthetics.

4759

Effects of balanced anesthesia with sevofluorane and dexmedetomidine on somatosensory and motor evoked potentials during spinal surgery in a patient allergic to peanut, a case report

Ghaddar Rivas L.[1], Lema Tomé M.[2], Fernández Lorente J.[2], Establés Learte M.[2], Del Castillo Fernández T.[2], Cruz Pardos P.[2]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [2]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Intraoperative neurophysiological monitoring (IONM) is a method of evaluation the integrity of neural structures which includes electroencephalography (EEG), electroneuromyography (EMG), somatosensory (SSEP) and motor evoked potentials (MEP). All anesthetic drugs interfere with IONM. The current gold standard is total intravenous anesthesia (TIVA) without neuromuscular block. Propofol is a potential cause of allergic reactions since current formulations contain an emulsion of soybean oil. We presents a case of a 43 years old man allergic to several kinds of nuts and previous episodes of asthma undergoing spinal surgery.
Case Report: History of cervical myelopathy made necessary the use of IONM. Allergic reactions to peanut required to find an alternative to propofol. Various anesthesia adjuncts which preserve evoked potentials (EP) where used while reducing doses of eachone.For induction, thiopental, fentanyl, ketamina and rocuronium were administered without further doses of neuromuscular blocking agent. General anesthesia was maintained with dexmedetomidine (Dex 0.6µg/kg/h), without loading dose, lidocaine (1.5mg/kg/h), sevofluorane 0.4 minimum alveolar concentrations (MAC) and intermittent injections of fentanyl. Depth of anesthesia, hemodinamic and normothermia was preserved. The amplitude variability of the SSEP and MEP responses were assessed as well as EMG. SSEP and MEP were obtained during all the surgery without patological changes. Increase of MEP variability were observed so stimulus intensity and number of trains adjusment was needed.
Discussion: Inhalational anesthetics dose-dependently increase latency of EP and reduce amplitude by depressing the pyramidal activation of spinal mortor neurons or

the synaptic transmission in the cerebral cortex. Dex is a α2-agonist that produces analgesia, sedation and sympatholysis. It changes EP amplitude at clinically nonsignicant levels and may be used in IONM at up to 1.2µg/kg/h. Lidocaine preserves EP while reducing doses of other anesthetics. Ketamine increases EP and promotes analgesia. IONM requires the maintenance of physiological variables, steady-state alveolar and serum concentrations of the agents employed.
References:
1. Curr Opin Anesthesiol 2018,31:532-538.
Learning points: The addition of sevofluorane 0.4 MAC combined with reduced doses of various intravenous anesthetics adjuncts such as Dex, lidocaine or ketamine can be used as components of balanced anesthesia without affecting IONM.

5649

Intraoperative spinal and neurogenic shock: excepcional and letal complication

Plaza Valiente C.[1], Bausili Ribera M.[2], Cirer Cirer A. M.[2], Rodríguez Prieto M.[2], Felipe Correoso M.[2], Merten A. R.[2]
[1]Hospital de la Santa Creu i Sant Pau - Barcelona (Spain), [2]Hospital de la Santa Creu i Sant Pau. Department of Anesthesia, Critical Care and Pain Medicine - Barcelona (Spain)

Background: The spinal shock is an entity produced after an insult to the spinal cord (secondary to multiple causes as trauma or ischemia) and is characterized by motor and sensory alterations. The neurogenic shock oftenly occurs simultaneously to the spinal shock and it's clinically recognized by bradyarrhytmia and hypotension due to autonomic alteration.
Case Report: 47-year-old woman diagnosed with breast cancer and D2 metastasis was scheduled for a D2 corpectomy and C6-D4 arthrodesis. A combined anaesthesia was performed (general anaesthesia + intrathecal administration of morphine) and motor and sensitive evoked potentials were monitored. After 7 hours of surgery, during the manipulation of the vertebral body, a sudden loss of motor and sensitive potentials was reported. Concomitantly accumulative loss of blood of 1.5L and need of norepinephrine to treat the hypotension appeared. Because normal evidence of the thromboelastometry test, we started aggressive hydration, blood transfusion and high doses of vasoactive drugs (norepinephrine + epinephrine) were increased as the patient developed a refractory shock. Severe hypotension followed by extreme bradicardia and cardiac arrest (asystole). Surgery was stopped and advanced CPR maneuvers were required. After 6 minutes of CPR the patients recovered sinusal rhythm. The transesophageal echocardiography showed normal contractility and absence of thrombus. The diagnostic orientation considered was spinal and neurogenic shock and 500mg of methylprednisolone was administrated. Postoperative, MRI showed a D2 injury corresponding to myelopathy (probably from ischemic cause). After two months of in-hospital rehabilitation, the patient was discharged with paresis of both legs.
Discussion: The motor and sensory deficit of the spinal shock is due to the damage of anterior horn (motor) and/or posterior horn (sensory). The autonomic alterations of the neurogenic shock as bradycardia and hypotension are due to a damage of the rostral ventral lateral medulla (RVLM). If a neurogenic shock is produced at a higher level than D6, extreme vasodilatation and predominance of parasympathetic lead to life-threatening adverse event. Early recognition is mandatory; treatment consists in keeping the spinal perfusion and, in some cases, lumbar drainage is required. Methylprednisolone can improve neurologic outcomes.
References:
1. Biering-Sørensen, F., Alterations in cardiac autonomic control in spinal cord injury, Auton. Neurosci (2017).

6327

Acute Hemorrhage of Spinal Arteriovenous Malformation in a child with Congenital muscular dystrophy: Case Report

Coelho M.[1], Casal M.[2], Figueiredo J.[1]
[1]Centro Hospitalar do Baixo Vouga - Aveiro (Portugal), [2]Centro Hospitalar do Porto - Porto (Portugal)

Background: Congenital muscular dystrophies (CMDs) are a group of early onset muscle disorders with histologic evidence of dystrophy. The merosin-deficient CMD subtype accounts for 30%. Patients present with severe muscle weakness, contractures, lung disease and cardiac disorders.1 They present a challenge to anesthesiologists when in need of surgery. Spinal arteriovenous malformations (sAVMs) are vascular lesions located within the spinal canal that in case of rupture can cause sudden-onset pain accompanied by myelopathy or radiculopathy.2
Case Report:♀, 7yo, 15kg, with merosin-deficient CMD, previously capable of ambulation, presented to the emergency department with spontaneous intense pain in both legs and back which evolved into numbness and paraplegia within 15min. Diagnosed with complete spinal syndrome below D5. The MRI showed an extensive intra-spinal hematoma. Urgent surgical intervention ensued. In the OR, severe contractures of all limbs and skin frailty mandated tailored ventral positioning and padding. Total intravenous anesthesia was used with propofol and sufentanil guided by processed EEG, rocuronium with neuromuscular monitoring and ketamine. Sugammadex was used at emergence. Characterization and excision of intradural sAVM was successful under 7 hours. The child was extubated prior to ICU transfer. Pain was controlled with paracetamol and gabapentine. Gradual partial recovery of sensation and mobility of the lower limbs was observed within 23 days.
Discussion: Overall prevalence of CMD is 0.99 per 100,000, 80% are children. Spinal AVMs are uncommon, and even rarer in children.1 The latter present with acute hemorrhage in 70% against 45% in adults.2 Intraoperative management was particularly interesting due to: tailored positioning; the use of propofol, avoiding volatile agents (risk of rhabdomyolysis and hyperkalemia); the use of sugammadex, avoiding neostigmine induced side effects. Low dose ketamine is safe and together with gabapentine provided optimal pain management. Due to the rarity of both findings mentioned, no reports were find about CMD children operated on sAVM with acute hemorrhage.
References:
1. Can J Neurol Sci 2016;43:163–177; 2-Neuroimag Clin N Am 2007;17:207-221.
Learning points: A child with complicated CMD demands the management of parents, expectations, and even medical staff. Most patients with sAVM complicated with hemorrhage improve significantly after treatment in the acute phase, even with severe deficits.

5151

Anesthetic considerations in the syringopleural shunt: case report

Quesada Carrascosa M.[1], Salvador Gozalbo L.[1], Morales Sarabria J.[1], Sanchis Veryser C. A.[1], Olivas Dols M.[1], De Andres J.[1]
[1]Hospital General Universitario de Valencia - Valencia (Spain)

Background: Syringomyelia represents a pathology of the spinal cord that consists of the formation of a cavity filled with fluid within the spinal cord. It appears more commonly associated with the malformation of Chiari type I, although it may also be due to congenital malformations, secondary to an infection or inflammation. Syringomyelia can be asymptomatic, being discovered incidentally on an MRI or presenting with pain, progressive neurological deficits and other symptoms secondary to the compression the spinal cord. Decompression of the foramen magnum remains the recommended surgical treatment. The recurrence of syringomyelia after decompressive treatment has been described in up to 66% (1). In this situation, syringopleural shunt is one recommended therapeutic option.
Case Report: We present the case of a 54-year-old woman who underwent surgery for syringopleural shunt placement. The patient was operated in 2012, performing haemilaminectomy and syringopleural shunt after detection of the syringomyelic cavity that extended from T5 to T9. Seven years later, the patient consulted again for worsening neurological symptoms. The intervention was performed under general anesthesia and in prone position. Once the old catheter was located after the opening of the dura, obstruction was observed in its proximal end, so it was removed, placing a new one. Once the pleura was exposed, after thoracotomy on a previous scar, we caused a 4-second apnea to facilitate pulmonary descent during the opening of the interpleural space and the placement of the distal end of the new catheter, thus avoiding complications derived from puncture of the pulmonary parenchyma.
Discussion: The literature on anesthetic management in syringopleural shunt is nil. This procedure requires important anesthetic considerations, such as airway management in patients with possible abnormalities, complications caused from prone position, intra and postoperative neurological control and adequacy of ventilation when accessing the pleural cavity to prevent lung complications. In our knowledge this is the first time that a case of syringopleural shunt is presented from the anesthetic point of view.
References:
1. Jehud a Soleman et al. Treatment failure of syringomyelia associated with Chiari I malformation following foramen magnum descompression: how should we proceed? Germany: Neurosurgical review; 2018.

4722

Does Preoperative Bispectral Index monitoring predict postoperative delirium?

Satomoto M.[1], Echizen M.[2], Miyajima M.[3], Adachi Y.[4], Matsushima E.[3], Ochiai R.[1]
[1]Department of Anesthesiology, Toho University School of Medicine - Tokyo (Japan), [2]Department of Anesthesiology, Tokyo Medical and Dental University - Tokyo (Japan), [3]Department of Psychiatry, Tokyo Medical and Dental University - Tokyo (Japan), [4]Department of Surgical Intensive Care Medicine, Nagoya University Hospital - Nagoya (Japan)

Background and Goal of Study: Delirium is recognized as a significant contributor to postoperative morbidity and mortality in intensive care unit (ICU). The early detection and appropriate intervention are indispensable; however, the diagnostic tools are limited (1). We have hypothesized Electroencephalography (EEG) obtained by Bispectral Index (BIS) system could detect the onset of delirium and already reported that EEG showed the significant decrease in the relative power of theta wave in the delirious patients on Post-Operative Day (POD) 1 and POD 2 compared to non-delirium patients (2). If we could predict a risk of delirium before surgery using practical BIS analysis in the preoperative visit, the prognosis of the patient will be improved. So, we have analysed EEG obtained by BIS to same patients at the day before surgery retrospectively.
Materials and Methods: This study was approved by the Institutional Review Board. Informed consent was obtained from patients scheduled for esophageal cancer surgery. EEG data was obtained by BIS system during 6 minutes on the day before surgery as the patient data. Their preoperative cognitive function was evaluated with Mini-Mental State Examination. The patients were induced general anesthesia with epidural anesthesia. The patients of trachea were extubated in the morning on POD1 and subsequent management was continued in ICU. Based on medical interview, the psychiatrists diagnosed delirium.
Results and Discussion: Twenty-five patients completed the study schedule and were analysed. Seven of them experienced delirium and 18 of them did not. The average age and the percentage of male patients were significantly higher in delirium group. The relative power of the alpha, beta, theta and delta waves were not significantly different between delirium group and non- delirium group. Although we have reported that delirious patients showed significant EEG change, preoperative EEG data obtained by BIS were not significantly different from delirious and non-delirious patients. This result suggested that postoperative delirium and EEG changes might be occurred by surgery and anesthesia. Conclusion(s): Before surgery in patients who did not receive anesthetics and surgery yet, the prediction of development of delirium using EEG in the current bed-side practical analysis has a room for discussion.
References:
1. Van der Kooi AW. Chest 2015.
2. Echizen. ASA annual meeting in San Francisco 2018 poster presentation.

4723

Preoperative cognitive impairment is associated with adverse outcomes in elderly patients undergoing major surgeries: a prospective cohort study

Yuan H.[1]
[1]Maternity and Obstetric Hospital affiliated Nanjing Medical University - Nanjing (China)

Background and Goal of Study: Objective: To explore the association between preoperative cognitive status with postoperative outcomes in elderly patients undergoing elective total knee or hip arthroplasty.
Materials and Methods: Two hundred and seventeen patients were enrolled and baseline cognition was assessed using the mini-mental state examination 24h before surgery .Accordingly,patients were divided into impaired group(n=61)and normal group(n=156).Baseline characteristics,intraoperative data,clinical outcomes including length of stay,postoperative complications,and 5-year survival rate wew recorded.
Results and Discussion: The length of stay in the impaired group is prolonged compared with the normal group(p=0.012).patients in the impaired group show higher incidence of postoperative delirium than that in the normal group(p<0.001). During the 5-year observation period,the survival rate in the impaired group is significantly lower than their normal counter parts(p=0.043).However,no signicant difference was observed in other postoperative complications between these two groups(p>0.05)
Conclusion: Our study confirms previous studies that preoperative cognitive is associated with adverse outcomes in elderly patients undergoing elective total knee or hip arthroplasty.

4732

Scalp Block is Associated with Favourable Progression-Free Survival in Patients with High-Grade Glioma

Sung C. H.[1], Tsuang F. Y.[1], Liao M. H.[1], Chou T. L.[1], Chiu H. C.[1], Wu C. Y.[1]
[1]National Taiwan University Hospital - Taipei City (Taiwan)

Background and Goal of Study: High-grade glioma is notorious for high recurrence rate, which is highly related to the genetic profile of tumour, including isocitrate dehydrogenase (IDH) mutation and Ki-67 index. Regional anaesthesia can reduce opioid consumption and stress responses, thereby improving the preservation of intraoperative immune function. We have shown that scalp block (SB) is associated with favourable recurrence profile for glioma, but the influence of genetic profile has not yet been investigated.
Materials and Methods: Patients undergoing resection craniotomy between 1 January 2014, and 30 September 2018 for World Health Organization (WHO) grade III and IV glioma with complete reports of IDH and Ki-67 index were included in analyses. Exclusion criteria comprised 1) recurrent tumour, 2) awake craniotomy, 3) stereotactic biopsy, 4) presurgery radiotherapy or chemotherapy, 5) current pregnancy, and 6) age of less than 20 years. SB was performed using 10 mL of levobupivacaine with 1:200,000 epinephrine for each side of the scalp after induction of general anaesthesia. The diagnosis of recurrence was based on postoperative brain magnetic resonance imaging every 3 months. Kaplan–Meier analysis was used to compare the survival curves between groups. Cox regression analysis was used to determine the effect of risk factors on survival outcomes.
Results and Discussion: Total 108 patients were included, 56 of whom received SB. The characteristics of the groups are comparable. SB was associated with improved progression-free survival (PFS) (median PFS:15.17 [95% confidence interval (CI):8.63–37.37] vs. 11.9 [95% CI:7.53–59.53] months, P=0.0301). Cox analysis revealed that SB (hazard ratio [HR]:0.115, 95% CI:0.020–0.675, P=0.0166), gross total resection (HR:0.143, 95% CI:0.023–0.897, P=0.0379), adjuvant chemotherapy (HR:0.001, 95% CI:0.001–0.251, P=0.0152), and IDH mutation (HR:0.003, 95% CI:0.001–0.203, P=0.0070) were associated with better PFS. WHO grade IV instead of III (HR:10.305, 95% CI:1.062–100.035, P =0.0443), infratentorial tumour (HR:16.707, 95% CI:1.115–250.300, P=0.0415), and Ki-67 index (HR:1.063, 95% CI:1.013–1.116, P=0.0134) were risk factors for worse PFS.
Conclusion: The application of SB is associated with favourable PFS in high-grade glioma.
References:
1. Scalp Block Is Associated with Improved Recurrence Profiles in Patients Undergoing Primary Glioma Resection Surgery. Journal of Neurosurgical Anesthesiology 2020. In press.

4742

Personify premedication in the structure of general anaesthesia in neurosurgical patients with intracranial neoplasm

Savvina I.[1], Orechova E.[1]
[1]Almazov National Medical Research Center - St. Petersburg (Russia)

Background and Goal of Study: Preoperative evaluation of psycho-emotional status and functional state of autonomic nervous system (ANS) in neurosurgical patients with intracranial neoplasm is actually for the personify premedication.
Materials and Methods: 178 ASA II-III neurosurgical patients (110 female, 68 male, age 47,3±3,8yo) with supra- and subtentorial intracranial neoplasm were examined using: 1) intergative anxiety test (IAT) (L. Wasserman, et al., 2005) for differentiiated assessment of anxiety and its severity twice: one day before the operation and in the morning of the operative day after premedication. To standardize the results were translated to scores of General anxiety scale and an auxiliary scale, stanine scales (SN) (standard nine); 2) methods of functional examination of supra- and segmental parts of the ANS with Kerdo, Hildebrant indexes, Dagnini-Ascher reflex, Chermak-Goering reflex, orthostatic test; evaluation twice - before and after premedication; 3) measurement of hemodynamic parameters: BP, HR (monitoring before and after premedication).
Results and Discussion: We obtained 3 groups: 1 group - 63 patients with supratentorial brain tumour without intracranial hypertension (ICH); normal level of anxiety (1-3 SN) and saved balance of the sympathetic and parasympathetic ANS parts; 2 group - 48 patients with subtentorial brain tumour, 29 from them with ICH; an average level of anxiety (4-6 SN) with the prevalence of parasympathetic part of ANS; 3 group - 67 patients with supratentorial (n=37; temporal lesion) and subtentorial (n=30; initial stage of brainstem dislocation) brain tumour with high levels of personal and situational anxiety (7-9 SN) with marked activation of sympathetic ANS part. The premedication included non-benzodiazepine anxiolytic for the 1 group, benzodiazepine anxiolytic for the 2 group, moxonidine and

benzodiazepine anxiolytic for the 3 group. The score of effective premedication according IAT results and demonstrated vegetative stability in all investigated patient groups was mathematically reliable (p<0,05 compared of two stages of assessment - before the operative day and in the morning of the operative day).
Conclusion: The intracranial hypertension, functional ANS and emotional state of the patients with intracranial neoplasm determine the personify premedication before neurosurgical operation.

5295

Frequency of Postoperative Shivering in Patients After Craniotomy Under General Anesthesia by Sevoflurane and Desflurane: A Single-center Randomized Trial

Gritsan A.[1], Dovysh N.[1], Danilovich A.[2], Kurnosov D.[2], Korchagin E.[2]
[1]Krasnoyarsk Regional Clinical Hospital, Krasnoyarsk State Medical University - Krasnoyarsk (Russia), [2]Krasnoyarsk Regional Clinical Hospital - Krasnoyarsk (Russia)

Background and Goal of Study: Shivering in the process of recovery is one of the adverse side effects of general anesthesia (GA). The incidence of postoperative shivering ranges from 5% to 66%. To assess the incidence of shivering during recovery of GA based on Sevoflurane and Desflurane in patients after removal of brain tumors of supratentorial localization.
Materials and Methods: We conducted an observational study of 30 patients who were operated on for brain tumors supratentorial localization under GA (group 1 - 15 patients, where the main anesthetic was sevoflurane, group 2 - desflurane). Patients in groups 1 and 2 had no statistically significant differences in age (52.4±7.3 and 51.4±10.7), level of consciousness assessed on the GCS (15 and 15), anesthetic risk assessed on the ASA scale (3 and 3), duration of the GA (320±21 min and 318±22 min) respectively. Routine methods were used during surgery to maintain normothermy in operated patients: thermoblanks, warming infusion solutions. The temperature in the operating room was controlled by a wall thermometer and maintained at the range of 22-23°C. Assessment of the presence and severity of postoperative shivering was assessed on a scale Crossley and Mahajan.
Results and Discussion: Shivering during recovery after GA were absent in 12 (80%) patients of Sevoflurane group and in 11 (73.3%) of Desflurane group. In the group of patients with basic anesthesia Sevoflurane 6.7% marked less development of postoperative shivering which has no statistically significant difference with the patients of the group Desflurane. Shivering of the 1st degree in form of vasoconstriction and piloerectionin the Sevoflurane group occurred in 2 (13.3%) patients and in Desflurane group - in 3 (20%) patients. Shivering of 2nd degrees in the form of muscle contractions in one muscle group in both the Sevoflurane and Desflurane groups occurred in 1 (6.7%) patient.
Conclusion: When Desflurane was used as the main anesthetic, a higher incidence of postoperative shivering was observed than with Sevoflurane by 6.7%, but without statistically significant differences. Routine methods for the prevention of postoperative shivering are reasonably effective and frequency of postoperative shivering in patients after removal of brain tumors of supratentorial localization does not exceed 26.7% with GA by inhalation anesthetics.

4794

Early discharge to the neurosurgical ward after elective supratentorial brain tumor resection

Lai Y. M.[1], Noske D.[1], Loer S.[1], Van Den Brom C.[1], De Witt Hamer P.[1], Schober P.[1]
[1]VU University Medical Center - Amsterdam (Netherlands)

Background and Goal of Study: Postsurgical care after craniotomy at an intensive care unit (ICU) is associated with utilization of limited resources and high costs while it may not always be necessary. The benefit of routine postoperative monitoring at the ICU compared to early discharge to the neurosurgical ward is unknown. Patients at risk for adverse events need to be monitored closely, however, we hypothesize that carefully selected patients following craniotomy may be discharged to the neurosurgical ward. In this study we explore the number of adverse events within 72 hours after brain tumor resections when selected patients are discharged to the neurosurgical ward from the post anesthetic care unit (PACU) after six hours.
Materials and Methods: This pilot study is a prospective single center observational cohort study. All adult patients who had an elective resection for a supratentorial brain tumor who met the early discharge criteria were included. These discharge criteria were: cognitive status and language skills must allow clear communication and cooperation, stable neurological status, mild focal deficit concordant with pre-surgical examination findings, stable or improving pulmonary status on nasal cannula oxygen, no new cardiac dysrhythmia or symptoms, systolic blood pressure below 150mmHg without intravenous drugs. The patients were followed for 72 hours post-operatively to assess adverse advents that needed PACU or ICU care.
Results and Discussion: Between December 2017 and March 2018, 20 patients (14 men and 6 women) with a mean age of 55 ± 14 years were included. The patients were classified as ASA 2 in 90% and as ASA 3 in 10%. The type of tumor was glioblastoma in 50% of the cases, 15% were meningioma and 5% astrocytoma. Mean length of hospital stay was 5.2 ± 1.9 days. No complications requiring re-admission at the PACU or ICU or re-craniotomy were observed. One patient had a seizure at the ward which was complicated by a shoulder luxation.
Conclusion: Our preliminary results are in support of a very low incidence of serious adverse events for which postsurgical care at the ICU or PACU is required. Early discharge to the neurosurgical ward after 6 hours seems feasible in patients meeting early discharge criteria.

4830

Short-term complications in adult patients submitted to elective craniotomy surgery: a Retrospective Audit in a Portuguese Tertiary Center

Gonçalves V.[1], Pereira C.[1], Varandas J.[1], Casal M.[1]
[1]Centro Hospitalar do Porto - Porto (Portugal)

Background and Goal of Study: Major postoperative complications after craniotomy surgery have great impact in patient outcome. Post-operative hemorrhage, cerebral oedema and convulsions are severe but less frequent, many times preceded by the more common ones, PONV and pain. The aim of this audit was to determine the incidence of postoperative complications during the first 24h after craniotomy surgery and evaluate the characteristics of the studied population. Materials and Methods: Retrospective audit using clinical records of patients submitted to elective craniotomy from January to July 2018. Clinical and demographic data included age, gender, ASA Classification, preoperative neurologic exam, tumor type and location, peritumoral oedema and anaesthetic technique. Complications in the first 24h included reintervention, convulsions, haemorrhage on scan control, decrease in GCS >3 points, new motor deficits, venous thromboembolism, PONV, pain, diabetes insipidus and death.
Results and Discussion: 85 patients analysed, 20 excluded (urgent craniotomy and incorrect surgical classification). 55% female, medium age 57,1 years old (±13,3, min 23, max 82). 9% ASA I, 58% ASA II, 33% ASA III. 17% were cases of tumor relapse. 33.8% presented with headaches, 27,7% motor deficit, 21,5% convulsions, 16,9% cranial nerve deficit and 16,9% consciousness depression. 9% had a normal exam. 40% meningiomas, 30,7% gliomas e and 10,7% brain metastases. 49% were frontal location and 22% temporal. 51% had peritumoral oedema. All were submitted to TIVA, two awake craniotomies. 33,8% of the cases had complication. 14 presented de novo motor deficits, one had haemorrhage on CT scan control. There were two cases of reintervention, two of convulsions and two of with deterioration of consciousness. Minor complications: three cases of PONV, four of postoperative pain and one case of Diabetes Insipidus. There were no reports of death or thromboembolism. There were no correlations between the preoperative features and complications in the postoperative period.
Conclusion: Craniotomy implies significant morbidity. The incidence of complications overlapped with the literature. We found a lower relative incidence of PONV and pain, which may be explained by the anaesthetic technique. In a centre with this kind of surgery, it is advisable that the immediate postoperative period should take place in a unit dedicated to neurocritical patients.

5343

Use of high oxygen concentration in pediatric patients is associated with increased morbidity

Saracoglu A.[1], Zengin S.[1], Öztürk N.[2], Niftaliyev S.[1], Harman F.[1], Aykaç Z.[1]
[1]Marmara Uni. Pendik Training and Education Hospital - Istanbul (Turkey), [2]Marmara Uni. Pendik Training and Education Hospital - Istanbul (Turkey)

Background and Goal of Study: Pulse oximetry is a frequently used device in our daily routine practice as a marker of hypoxemia. However, the most important limitations of the hypoxemia precursors are either 100% of peripheral oxygen saturation until the arterial oxygen level falls below 80 mmHg, or no value about the presence of hyperoxemia. The oxygen reserve index (ORI) forms an index based on the pulse oximeter. This index serves as a clinically important stimulant both in the detection of hyperoxemia and hypoxemia. Our primary goal in this prospective randomized study is to evaluate the effects of inhalation induction with different concentrations of inspiratory oxygen (FiO2) on ORI value and morbidity rate.
Materials and Methods: This study was planned as an observational and cohort study. Following the Ethics Committee approval and parental consents, 30 patients who were scheduled for craniosynocytosis, were included. Patients were randomized into two groups: 80% inspiratory oxygen concentration + air (Group 1, n=15) and 60% inspiratory oxygen concentration + air (Group 2, n=15) during volatile induction after routine monitoring. At the time of induction, arterial blood gas and ORI hemodynamic follow-ups were recorded at 60, 120, 180 and 240. min after tracheal intubation. Postoperative complications, length of hospital and intensive care unit (ICU) stay were recorded. Statistical analyzes were performed using IBM SPSS Statistics 22. The results were evaluated at 95% confidence interval and a p value of less than 0.05 was accepted as significant.
Results and Discussion: Since two patients were excluded from the study, the data of 28 patients were evaluated. Demographics were similar in groups ($p > 0.05$). The duration of surgery, hospital and ICU stay were significantly higher in Group 1 ($p < 0.05$). There was no statistically significant difference between the ORI values of patients at all times ($p < 0.05$). It was found that the duration of surgery, ORI value at 5th min and FiO2 in induction were statistically significant ($p < 0.05$).
Conclusion: The high oxygen concentration used in volatile induction in pediatric patients increases the length of hospital and ICU stay. New oxygen monitoring methods have been found to be more effective in preventing the use of high concentrations of oxygen than traditionally used methods.

5785

Position-related complications after neurosurgery: a case of airway obstruction

Benet i Bertran P.[1], Carrero Cardenal E.[2]
[1]Hospital Clinic of Barcelona - Barcelona (Spain), [2]Hospital Clínic de Barcelona - Barcelona (Spain)

Background: Position-related complications concern anesthesiologists, since patients are unable to express discomfort under general anesthesia. Neurosurgical patients are prone to present them, since some positions differ from the standard ones. In our case, after having a meningioma removed, a patient presented progressive swelling of the neck, requiring reintubation and a tracheostomy.
Case Report: A patient underwent left suboccipital craniectomy. Standard and specific monitoring were used during the procedure. Anesthetic induction and intubation had no difficulties. The patient was placed in the park-bench position. Surgery was carried out with no complications and, when finished, the patient was extubated and transferred to ICU. After six hours, the patient started developing a progressive swelling on the right side of the neck. A cervical CT scan showed extensive cervical edema and an enlarged right submaxillary gland. When performing the scan, she started presenting symptoms of respiratory failure and was reintubated under fiberscope vision, followed by a tracheostomy. Several tests were performed to rule out possible causal entities, but none was concluding. Literature suggested that surgical position was the most plausible one. The following days, the patient showed a progressive improvement. Once sedation was withdrawn, she was able to breath spontaneously throw the tracheostomy. The patient was transferred to a conventional hospitalization room, was decannulated and the tracheostomy was sealed. Once breathing and feeding throw the mouth were assured, she was discharged.
Discussion: Literature referred to cervical swelling is little compared to other position-related complications. It is mostly found in neurosurgery and has an important feature: the swelling progressively appears around six hours after surgery. In our case, the plausibility of surgical position being the cause of the swelling is high, since the park-bench position has been linked, in a number of cases, to swelling of the neck, face and upper airway due to the obstruction of their venous and lymphatic drainage. The time elapsed until the appearance of symptoms also matches with those found in literature.
Learning points: An optimal surgical position must provide the best surgical approach without harming the patient's wellbeing. In some cases, that balance may fail, so these patients should be closely monitored to detect any complications and rapidly treat them.

4745

Effect of Desflurane vs Propofol on electrocorticographic spikes in ECoG guided intractable Epilepsy Surgery- Prospective randomized controlled study

Gaur P.[1], Shetty A. N.[2], Kotak N.[2]
[1]Imperial College Healthcare NHS Trust, Charing Cross Hospital - London (United Kingdom), [2]Seth GS Medical College and KEM Hospital - Mumbai (India)

Background and Goal of Study: General anaesthesia, routinely used in Electrocorticography (ECoG) guided resection of epileptic foci, requires more vigilance as intermittent period of lightened anaesthesia is needed to elicit good ECoG waveforms. This is novel research to evaluate the efficacy of Desflurane vs Propofol in low sedating dose, having least interference with ECoG waveforms and outcome.
Materials and Methods: This is randomized controlled study conducted with ethical permission and informed consent. 32 patients with intractable epilepsy between 7-65 years and good neuropsychological assessment (IQ > 70) were included. Plane of anaesthesia is lightened to facilitate ECoG recording with target MAC 0.3-0.4 in Desflurane(D) group and propofol to 25-75 microgm/kg/min in Propofol(P) group with Bispectral index(BIS) of 50-70. ECoG recording is assessed by its onset and total duration. Withdrawal criteria were intraoperative seizures or no spikes with rescue being Propofol bolus.
Results and Discussion: Demographic data were comparable. ECoG onset was significantly early in P group being 3.25 mins vs 7.67 mins in D group ($P < 0.0001$). ECoG was satisfactory in all patients in P group while 2 patients in D group were withdrawn due to no spike. Average total ECoG duration was higher in D group with 17.19 mins vs 11.88 mins in P group ($p < 0.001$). BIS was comparable in both groups ($p > 0.05$). Mean emergence time in P group was almost double that of D group (16mins). No postoperative recall was detected in any group when assessed by Modified Brice Questionaire.
Conclusion: Optimal and early ECoG recording was better elicited with Propofol as compared to Desflurane.
References:
1. Bindra A, Chouhan RS, Prabhakar H, Har H, Chandra PS. Comparison of the effects of different anesthetic techniques on electrocorticography in patients undergoing epilepsy surgery – A bispectral index guided study. Seizure Eur J Epilepsy. 2012;21(7):501-507.
2. Alcaraz G, Manninen P. Intraoperative electrocorticography. j Neuroanaesth crit care. 2017;4(1):9-12.

4872

Effect of equiosmolar solutions of hypertonic saline and mannitol on cerebral oxygenation and brain debulking during elective supratentorial craniotomy surgery

Pezikoglou I.[1], Chlorou D.[1], Dalakakis J.[1], Nikopoulou A.[1], Pourzitaki C.[1], Tsaousi G.[1]
[1]Aristotle University of Thessaloniki - Thessaloniki (Greece)

Background and Goal of Study: Hyperosmolar therapy is the mainstay for brain volume reduction and thus surgical exposure optimization. This study aims to elucidate the impact of equiosmolar solutions of mannitol (M) or hypertonic saline (HTS) on brain relaxation, cerebral oxygenation and intracranial pressure, during supratentorial craniotomy surgery.
Materials and Methods: Fifty-two adult patients scheduled for elective supratentorial craniotomy were randomised to receive either 20% M (4.6mL/kg) or 7.5% HTS (2mL/kg) 30 min before dura opening. Hemodynamic variables were monitored by ClearSight System at following time points: before hypertonic agent infusion (T0), 15 (T15), 30 (T30), 60 (T60), 90 (T90), 120 (T120), 180 (T180), and 240 (T240) min after infusion conclusion. Blood samples from the jugular

bulb for cerebral oxygenation determination (SjO2) were collected concomitantly. Furthermore, subdural pressure (SdP) and cerebral perfusion pressure (CPP) were measured before opening the dura, while brain relaxation score (BRS) was evaluated after opening the dura.
Results and Discussion: A notable increase (p<0.001) of SjO2 between T0 and T15 was recorded in both groups (60±10 to 65±10mmHg for M and 58±9 to 70.4±9mmHg for HTS; p<0.001), which persisted up to T30 (64±10 mmHg for M and 67±11mmHg for HTS; p<0.001). Thereafter, SjO2 augmentation remained valid only in HTS group up to T120 (p<0.05). Cardiac output presented a profound elevation up to T30 (5±0.9 to 5.7±1.1 L/min for M and 4.7±0.9 to 5.2±1.2 L/min for HTS; p<0.001), which was then attenuated but remained important until the study completion (p<0.05) in both groups, while central venous pressure increased only at T15 (p<0.001). On the contrary, stroke volume variation declined at T15 compared to T0 (p<0.001) in both groups and though it was gradually restored, the last measured value was lower in HTS group (p<0.05). SdP and CPP were marginally improved in HTS compared to M group (5.9±3mmHg and 72±7.6mmHg vs 7.9±4 and 68±9.7mmHg, respectively; p<0.05 only for SdP). HTS favoured BRS over M (70% vs 52%; perfectly relaxed), yet this effect was not significant.
Conclusion: Our results indicate that 7.5% HTS exerts a more positive impact on cerebral oxygenation than equiosmolar dose of 20% mannitol during supratentorial craniotomy, but no clear superiority of either solution on brain debulking could be demonstrated.

4899

Low-dose droperidol reduces the amplitude of transcranial electrical motor-evoked potential: a randomised, double-blind, placebo-controlled trial

Mitsuma Y.[1], Deguchi H.[1], Furutani K.[1], Kamiya Y.[1], Baba H.[1]
[1]Niigata University Graduate School of Medical and Dental Sciences - Niigata (Japan)

Background and Goal of Study: Although low-dose droperidol (15–20 μg/kg) is a widely used antiemetic, it suppresses the amplitude of transcranial electrical motor-evoked potential (TCE-MEP), as reported in a recent case report. However, there are no randomised controlled trials to demonstrate the effects of low-dose droperidol on the TCE-MEP amplitude. The present study was to test our hypothesis that low-dose droperidol reduced the TCE-MEP amplitude.
Materials and Methods: Twenty female patients with adolescent idiopathic scoliosis, aged 12−20 years, and scheduled to undergo corrective surgery were randomly allocated to receive droperidol (20 μg/kg) or saline. General anaesthesia was maintained with continuous infusions of propofol and remifentanil. After recording the baseline TCE-MEP, the test drug was administered, followed by TCE-MEP recording every 2 min up to 10 min. The baseline amplitude and onset latency were defined as 100%. The primary outcome was the minimum relative TCE-MEP amplitude (peak-to-peak amplitude, percentage of baseline value) recorded in the left tibialis anterior muscle. The secondary outcomes were the minimum relative TCE-MEP amplitudes (percentage of baseline values) recorded from the other 11 muscles and the relative onset latencies of TCE-MEP (percentage of baseline values). Statistical analyses were performed using the Mann-Whitney U test. A p-value of <0.05 was considered statistically significant.
Results and Discussion: Two patients from the saline group were excluded from the analysis. The data are expressed as the median [interquartile range]. The TCE-MEP amplitude of the left tibialis anterior muscle was significantly reduced in the droperidol group as compared to that in the saline group (37% [30–55%] and 76% [58–93%], respectively, p<0.01). In the other muscles, the amplitudes were reduced in the droperidol group except for the bilateral abductor pollicis brevis and the left quadriceps femoris muscles. The relative onset latencies were not significantly different between the two groups. Our results showed that low-dose droperidol (20 μg/kg) reduced TCE-MEP amplitudes to around the alarm point. Anaesthesiologists should pay attention to the timing of droperidol administration during intraoperative TCE-MEP recording.
Conclusion: Low-dose droperidol reduced the TCE-MEP amplitude.

5359

Anaesthetic management in a patient with Eisenmenger and Down syndrome who requires neurosurgery. A case report

Fernández-Esmerats A.[1], Gómez-Tarradas J.[1], Calvo A.[1], Belda I.[1], Tercero F. J.[1], Valero R.[1]
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background: Patient with Eisenmenger syndrome (EMS), Down syndrome and difficult airway (DA), presents cerebral abscess and progressive neurological symptoms.
Case Report: 42-year-old woman with DS and EMS with severe pulmonary hypertension (97mmHg), central cyanosis (SpO2 75%), erythrocythemia and severe atrioventricular valve regurgitation, presented with neurological symptoms (left hemiparesis 4/5 and GCS 12). Diagnosed by CT scan of right occipito-parietal abscess (49x45mm) with herniation and hydrocephalus signs. Patient had DA criteria and was poorly collaborative. After multidisciplinary consensus (cardiologist, neurosurgeon, anaesthesiologist), trephine surgery was decided for abscess drainage, under deep sedation with dexmedetomidine (DEX)1 (no bolus, up to 1.3 μg.kg-1.h-1, RASS-4 after 1 hour). Abscess was drained partially (40mL). Patient maintained hemodynamic (HD) stability during whole surgery. During ICU recovery, patient improved progressively her neurological symptoms (GCS 13) but not her left hemiparesis. Due to persistence of abscess in CT scan, was scheduled for complete drainage. Total Intravenous anesthesia1 (TIVA) was performed, with phenylephrine perfusion (up to 0.28 μg.kg.min-1) maintaining HD stability. Fastrach LMA and invasive monitoring (LiDCO) were used. Acute pulmonary oedema and respiratory infection appeared 96 h after surgery, treated with oxygen therapy, furosemide and antibiotics. She was discharged from ICU after 10 days of admission. Streptococcus Intermedius was grown in culture; blood culture test was negative.
Discussion: DA, cognitive impairment and EMS were the factors that determined the performed anaesthesia. Patients with EMS are at high risk of complications and mortality2. Deep sedation in a non-collaborative patient with DA may be associated with complications; On the other hand, hemodynamic alterations by general anaesthesia can lead to ventricular collapse, increase shunt and cyanosis. In our case, deep sedation with DEX3 as well as TIVA (with phenylephrine perfusion, supraglottic device and invasive monitoring) can be effective options in this patient population.
References:
1. Goettel N. Br J Anaesth. 2016.
2. Carvajal CF. Rev Chil Anest. 2013.
3. Surve RM. J Neurosurg Anesthesiol. 2017.
Learning points: Multidisciplinary consensus is mandatory in patients with high surgical risk. DEX, as well as TIVA, could be an effective option in this context.

5417

Brain tumor resection neuroanesthetic management: a five years retrospective review of the practice performance

Banney A.[1], Pandin P. C. A.[1], Estruch I.[1], Truong H. N.[1], Van Hecke D.[1], Van Obbergh L.[1]
[1]CUB Erasmus Hospital - Brussels (Belgium)

Background and Goal of Study: The cerebral preservation during brain tumor resection (BTR) matches for the maintenance of the cerebral blood flow to prevent tissual ischemia. This is underpinned by a physiological triple law (TL): cerebral self-regulation, vasoreactivity to blood carbon dioxide and metabolic coupling. In order to analyse our dailly practice performance during BTR, we have retrospectively analyzed the degree of compliance to the TL by reviewing our anesthetic monitoring data between 2014 and 2018.
Materials and Methods: The individual monitoring data have been extracted from anesthesia records (perioperative management IT solution Dräger™ Innovian™). Five parameters in relation with the TL (HR, MAP, EtCO2, Temperature abd SevoMAC) have been assembled in the databse for analysis, consisting, first in the calculation of three individual specific & original indicators (Fig.1) and second, the determination of their median values of all patients for distribution description (Fig2). Results and Discussion: From 1260 patients, 1024 patients (M=489/F=535) were studied (Fig.1). 87.3% received Sevo (<1MAC) while TIVA reprented 12.7%. Demographics advocates for an usual population regarding this kind of pathology (Fig.1). The descriptive statistical analysis of the 3 original indicators (Fig.1) regarding the 5 relevant parameters and the pharmacological data highlights the adequacy of most of our practices (RC, Temp, MAC). Although, MAP & EtCO2 management (72% and 47% of adequacy) need to be optimized (Fig.2).
Conclusion: This kind of review (including the original methodology) is able to give valuable informations regarding our real performances regarding the implementation of the TL. Now, we know what must be optimized. More detailed analysis and extension to BFM are possible & even desirable.

5436

Intraoperative seizures in anesthetized and curarized patient recorded on spectrogram

Gonçalves V.[1], Seixas F.[2], Figueiredo D.[2], Pereira M.[2]
[1]CHUP - Centro Hospitalar Universitario do Porto - Porto (Portugal), [2]Centro Hospitalar Universitário do Porto - Porto (Portugal)

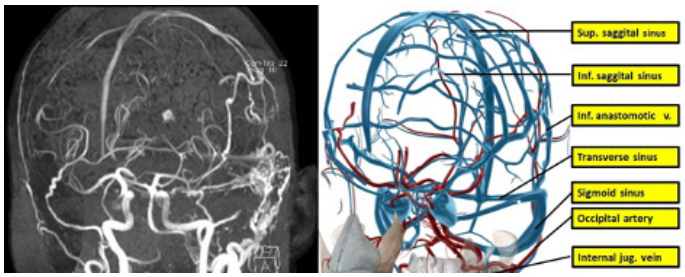
Background: Anesthetic management of an epileptic patient is challenge for the anesthesiologist. Induction of general anesthesia is often associated with the administration of drugs that lower the epileptogenic threshold, so in these patients we question the need for more adequate brain function monitoring and drug management.
Case Report: We report the case of a 57-year-old man with a history of controlled epilepsy (without seizures for more than 5 years), who presented two episodes of seizures in two consecutive peripheral vascular surgeries (15 min after endotracheal intubation, about 5 min duration), captured by the spectrogram of two different monitoring devices. We used balanced general anesthesia in the first surgery and intravenous general anesthesia in the second (induction Fentanyl 2 mcg/kg, Propofol 1mg/kg, Rocuronium 0.6mg/kg, maintenance respectively with Sevoflurane and Propofol). The convulsive episode stopped after phenytoin 500 mg IV administration in the first surgery and diazepam 10 mg IV in the second.
Discussion: Literature regarding intraoperative seizure activity in neurosurgical patients is abundant, but there's less evidence in the other surgical patients. Although there are still conflicting positions on this subject, monitoring of anesthetic depth and intraoperative EEG are now part of good anesthetic conduct. Identifying a seizure in the commonly used raw EEG in anesthesia may be difficult, but this was facilitated by the use of the spectrogram in this case. Propofol may have myoclonic activity that simulates a seizure, but this is unlikely as both seizures occurred with the curarized patient and with neuromuscular block monitoring. The patient apparently had no metabolic, mechanical or electrical triggers that could explain this episode, which points in the direction of drug-induced seizures (could be Fentanyl but it has been described for other drugs too).
Learning points: This case highlights the need of brain activity monitoring that is of the uttermost importance in patients with epilepsy – where spectrogram may offer tools that raw EEG lacks – given that, with our drugs, we may be lowering the seizure threshold of the patient.

5478

The five P's and an often forgotten A(ngio) - a case report of massive venous bleeding during scalp dissection caused by intracranial venous congestion

Sahinovic M.[1], Venema A. M.[1], Absalom A. R.[1]
[1]University Medical Center Groningen - Groningen (Netherlands)

"Proper Preparation Prevents Poor Performance" is a military saying but is equally relevant to neuro-anesthesia. This case report demonstrates that a preoperative case discussion with the surgeon and a review of radiological imaging are critical parts of preoperative anesthesia planning.
Case report: A 77-year-old female presented with a headache and a "whooshing" sound behind the left ear caused by a dural arteriovenous fistula (dAVF) with the nidus connecting the occipital artery to the transverse sinus. She had undergone a partially successful embolization, but subsequent venous congestion of the temporal lobe cause incapacitating aphasia and epilepsy. A decision was made to attempt surgical palliation by disconnecting the inferior anastomotic vein. After placement of the Mayfield clamp, the surgeon infiltrated the scalp with bupivacaine 0.5%/adrenaline 5 mcg/ml mix to minimize the bleeding on incision. As expected, bleeding began during the incision and scalp dissection. A minor procedure of skull opening, where often less than 100 ml blood is lost, became a challenging act. Bleeding was difficult to control surgically. Total blood loss before dural opening was 1300 ml blood. Euvolaemia was maintained with administration of crystalloid, colloid and blood. After craniotomy, the inferior anastomotic vein was disconnected, and the skull was closed. The patient initially recovered well from anesthesia, but sadly suffered a fatal intracerebral hemorrhage several days later.
Discussion: Providing safe anesthesia for dAVF resection requires optimal case preparation and close cooperation of the surgical and the anesthesia team. Fistulae alter the blood flow dynamics in the brain thereby increasing the venous pressure and decreasing the arterial pressure. In the current case, a preop review of the images with the surgeon showed that the dAVF had induced intracranial venous congestions causing the scalp veins to "arterialize." Thereby a "minor" act of skull opening, normally accompanied with minimal blood loss, lead to extensive bleeding.
Learning points: Preoperative radiological image evaluation is a critical part of preparing for a neuro-anesthesia case.



5761

Influence of Cerebral Desaturation on the Spectral Entropy of the Electroencephalogram (EEG)

Klinker S. D.[1], Kaiser H.[2], Hight D.[2], Schneider G.[1], Kreuzer M.[1]
[1]Klinikum rechts der Isar, TU Munich - Munich (Germany), [2]Inselspital Universitätsspital - Bern (Switzerland)

Background: Perioperative neurological complications may be reduced by neuromonitoring. Concerning cardiac anesthesia, near-infrared-spectroscopy (NIRS) guided monitoring can help to ensure adequate cerebral oxygenation. Although there is no specific NIRS threshold for appropriate brain saturation, NIRS can reduce neurological complications(1). EEG-based patient monitoring allows estimation of the anesthetic level(2). Similarly, ischemia influences the raw and consequently processed EEG(3). We hypothesize that an identification of desaturation-induced or anesthetic-induced EEG changes is possible. Hence, we assessed the influence of cerebral desaturation on the spectral entropy (SpEnt) of the EEG.
Material: We analyzed frontal NIRS and EEG recordings during cardiac surgery. We visually selected 9 patients with a desaturation event at stable isoflurane concentration and without the occurrence of EEG burst suppression. We calculated SpEnt from a 10-second EEG-period including for the 0.24 to 31.98 Hz range, at either high or low saturation within each patient. We defined the cerebral desaturation as ´mild´ (not below 50%) and ´severe´ (below 50% NIRS) and compared the change of SpEnt between the high and low saturation for each patient.
Results: For all patients, except for one with mild cerebral desaturation, we observed a decrease in SpEnt, a parameter behavior observed with increasing anesthetic level, whereas we found a SpEnt increase for all patients with severe desaturation. An increase in SpEnt can also indicate an arousal reaction. Figure 1 presents the individual cases.
Conclusion: With this analysis we could identify a biphasic behavior of SpEnt dependent on the extent of cerebral desaturation. In terms of ´mild´ desaturations, SpEnt declines with decreasing NIRS level. In terms of ´severe´ desaturation however, SpEnt increase may be caused by a depression of neuronal activity. This biphasic course could influence EEG-based monitoring devices and lead to an index increase during a severe cerebral desaturation.
References:
1. Murkin JM et al. BJA 2009.
2. Aldecoa et al. EJA 2017.
3. Lewis C et al. JCardiothoracVascAnesth 2018.

5775

Intraoperative management of Stevens Johnson Syndrome in patient with meningioma diagnosis

Sanchez Salamero S.[1], Sole Guixes J.[1], Mur Irizar M.[1], Ortega Abad A.[1], Sanchez Garcia S.[1], Montero Matamala A.[1]
[1]Hospital Universitari Arnau de Vilanova - Lleida (Spain)

Background: A case of a patient with meningioma and Stevens Johnson Syndrome diagnosis is presented. Because of pneumocephalus and bleeding, after surgery a new craneotomy under general anaesthesia was performed.
Case Report: 63-year-old patient needed a resection of right frontal meningioma, requiring reintervention for pneumocephalus. Antibiotherapy treatment (cefotaxime and ampicillin) and anticomicial therapy with phenytoin was required.The patient had burn skin lesions >80% of body surface. Stevens Johnson Syndrome was associated with anticonvulsant drugs or antibiotherapy.There were no incidents with the airway.During surgery, she required careful mobilization of the skin, covering it with skin gel dressings. It was impossible arterial catheterization for continuous

blood pressure control.There was strict control of temperature, hydroelectrolytic balance and diuresis during the intervention.For adequate hemodynamic control, norepinephrine was initiated (0.05-0.1ug/kg/min).
Discussion: Stevens-Johnson Syndrome is a skin hypersensitivity reaction usually due to drugs (anticomicials and antibiotics are commonly implicated).1Advanced age and immunocompromised states have been described as risk factors.There is hardly information about intraoperative anesthetic management.2Optimal intraoperative management would consist of replacing with fluids and electrolytes, maintenancing ambient temperature, using a serum heater , skin cures, nutritional support (enteral route is preferred), pain control, and monitoring of superinfections. The daily wound water loss in burn patients with more than 50% of affected skin could be 3 liters.In this cases they may require up to 7 liters of crystalloid solutions in 24 hours.A urinary flow of 0.5-1 ml/kg/h should be maintained to avoid water over-resuscitation.3
References:
1. Stevens-Johnson syndrome and toxic epidermal necrolysis: a retrospective descriptive study.Carrasquillo OY, et al.Int J Dermatol.2019 Nov;58(11):1293-1299.
2. Treatment of toxic epidermal necrolysis by a multidisciplinary team. A review of literatureand treatment results.Papp A,et al.Burns.2018 Jun;44(4):807-815.
3. Stevens-Johnson syndrome and toxic epidermal necrolysis: retrospective review of 10-year experience.Zhang AJ, et al.Int J Dermatol.2019 Sep;58(9):1069-1077.
Learning points: Stevens Johnons Syndrome has not any anaesthetic management described. Control of hydroelectrolytic balance, diuresis, temperature and nutritional support increase survival.

6003

Abnormal EEG patterns and sudden drop on bispectral index monitor as pattern suggestive of seizures. Case report

Silva L.[1], Ramirez C.[1], Juanola A.[1], Bonev M.[1], Bataller A.[1], Rodiera J.[1]
[1]Hospital Quiron Teknon - Barcelona (Spain)

Background and Goal of Study: We report the case of a 57-year-old male who developed generalized tonic-clonic seizures during general anesthesia accompanied by changes in bispectral index, suppression ratio and abnormal morphology of EEG waves.
Materials and Methods: A 57 year old ASA II patient with benign prostatic hyperplasia was programmed for elective cerebrospinal fistula repair via middle cranial fossa. Preoperative assessment was strictly normal. The patient was monitored with non invasive blood pressure, oxygen saturation and ECG, bispectral index monitor (BIS) quantitative NMT monitoring (TOFF CUFF) and capnography. General anesthesia was established with tracheal intubation and target controlled infusion (TCI) of remifentanil 3mcgr/ml and propofol 5 mcg/ml plus rocuronium 0,6mg/kg. NMT block was allowed to spontaneously recover for monitoring the facial nerve during surgery. Anesthesia was maintained with TCI propofol and remifentanil titrated to BIS 40-50 and median arterial pressure of 60mmhg. During manipulation of the temporal lobe for accessing the fistula the patient presented generalized tonic-clonic movements. BIS was 50 showing epileptiform spikes on the EEG. Seizures lasted <1min and were treated with bolus of 40mg propofol, and 2 mg midazolam. After the seizure BIS dropped to 0 with a suppression index (SI) of 49, and recovered to baseline in 5 min. NMT blockade was instaurated and after 20 min a new burst of epileptiform activity was seen in BIS reenacting the same pattern of post ictal suppression. Venous and arterial gasometry were analyzed, and all findings were within normal range. Surgery was continued and patient was extubated without showing any neurological symptoms.
Conclusion: Intraoperative tonic clonic movements during general anesthesia pose several challenges to the anesthesiologist. They require the establishment of differential diagnoses, rapid recognition, management, and treatment of reversible causes. BIS might be useful in orienting diagnosis in patients who present with tonic clonic movements during general anesthesia. It could also be helpful to take into account that patients with sudden drop of BIS preceded by abnormalities in EEG with NMT block might be having a seizure, to allow for initiation of the differential diagnosis and treatment of any precipitation factors, as well as contemplating treatment, continuation of surgery, choice of agent for maintenance of anesthesia and postoperative plan.

4653

Serum concentration of ropivacaine after the repeated administration to several parts of the head during awake craniotomy

Sato T.[1], Ando T.[2], Mori A.[3], Nishiwaki K.[2]
[1]Nagoya University Graduate School of Medicine - Nagoya (Japan), [2]Nagoya University Hospital - Nagoya (Japan), [3]Department of Perioperative Management System, Nagoya University Graduate School of Medicine - Nagoya (Japan)

Background and Goal of Study: Patient needs to be awakening during awake craniotomy (AC) . So, it is important to use local anesthetics effectively, such as ropivacaine. It has been reported that the maximum dose of ropivacaine is 3.6 mg/kg during AC.Although large amounts of ropivacaine injection has a risk of local anesthetic toxicity, So far, blood concentration of ropivacaine after the repeated administration in a short time has never been studied during AC. In this study, we measured the serum concentration of ropivacaine at the point of 15 min after each administration during AC in order to determine the safety dose.
Materials and Methods: After approval of Nagoya university ethics committee (Approval number:2017-0529) and registered with the University Hospital Medical Information Network (UMIN-ID:00030896), the elective AC patients with obtained informed consent (n = 30) were injected 0.375% ropivacaine before awake phase at the points as follows: scalp block (T1), headpin area (T2), skin incision area (T3) temporal muscle (T4) and dura mater (T5). Ropivacaine was administered in a single dose not exceeding 3 mg/kg, and allowing the total dose could exceed 3.6 mg/kg. Arterial blood samples were collected using vacuum blood collection tubes containing a gel for serum separation 15 min after each ropivacaine administration. The blood concentration was measured by the HPLC-UV method, and the value was expressed as an average value ± standard deviation. In addition to the blood concentration of ropivacaine, complications during awake phase (nausea and vomiting, headache, seizure) were also evaluated as the secondary endpoints.
Results and Discussion: The average total ropivacaine dose was 5.01 ± 0.68 mg/kg with the maximum total dose of 6.3 mg/kg, and the average interval times from T1 to T5 was 128 ± 17.7 min. Until awake phase, there were no cases that the maximum concentration exceeded the toxic threshold of 4.3 μg/ml in all patients. (The mean serum concentration of T1: 1.23 ± 0.36 μg/ml, T5: 0.82 ± 0.26 μg/ml) No one local anesthetic toxicity symptoms were observed during awakening in all cases. Other complications at awake phase were: headache 9 cases (30%), nausea 4 cases (13%), seizure 3 cases (10%), agitation 2 cases (6.6%), and vomiting 1 case (3%).
Conclusion: It was suggested in case of the repeated administration that total dose up to 5 mg/kg could be safe without local anesthetic toxicity symptoms.

4737

“Awake” versus “asleep” deep brain stimulation surgery in Parkinson’s disease

Valero R.[1], Garcia-Orellana M.[1], Pujol G.[1], Hurtado P.[1], Ferrés A.[1], Fàbregas N.[1]
[1]Hospital Clínic De Barcelona - Barcelona (Spain)

Background and Goal of Study: Deep brain stimulation (DBS) for Parkinson disease is an alternative for drug-resistant patients. Advancements in neuroimaging have led to image-based targeting of subthalamic nucleus under general anesthesia (GA, or “asleep DBS”) without the use of microelectrode recording (MER) or intraoperative test stimulation (performed under conscious sedation, CS)1. Our aim was to compare the anaesthetic concerns and complications of these two procedures.
Materials and Methods: Retrospective observational analysis comparing patients who underwent DBS surgery (2014-19), performed under CS or GA. Data collected included demographics, ASA, comorbidities, difficult airway criteria, intraoperative monitoring, duration of surgery and hospital admission. Intraoperative and postoperative complications were registered.
Results: 78 patients were analysed in 2 groups: CS 36 (47.4%) and GA 42 (52.6%), 25 women and 53 men, mean age 60.9 y (33-75). Four CS patients met difficult airway criteria and 7 in GA group. Globally, 23 patients suffered an intraoperative complication, 19 (52.7%) in CS group and 4 (9.5%) in GA group, being arterial hypertension the most frequent [8 (22%) in CS group and 1 (2.4%) in GA group] (table 1). Six patients (16.6%) presented agitation and 4 (11.1%) had a minor airway obstruction in CS group. Procedures under CS were performed in two surgical times. Total mean duration was 5.4 h (3.5-9.2h) in CS and 4.7 h (3.1 -9.2 h) in GA (p=0.002). Length of admission was reduced from 8.7±3.9 days in the CS group to 3.7±4.0 in the GA group (p<0.0001).

TABLE 1. Perioperative neurological and hemodynamical complications. (CS: patients under Concious sedation; GA: patients under general anesthesia)

	CS; n (%)	GA; n (%)	TOTAL; n (%)	p
Hemodynamical (intraoperative)				
Arterial Hypertension	8 (22.2%)	1 (2.4%)	9 (11.5%)	0.006
Arterial Hypotension	7 (19.4%)	0	7 (9.0%)	0.002
Sinusal bradycardia	1 (2.8%)	0	1 (1.3%)	NS
Neurological (perioperative)				
Disorientation/agitation/delirium	12 (33.3%)	2 (4.76%)	14 (17.94%)	0,005
Dyskinesia	7 (19.44%)	4 (9.52%)	11 (14.10%)	NS
Decreased level of consciousness	5 (13.88%)	2 (4.76%)	7 (8.97%)	NS
Neumoencephalus	4 (11.1%)	1 (2.38%)	5 (6.41%)	NS
OFF state	4 (11.1%)	1 (2.38%)	5 (6.41%)	NS
Surgical path hematoma	1 (2.77%)	0	1 (1.28%)	NS

Conclusion: Asleep DBS is associated with reduced morbidity compared with traditional DBS surgery under CS. Arterial hypertension was the most frequent incidence. Factors such as claustrophobia, severe off-medication symptoms or a fear of being awake during the surgery are reduced, leading to an increased number of surgical candidates. Asleep DBS can be performed in one surgical time, which reduces the surgical and admission time.

References:

1. Dunn LK. J Neurosurg Anesthesiol. 2018;30(1):18-25. 2 LaHue SC. Parkinsonism Relat. Disord. 2017;41:25–30.

4756

Anesthesia for awake craniotomy in brain surgery – our experience

Toma D.[1], Suiaga D.[2], Lazar O.[2], Dumitrescu C.[2], Calarasu G.[2]
[1]Life Memorial Hospital - Bucharest (Romania), [2]Life Memorial Hospital - Bucuresti (Romania)

Background and Goal of Study: “Awake anesthesia” or “awake craniotomy” is an anesthetic technique indicated in brain surgery when lesion is located in close proximity to those cortical tissues that are indispensable for defined cortical functions (motor, sensory, visual and language cortex). The technique allows a maximum of brain tumor resection with a minimal risk of functional damage in patients.
Materials and Methods: Between May 2018 and November 2019, in our clinic were performed a number of 7 cases of awake craniotomy for brain tumor resection. All patients have been subject of a preoperative evaluation for assess the patient’s health, cooperation, airway, and also to a psychological preparation. The patients were orally premedicated two hours before surgery with oral Clonidine and Alprazolam. Monitoring of the patients included: ECG, IBP, SpO2, temperature, EtCO2, E-Entropy, and per operatory monitoring of speech/upper limb movement by maintaining verbal contact with the patient. The chosen anesthetic technique was “awake anesthesia” using TCI Propofol and Remifentanil infusion. The surgery was preceded by performing a scalp block (7 nerves bilateral) with 0,6 % Ropivacaine. All procedures were performed using a surgical microscope. The functions of the patients were continuously monitored during removal of the tumor and the tumor resection was continued with smaller steps and under permanent neurophysiological monitoring.
Results and Discussion: The surgery in all 7 cases, were over all uneventful and in comfort conditions for the patients. During the intraoperative period, light neurological deterioration (dyshartria, paresthesia in upper limb) was observed in 2 patients with quick postoperative improvement. No intraoperative epileptic seizures were observed.
Conclusion: The key and safety of an "awake craniotomy" depends on patient motivation and cooperation, titration of anesthetics and maintenance a close psychological contact with the patient throughout the surgical procedure. The technique of "awake craniotomy" is important for the preservation of language and motor functions.
References:

1. Rachel Grossman, Zvi Ram - Awake Craniotomy in Glioma Surgery; Eurr Assoc Neurooncol Mag 2014.
2. John R. Cormack, Fanzca Timothy G. Costello, Fanzca - Awake Craniotomy: Anaesthetic Guidelines and Recent Advances; Australasian Anaesthesia 2005.

5127

Scalp block and dexmedetomidine infusion in awake deep brain stimulation surgery

Yoo J.[1], Oh J.[1], Moon B.[1]
[1]Ajou University Hospital - Suwon (South Korea)

Background and Goal of Study: To minimize pain and hemodynamic change, patients need a proper sedative and analgesics in awake deep brain stimulation surgery (DBS) using microelectrode recording (MER) or intraoperative test stimulation (ITS). We evaluated scalp block and dexmedetomidine infusion may be appropriate and tolerable for the patients with parkinson’s disease.
Materials and Methods: We retrospectively studied intraoperative hemodynamic parameters and perioperative medication in 5 patients undergoing DBS surgery. The focus of this study was investigating patient's vital signs including BP and HR. The secondary focus was observing patient's cooperation when required and feeling comfortable throughout the perioperative period. Bilateral scalp block (1.5% lidocaine + 0.25% bupivacaine) and 0.4-0.5 mcg/kg/hr dexmedetomidine infusion without loading dose were performed during DBS surgery.
Results and Discussion: BP and HR were stable without hemodynamic reaction and patients' respiration were stable. Patients’ consciousness level was sedative, but they showed an accurate response to ITS and communication.
Conclusion: DBS using scalp block and low dose dexmedetomidine infusion can be performed safely for parkinson's disease patients with comfortable condition during surgery and good clinical outcomes.
References:

1. A. Sarang, J. Dinsmore, Anaesthesia for awake craniotomy—evolution of a technique that facilitates awake neurological testing, BJA, Volume 90, Issue 2, February 2003, Pages 161–165.
2. Alex Bekker, Mary Sturaitis, Dexmedetomidine for Neurological Surgery, Operative Neurosurgery. 57(1):1-10, JULY 2005.
3. Sewell, Darreula, Smith, Martina, Awake craniotomy, anesthetic considerations based on outcome evidence, Current Opinion in Anesthesiology: October 2019 - Volume 32 - Issue 5 - p 546–552.

5581

How can we manage awake craniotomy?

Nastasovic T.[1], Milakovic B.[1], Stosic M.[1], Savic N.[2], Gavrilovska Brzanov A.[3], Grujicic D.[1]
[1]Clinical Center of Serbia - Belgrade (Serbia), [2]School of Medicine - Belgrade (Serbia), [3]University Clinical Center “Mother Theresa” - KARIL - Skopje (Republic of North Macedonia)

Background and Goal of Study: Awake craniotomy allows speech mapping during neurosurgical interventions in patients with tumours in the area of the language cortex. Anesthesiologists have to manage patients in a way so that they are compliant throughout the awake state, maintaining adequate analgesia and anxiolysis. On our clinic we practice asleep-awake protocol. The aim of the study was to describe the protocol we are using.
Materials and Methods: 21 patients undergoing awake craniotomy during 30 months were introduced into general anesthesia with intubation. The anesthesia till awakening were maintained with combination of propofol and remifentanil continuously. The depth of anesthesia was monitored with bispectral index. Scalp block with bupivacaine was done. After opening of the skull, the awakening of the patients with extubation was done. Patient stayed awake with spontaneous breathing till the end of the procedure.
Results and Discussion: There were 12 females and 8 males, one of the females was operated two times. The mean age was 39.2 years (19-65). Mean ASA score was 2.05. One of the patients was agitated after awakening and in that patient only the biopsy of the tumour with additional sedation was done. One of the patients was agitated and managed with dexmedetomidine continuously after awakening. 17% of the patients had seizures during speech mapping stopped with cold normal saline. None of the patients needed reintubation.
Conclusion: According to our experience, this protocol is safe and effective during awake craniotomy. Prospective randomized trials are necessary to confirm the optimal anesthetic technique to be used.
References:

1. Prontera A, Baroni S, Marudi A, et al. Awake craniotomy anesthetic management using dexmedetomidine, propofol, and remifentanil. Drug Design, Development and Therapy 2017;11:593-598.
2. Picht T, Kombos T, Gramm HJ, Brock M, Suess O. Multimodal protocol for awake craniotomy in language cortex tumor surgery. ACta Neurochir.(Wien) 2006;148:127-138.

5681

A retrospective cohort review comparing post-anesthesia recovery after “awake” craniotomies under regional anesthesia and “asleep” craniotomies under general anesthesia

Bojaxhi E.[1], Gruenbaum S.[1], Refaey K.[1], Louie C.[1], Chaichana K.[1], Quiñones-Hinojosa A.[1]
[1]*Mayo Clinic in Florida - Jacksonville (United States)*

Background: An “awake” craniotomy (AC) is indicated for tumors near eloquent regions of the cortex, and it is associated with enhanced post-operative recovery and reduced hospital stay. As AC is often conducted under regional anesthesia (RA), these benefits in recovery are largely due to RA providing pain management in the post-operative period. To investigate these potential benefits in our institution, we compared the post-anesthesia course of craniotomies conducted under RA or under general anesthesia (GA).
Methods: A retrospective chart review was conducted in patients undergoing a craniotomy for supratentorial intra-axial tumors with a pterional surgical exposure from January 2016 to December 2017. Patients with chronic opioid use and emergent cases were excluded. Primary outcome included pain scores on a numerical rating scale (NRS), opioid use as oral morphine milligram equivalence (OMME), first time to opioid, nausea, and sedation on the Richmond Agitation and Sedation Scale (RASS). These assessments were recorded until the second postoperative day (POD). Secondary outcomes included seizures, Karnofsky Performance Scale (KPS) status, and hospital length of stay.
Results: Of the 91 patients identified to meet the above criteria, 56 underwent an AC under RA and 35 underwent surgery “asleep” under GA. Demographics and operative characteristics were similar between both groups except for lower intraoperative opioid use in the RA group compared to GA [mean mcg of fentanyl 152.23 vs 293.57 (p<0.01) respectively] . A significant reduction in postoperative pain and opioid use was noted in the RA group compared to GA [first postoperative pain score 2 vs 5 (p <0.01); POD 0 median pain scores 2.5 vs 4 (p<0.01); mean time to first opioid dose 7.23 vs 3.42 hours (p <0.01); POD 0 mean opioid in mg 24.43 vs 14.49 (p<0.01)respectively]. Somnolence was less in the RA group compared to GA with RASS less than zero in 23% vs 43% (p<0.05) of the patients on POD 0 and 7% vs 20% (p=0.06) on POD 1. Nausea was experienced in 27% vs 40% (p=0.19) of the patients on POD 0 between RA and GA respectively, and no other differences in were outcome noted.
Conclusion: AC under RA provides better post-operative pain control and a reduction in opioid use, and utilization of RA has the potential to minimize masking the postoperative neurological exam with opioid related side-effects such as somnolence.

5926

Searching for the optimal sedation for brain mapping during awake craniotomy for epilepsy surgery. A case report with regional block, dexmedetomidine and remifentanil infusions

Arnalich-Montiel A.[1], García-Hernández S.[1], Puig-Ramos A.[1], Barrio-Perez M.[1], Pazó-Sayós L.[1], Quintana-Villamandos B.[1]
[1]*Hospital General Universitario Gregorio Marañón - Madrid (Spain)*

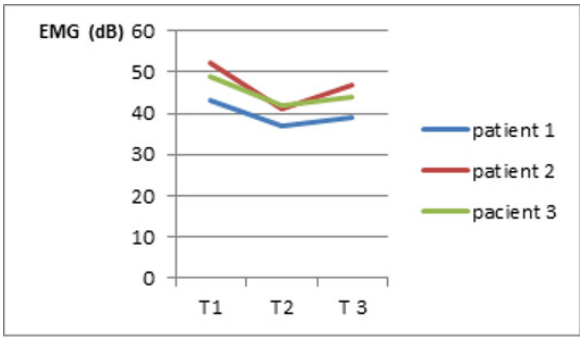
Background: Anaesthetic management for awake craniotomy remains challenging. In our case, we successfully combined a titration of dexmedetomidine and remifentanil with a scalp block, a scheme which has not been previously documented in the context of epilepsy surgery.
Case Report: A 33-year-old woman was presented for surgical resection of an epileptic focus near Brocca area. A two-time craniotomy surgery consisting of monitoring electrode placement followed by awake resection with brain mapping for speech testing was decided. As described in figure 1, sedoanalgesia was induced with dexmedetomidine and low-dose of remifentanil infusions. Local anaesthesia was employed for scalp block, Mayfield points and duramater. Infusions were adjusted to achieve full patient cooperation during language testing, alternating at other times with deeper levels of sedation. Haemodynamic and respiratory stability were maintained. Postoperatively the patient was admitted to ICU for 18 hours and suffered four short episodes of right hand-clonic seizures, despite of which she had no neurological injuries and was discharged on day 5.
Discussion: The optimal strategy for awake craniotomy has not been identified yet. Dexmedetomidine with its unique pattern is close to be the “ideal drug”, however, it may not be sufficient alone for all stages of awake craniotomy (1). The model of sedoanalgesia described in this case is, according to our experience, an optimal strategy to ensure an adequate level of sedation, providing a dynamic form of sedation with easily transition from sleep to wakefulness as well as clinical stability. Other options such as propofol-remifentanil sedation (1) have been associated with more respiratory events.
References:
1. Goettel N. et al. Dexmedetomidine vs propofol-remifentanil conscious sedation for awake craniotomy: a prospective randomized controlled trial. Br J Anesth. 2016; 116: 811-21.
Learning points: The combination of dexmedetomidine, remifentanil and local anaesthetics ensures an adequate level of sedation and analgesia adapted to the rapid changes happening in the surgical field of awake craniotomy for epilepsy surgery.

4977

Effects of botulinin toxin on bispectral index monitor and electromyographic activity

Rodrigues F.[1], Santiago Almeida Coutinho R.[1], Pereira De Alencar Araripe P.[1], Rodrigues Nunes R.[1], Rodrigues Nunes Filho R.[1], Paixão Rodrigues L.[1]
[1]*Hospital Geral de Fortaleza - Fortaleza (Brazil)*

Background and Goal of Study: The use of botulinum toxin with aesthetic purpose began in the 90's. With the popularization of the technique for the treatment of expression lines, the number of surgical procedures in applied botox patients has increased expressively. The aesthetic paralysis of the facial muscles with botulinum toxin may affect the bispectral index monitor (BIS), which requires muscular activity in addition to an awake EEG to generate values, indicating the patient is awake. The aim of this study is to evaluate the influence of botulinum toxin used in facial muscles on BIS values and electromyographic activity
Materials and Methods: Three female volunteer patients were admitted to undergo the procedure of applying botulinum toxin A in the upper third facial area for aesthetic purposes. The applications were conducted by the same plastic surgeon. Each patient was evaluated in 3 different periods, observing the following parameters: BIS with bilateral sensor and electromyography (EMG) bilaterally. The evaluations were completed before application, 15 days after and 90 days after the application. Results and Discussion: In the analyzed cases we observed a variable reduction in electromyographic values when compared to the pre-application values of the toxin. Furthermore, there were some recovery of motor activity, as evidenced by the partial increase in electromyography. In one patient, it was observed that electromyography values remains similar 15 days and 3 months after application.
Conclusion: This study shows that brain monitoring is influenced by the application of botulinum toxin on the face, which requires special attention from the anesthesiologist. The local effect of the toxin decreases muscle contractility and dystonic movements, an effect that remains for a variable time, and may last for more than 3 months after application of the product. Since decreased electromyography values in the evaluation of anesthetic depth is affected, negative outcomes are possible.



EMG values in dB before botox application (T1), 15 days after application (T2) and 90 days after application.

4321

Thromboelastometric (ROTEM) versus standard coagulation test (SCT) results in patients with traumatic brain injury (TBI) undergoing craniotomy

Rimaitis M.[1], Bilskiene D.[1], Lodaite S.[2], Vilcinis R.[1], Tamosuitis T.[1], Macas A.[1]
[1]Hospital of Lithuanian University of Health Sciences Kaunas Clinics - Kaunas (Lithuania), [2]Lithuanian University of Health Sciences - Kaunas (Lithuania)

Background and Goal of Study: Coagulopathy (CP) is a common finding in TBI patients associated with secondary brain damage. However, there is no clear guidance to the clinician on how CP should be managed. SCT have significant limitations. Viscoelastic tests (e.g. ROTEM) reflect whole blood coagulation from initiation to fibrinolysis and may add important information. We aimed to identify dynamic changes in coagulation, and to clarify associations between SCT and ROTEM results in patients with TBI undergoing craniotomy.
Materials and Methods: We present preliminary results of a prospective study in adult TBI patients undergoing urgent craniotomy. Patients with polytrauma (AISextracranial>3), hematologic disease, use of anticoagulants or antiplatelets, were not included. Blood was collected pre- (day 0) and post-operatively (days 1, 2, 3) and analyzed with SCT (prothrombin time index [PTI], partial thromboplastine time [APTT], platelet count [PLT], fibrinogen concentration [FIB]), and ROTEM assays (EXTEM, INTEM, FIBTEM). CP was considered as any deviation from normal coagulation test values. Dynamic changes of ROTEM and SCT results as well as interrelationships between them were investigated. Significance level for comparisons, $p<0.05$.
Results and Discussion: 69 patients were included. Patient coagulation profile was generally good and coagulation test abnormalities were mild. Significant negative trends were observed in PTI, APTT and PLT until day 2, whereas FIB increased from day 1. CP prevalence according to SCT increased from 36.2% (day 0) to 71.9% (day 2). Notably, ROTEM parameters generally improved from day 1, and CP prevalence according to ROTEM decreased from 36.2% (day 0) to 16.4% (day 3). EXTEM and INTEM CFT, A10 and MCF showed significant correlations (mostly moderate to strong) with PLT and FIB. FIBTEM A10 and MCF correlated strongly with FIB. Relationships between APTT and PTI with INTEM CT and EXTEM CT, were weak or absent. ROTEM improvements despite negative trends in SCT reflect that viscoelastic tests represent patient coagulation status from a different perspective and overall clot quality in some individuals may be adequate or even improved despite abnormalities found in standard coagulation tests.
Conclusion: PLT and FIB are the main determinants of clot quality. Mild APTT and PTI abnormalities are rarely clinically significant as reflected by ROTEM, and may trigger unnecessary procoagulant interventions in neurosurgical patients.

4714

Evaluation of factors that cause secondary brain damage on mortality and morbidity in patients undergoing emergency surgery due to head trauma

Yaldiz M.[1], Bilgin H.[2], Rahimi P.[3]
[1]Baskale devlet hospital - Baskale (Turkey), [2]Uludag University Faculty of Medicine Hospital - Bursa (Turkey), [3]Uludag University Faculty of Medicine Ho - Bursa (Turkey)

Introduction: Traumatic brain injury is combination damage that occurs as of various metabolic events that develop after primary damage caused by trauma (1). Pathological events such as lactic acidosis, electrolyte imbalance, increased inflammation that occur during traumatic brain injury leads to poor prognosis in patients (2). This retrospective study was conducted to investigate the effect of factors that may cause secondary damage on mortality and morbidity in patients undergoing emergency surgery due to head trauma.
Materials and Methods: After ethics committee approval 108 patients who admitted to Bursa Uludag University hospital between 2013 and 2018, diagnosed with traumatic brain injury and operated within the first 24 hours after admission included in the study. We collected demographic data (age,sex), Glascow Coma Score (GCS), American Society of Anesthesiology (ASA) class, Peripheral Oxygen saturation (SpO2), heart rate, systolic and diastolic blood pressure, body temperature, electrolytes (Na, K, Ca, Cl), haemoglobin (Hb), plateletes (PLT), leukoocytes (WBC), urea, creatinine, aspartate aminotransferase (AST), alanine aminotransferaz (ALT), pH, PaO_2, PCO_2, lactate and blood glucose levels and inotropic agents dosage of the patients during admission – postoperative 48 hours period. We used Kolmogorov-Smirnov, Kruskal Wallis, Mann Whitney U, Wilcoxon, Fischer and Chi Square statistic tests.
Results and Discussion: Patients were divided into Healthy, Sequel and Exitus Group by postoperative surveillance. We investigated mortality and morbidity in patients who underwent emergency operation within 24 hours after traumatic brain injury. We found that higher age and ASA class, lower GCS and diastolic blood pressure and inotropic agents requirement increased mortality and morbidity. Hypernatremia, hypocalcemia, hypokalemia, high creatinine and low platelet counts have also been found to increase mortality and morbidity. In addition, we have not detect the effects of heart rate, systolic blood pressure, body temperature, SpO2, WBC and Cl values on the mortality and morbidity.
Conclusion: It seems that secondary damage caused by metabolic events like eletrolyte imbalance in patients with head trauma should always keep in mind. If we encounter these situations, we should treat the patient and do replacements immediately.
References:
1. Baethmann A Et al,Curr Opin Anaesthesiol 1998;11(2):193-200.
2. Shi J et al, Oncotarget 2016;25;7(43):71052-71061.

4874

Anaesthetic management of severe pulmonary arterial hypertension in a patient undergoing craniotomy under general anaesthesia

García I. M.[1], Isabel G.[1], García M.[1], Martinez S.[1], Gonzalez J. J.[1], Carrero E.[1], Department of Anaesthesiology, Department of Neurosurgery Hospital Clinic, Barcelona, Spain
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background: Chronic Thromboembolic Pulmonary Hypertension (CTPH) represents a challenge in the perioperative anaesthetic management with up to 3.5% mortality in non-cardiac surgery1. Guidelines available offers few recommendations regarding the evaluation and management of these patients. We present the case of a patient with a recent diagnosis of severe pulmonary artery hypertension (PAH) undergoing craniotomy under general anaesthesia.
Case Report: A 73-year-old, scheduled for a suspected high-grade glioma resection surgery was diagnosed of CTPH during cancer extension study and pre-operative assessment. He presented NYHA class II; right heart catheterization showed: CI: 2.29 L.min-1.m-2, PAP: 93/18 (41) mmHg, PVR: 652 dyn·sec·cm-5, compatible with precapillary PAH and right ventricle (RV) dysfunction, with a compatible echocardiography. Enoxaparin treatment was instituted. Epoprostenol infusion was started, increasing it daily, up to the maximum dose, with good patient tolerance. Inferior vena cava filter was placed the day before surgery. Extensive intra-operatively hemodynamic monitorization was performed, including TEE and pulmonary artery catheter. Total intravenous anaesthesia with propofol, remifentanil and rocuronium was performed. Systemic hypotension and elevation in PAP was managed with norepinephrine and milrinone. Iloprost was available, but it was not necessary to use. Scalp block was provided for analgesia. The patient was extubated in the OR and transferred to the ICU. Discharge from hospital happened three weeks after surgery without sequelae.
Discussion: PAH is a condition with high perioperative risk, mainly cardiovascular and pulmonary. The risk is even greater in neurosurgery procedures2. For this reason despite most complications occur in the postoperative period, preoperative optimization reducing pulmonary vascular resistance and optimizing RV function, careful intraoperative hemodynamic monitorization and management, and adequate postoperative analgesia are mandatory.
References:
1. Eur Respir J. 2013;41:1302–7.
2. Am J Cardiol. 2019;123:1532–7.
Learning points: In patients with CTPH, decision-making process before surgery must consider both the severity and prognosis of PAH and magnitude of the surgical procedure. The success of the results depends on a multidisciplinary perioperative management, ideally in a centre with large experience in PAH and involving both neurosurgeons, expert pulmonologists and anaesthesiologist.

5381

Concentration gradients of routine laboratory analyses in serial lumbar cerebrospinal fluid aspirates

Tigchelaar C.[1], Atmosoerodjo S. D.[1], Muller W. D.[1], Absalom A. R.[1]
[1]University Medical Center Groningen/University of Groningen, Dept of Anaesthesiology - Groningen (Netherlands)

Background and Goal: Analysis of Cerebrospinal fluid (CSF) may illuminate the neurobiology of diverse neuropsychiatric disorders. As many of the molecules of interest are produced by or excreted from the brain, it is important to know whether there is a rostro-caudal gradient (RCG) in concentration. Limited evidence from patients with neurological disorders suggests a RCG for blood-derived proteins such as albumin. Even less is known about gradients for cells, molecules and most brain-derived proteins. The purpose of this study was to determine if there is a RCG in the results of routine laboratory CSF assessments.
Materials and Methods: This is a sub-study of the Anaesthetic Biobank of Cerebrospinal Fluid (ABC) for which CSF is obtained from patients undergoing elective surgery under spinal anaesthesia. Subjects were patients ≥18 years old, who were healthy, did not use relevant medication and had a BMI<30. Immediately prior to intra-thecal local anaesthetic administration, CSF was aspirated sequentially into 5 x 2 ml syringes. The 5 fractions were immediately transported to the laboratory where routine analyses (albumin, total protein, glucose, leucocyte and erythrocyte count) were performed.
Preliminary results: Thirteen patients have been enrolled (62% male; 77% ASA status I). Median age was 36 years (range 21-77 years), and duration of CSF aspiration 1 to 4 minutes. Within each fraction there was broad inter-patient variability in albumin and total protein concentration (overall ranges 0.04 - 0.33 g/L and 0.13 - 0.55 g/L respectively). There were significant changes in albumin and total protein concentrations across the CSF fractions (RMANOVA, P values 0.008 and 0.043 respectively) with concentration decreasing from the first to the last fraction (Figure 1). There was no significant change in glucose concentration, and erythrocyte and leukocyte count across fractions.
Conclusion: We confirmed a RCG for albumin and total protein. Further work is required to investigate RCG's for other CSF biomarkers and molecules of interest. When RCGs exist, comparisons among subjects and/or studies are only valid if standardized CSF sampling procedures are followed.

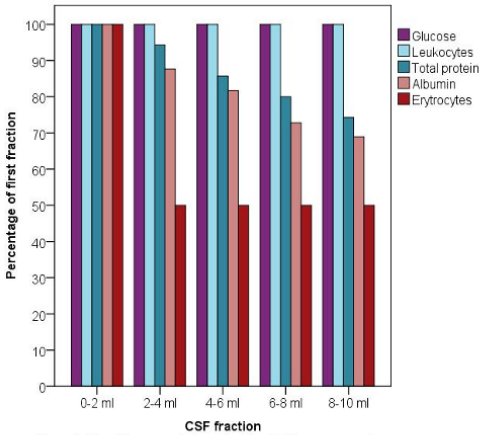


Figure 1. Trends in concentration of routine CSF measurements, normalized to the first fraction.

5805

Analysis of cerebrospinal fluid in diagnosis of postoperative meningitis in neurosurgical patients with subarachnoid hemorrhage

Misir A.[1], Knežević P.[2], Tonković D.[3]
[1]University Hospital Centre Zagreb - Zagreb (Croatia), [2]University of Zagreb, Medical School (student) - Zagreb (Croatia), [3]University Hospital Centre Zagreb, Medical School, University of Zagreb - Zagreb (Croatia)

Background and Goal of Study: The accurate incidence of postoperative bacterial meningitis in neurosurgical patients is unknown due to lack of gold standard and difficult diagnosis. Clinical signs can be nonspecific and affected with clinical state of patients and conditions that cause inflammatory response as well as subarachnoid hemorrhage, bone dust, implants or tumors. Blood in brain cause inflammatory response and affected cells count, protein and glucose levels. Our aim was evaluate cerebrospinal fluid cellularity and biochemical parameters in diagnosis of postoperative meningitis.
Materials and Methods: We conducted a retrospective descriptive study and collected data of cerebrospinal fluid cellularity (leucocyte and erythrocyte count), lactate, protein and glucose level and level of C reactive protein in peripheral blood. Correction of leucocyte count in cerebrospinal fluid was made according to erythrocyte value in cerebrospinal fluid.
Results and Discussion: Of the 35 patients, 18 were women (51,43%) and 17 were men (48,57%). The average year was 59,11 years and median was 60 years. According to biochemical analysis of cerebrospinal fluid glucose was decreased in 15 (42,86%), normal in 9 (25,71%) and elevated in 11 (31,43%) patients. Lactate were increased in 34 (97,14%) and normal in 1 (2,86%) patients. Total proteins were normal in 2 (5,71%) and increased in 33 (94,29) patients nad C reactive protein in cerebrospinal fluid was normal in 9 (25,71%) and increased in 26 (74,29%) patients. Corrected leucocyte count was increased in 33 (94,29%) and decreased in 2 (5,71%) patients. C reactive protein from peripheral blood was elevated in all 35 (100%) patients. Pleocytosis in cerebrospinal fluid as well as high C reactive protein level in peripheral blood can be a part of inflammatory response due subarachnoid hemorrhage. Lactate level in cerebrospinal fluid is good marker in diagnosis of postoperative meningitis according to inflammatory response.
Conclusion: High levels of lactate and protein in cerebrospinal fluid in regard to glucose levels are better markers in diagnosis of postoperative meningitis. Pleocytosis was significantly expresses in patients with subarachnoid hemorrhage even after correction of leucocyte count.

5826

Correlation between the measurement of the diameter of the optical nerve coat and tomographic findings of intracranial hypertension of a population from a University hospital in Colombia

Caballero-Lozada A. F.[1], Miño-Bernal J.[1], Espinosa-Marsiglia R.[1]
[1]Universidad del Valle - Cali (Colombia)

Background and goal of study: Intracranial hypertension requires the use of CT scan images of the skull to document the displacement of vascular and parenchymal structures, however, the tomograph is not always available in certain situations. Our hypothesis was that the ultrasound is a safe, economical and accessible method that can be used for the measurement of the optic nerve sheath diameter (ONSD) when CT scan is not an option.
Materials and Methods: This was an observational, descriptive, prospective, cross-sectional pilot study, approved by the Ethics committee of the Universidad del Valle code 226-018. All participants signed the informed consent. 25 patients conformed the intracranial hypertension group and 25 patients without intracranial hypertension conformed the control group. For the ultrasound measurement of the ONSD we used the SONOSITE TURBO ® ultrasound. The tomographic images obtained from each patient diagnosed with intracranial hypertension were available in the software of the Hospital Universitario del Valle. As statistical analysis we performed a two tailed t-student test (alpha 0.05) in SPSS Statistics V25.
Results and Discussion: The global average (Left and right eye) of ONSD for the group with intracranial hypertension was 6.3±0.6 and a global average for the control group 4.8±0.5. The t-student test showed significant differences (P-value<0.05, alpha 0.05, two tailed test) between the measurements of the groups. Overall, our study indicated that ultrasound measurements of ONSD were effective to differentiate a group with intracranial hypertension, previously diagnosed by CT scan images, from patients without this condition. Our results are consistent with the finding of other studies; ultrasound measurements would allow the detection of intracranial pressure increasing before deciding an invasive neurosurgical monitoring.
Conclusion: According to our findings, we suggest the implementation of ultrasound measurements as a fast and safe tool, which, depending on the speed could improve survival and neurological prognosis, detecting an intracranial pressure elevated in cases when CT scan images are not an available option. Nevertheless, more studies should be made with a greater sample to further validate our results.

6287

Cerebral blood flow velocity decrease and its relationship to hemodynamic parameters in reduced cardiac output induced by lower body negative pressure

Thudium M. O.[1], Kornilov E.[2], Moestl S.[3], Hoffmann F.[3], Hoff A.[3], Tank J.[3]
[1]University Hospital Bonn - Bonn (Germany), [2]Rabin Medical Center, Beilinson Hospital - Petach Tikva (Israel), [3]DLR Aeromedical Center - Cologne (Germany)

Background and Goal of Study: The integrated regulation of cerebral blood flow (CBF) and its determinants in health and disease are still largely unclear. While the concept of cerebral autoregulation has been present for a long time, other parameters such as cardiac output have been shown to affect CBF. It was the objective of this study to investigate the effect of lower body negative pressure (LBNP) on global hemodynamic parameters and parameters of cerebral perfusion represented by transcranial doppler sonography (TCD) and near infrared spectroscopy (NIRS).
Materials and Methods: After a standardized medical examination and informed consent, 5 healthy male subjects between age 20-30 were included. Subjects were placed in supine position on a horizontal tilt table. Basic monitoring consisted of continuous ECG and oxygen saturation. Continuous blood pressure, cardiac output and stroke volume were measured using a finger cuff device. Cerebral monitoring included TCD using a robotic probe and frontal NIRS. After a baseline measurement of 10 minutes, LBNP was applied at -15 mmHg for 5 minutes, then decreased to -30 mmHg for 5 minutes. Pressure was further decreased in steps of 10 mmHg every 5 minutes until subjects reached presyncope. LBNP was stopped and the table was placed in a head down tilt position until complete recovery. Data were analyzed offline. Values were compared to the baseline and to every previous pressure level using the Kruskal-Wallis test with post hoc Bonferroni corrections of multiple comparisons. Data are presented as median (interquartile range). Variables were further analyzed using a linear mixed model. P values of ≤ 0.05 were considered significant.
Results and Discussion: Subjects reached presyncope at LBNP levels between -40 and -70 mmHg. All hemodynamic and cerebral variables were significantly altered by LBNP below -50 mmHg. In the mixed model analysis, stroke volume and mean cerebral artery flow velocity (MCAV) showed a strictly linear decrease with LBNP pressure level decrease in all subjects while this was not the case with mean arterial pressure, cardiac output and cerebral saturation. This suggests that stroke volume may play a central role in cerebral perfusion in situations with reduced cardiac preload. Our results also question the significance of intact cerebral autoregulation.
Conclusion: Stroke volume is an important factor for cerebral perfusion in LBNP.

6172

Case Report: epidural blood patch as a treatment of intracraneal hypotension syndrome

Lopez Fernandez J.[1], Díaz Balbas E.[1], Cohn Reinoso C. M.[1], Baca Pose B.[1], Rodriguez Maurell C.[1], Hernandez Aguado C.[1]
[1]Hospital Doctor Josep Trueta - Girona (Spain)

Background: Spontaneus intracranial hypotension syndrome it's caused by cerebrospinal fluid (CSF) leakage characterised by postural headache associated with neurological symptoms without any trigger(1).
Case Report: 53-year-old man, no drug allergies. No neurological symptoms before. Clinical history: arterial hypertension and thyroidectomised in 2014. Clinical findings were tinnitus, orthostatic headache (improvement with decubitus), ataxia, urinary incontinence and incipient cognitive impairment (behavioural disorder). CT cranial: bihemispheric laminar subdural hygromes with radiological signs of intracranial hypotension. Spinal CT & myelography: contrast leak at extraaracnoid space, C3-L2, big extraaracnoid circumferential leak at D5 level. Clinical diagnosis was hypotension of CSF secondary to spontaneous fistula. We decide to do an epidural blood patch as treatment. We drain 15ml of basilica vein blood in a sterile way, epidural puncture was performed at T6-T7 level with Tuohy needle and blood was injected in order to do an epidural blood patch. 24 hours later ataxia and cognitive impairment improved. 7 days later significant clinical improvement was observed: no orthostatic headache either urinary incontinence. 1 month later cerebral CT showes a decrease in size of hygromas as well as an improvement in intracranial hypotension sings. Our final diagnosis was BRAIN SAGGING SYNDROME: Rapidly progressive cognitive impairment (front- temporary dementia like) associated to urinary incontinence + ataxia+ orthostatic headache caused by severe intracranial hypotension in context of spontaneous CSF fistula.
Discussion: The effectiveness of epidural blood patch has already been documented when conservative treatment is not enough. It augments CSF pressure and repair dural defect. It's effective in 90% of cases(2). Second patch can be made in absence or remission of improvement.
References:
1. Rodriguez,A., Miñambres,J., Tello, J., Tello,C.(2008). Cefalea por hipotensión del Líquido Cefaloraquídeo. Rev Clin Med Fam,2(4),181-183.
2. Lopez-Sanchez,F., Asensio,I., Molina,I., Barrio,J., Sanchez-Roy,R., García-Ferrando,V.(2003). Parche sanguíneo epidural como tratamiento de un cuadro de hipotensión intracraneal espontánea. Rev Soc Esp Dolor,10(8),511-515.
Learning points: Epidural blood patch it's an effective and secure treatment for spontaneous intracranial hypotension in refractory cases. Symptoms may even improve when fistula level is not identified in imaging tests.

5946

Dexmedetomidine ameliorates isoflurane-induced cognitive deficit in mice subjected to chronic traumatic brain injury by attenuation of the reactivation of monocyte-derived macrophages

Kii N.[1], Sawada A.[1], Yoshikawa Y.[1], Yamakage M.[1]
[1]Sapporo Medical University School of Med - Sapporo (Japan)

Background and Goal of Study: Traumatic brain injury (TBI) is a leading cause of long-term neurological deficit. Postoperative cognitive deficit (POCD) can irreversibly worsen cognitive impairment. Both TBI-induced cognitive deficit and POCD have been reported to be associated with inflammatory activation of hippocampal monocyte-derived macrophages (MDM). It is considered that hippocampal MDM reactivated by isoflurane (Iso) exposure would play a crucial role in POCD in TBI model mice. Although dexmedetomidine (DEX), an α2 adrenoreceptor (AR) agonist has been reported to have a neuroprotective effect, the mechanism underlying its effect has not been fully elucidated. We investigated whether treatment with DEX could remedy Iso-induced cognitive deficit and inflammatory activation of hippocampal MDM several weeks after TBI.
Materials and Methods: Adult male C57BL/6 mice received bone marrow transplantation from green fluorescent protein C57BL/6 transgenic mice. Those mice were assigned to 5 groups: Naïve-Iso, Sham-Iso, TBI-Iso, TBI-Iso-DEX, and TBI-Iso-DEX-Yohimbine (TBI-YOH) groups. A controlled cortical impact model of TBI was performed. At 4 weeks postoperatively, mice were exposed to Iso in the presence or absence of DEX. In the TBI-YOH group, YOH (α2-AR antagonist) was administered prior to the administration of DEX.Cognitive function was assessed by the Barnes Maze test. The presence and expression levels of hippocampal MDM, microglia, and astrocytes were assessed by immunohistochemical staining. The expression levels of brain-derived neurotrophic factor (BDNF) and the BDNF high-affinity receptor tropomyosin-related kinase B (TrkB) were assessed by Western blotting.All statistical data were analyzed by one-way ANOVA or repeated measures two-way ANOVA with post-hoc Tukey's multiple comparison appropriately.Statistical differences were considered significant with a value of $P < 0.05$.
Results and Discussion: TBI-Iso-DEX mice showed amelioration of impaired learning of the task and found the hole faster than did in TBI-Iso mice. TBI-Iso-DEX mice had a profound depletion of hippocampal MDM compared to that in TBI-Iso mice. TBI-Iso-DEX mice had greatly increased levels of TrkB and BDNF. These phenomena were counteracted by YOH.
Conclusion: We demonstrated that DEX ameliorates Iso-induced cognitive deficit in chronic TBI model mice. DEX had a neuroprotective effect by attenuation of the reactivation of MDM through the TrkB/BDNF pathway.

4545

Use of near-infrared spectroscopy (NIRS) during endovascular thrombectomy (EVT) in acute ischemic stroke

Verhoeve S.[1], Collete S. L.[1], Uyttenboogaart M.[1], Absalom A. R.[1], Bokkers R. P. H.[1], Sahinovic M. M.[1]
[1]University of Groningen and University Medical Center Groningen - Groningen (Netherlands)

Background and Goal of Study: NIRS is a non-invasive method of measuring regional tissue oxygen saturation (rSO2). The goal of this ongoing study was to determine if the NIRS monitor (O3® Regional Oximetry, Masimo Corporation) is able to detect changes in rSO2 associated with reperfusion during EVT in patients with an acute ischemic stroke.
Materials and Methods: After informed consent, 17 patients with a medial cerebral artery (M1) and/or unilateral internal carotid artery (ICA) occlusion diagnosed with

CT angiography were enrolled in the study. NIRS sensors were applied to the scalp directly over the ischemic area and over the contralateral temporal region. The rSO2 values from the ischemic and non-ischemic hemisphere before and after EVT were compared. Data are summarized as median [IQR] and were analyzed with the Wilcoxon signed-rank test.
Results and Discussion: Data from 7 of 17 patients were excluded from further analysis because of either previously unknown bilateral ICA occlusion, an M2 or more distal occlusion, or recanalization by intravenous thrombolysis alone. Patient demographics, procedural characteristics and results are displayed in Table 1. The rSO2 of the affected vs. non-affected hemisphere was 67% [65-73] vs. 67% [65-69] before, and 69% [67-74] vs. 67% [64-72] after EVT (Figure). This is the first study which measures oxygenation with NIRS directly over the ischemic area of interest. The possible reasons why we found no change in rSO2 before and after EVT include: (a) contamination of the signal from extracranial tissue, (b) intracranial collaterals maintaining oxygenation, (c) impaired O2 consumption in the ischemic brain.
Conclusion: Despite application of the NIRS sensor over the ischemic region, no change in rSO2 was detected during successful reperfusion in patients with acute stroke due to a M1 and/or unilateral ICA occlusion.

Patient demographic-, procedural characteristics and results			
Age (median,[IQR])		79 [65-81]	
Male - no./total no.		7/10	
Occlusion site (ICA/M1) – no.		ICA= 4, M1=10	
General anesthesia/conscious sedation/ local anesthesia – no.		4/0/6	
Intra-venous thrombolysis- no./total no.		4/10	
mTICI score – (2B/2C/3) – no.		3/3/4	
Time last seen well to recanalization (min. (median, IQR))		410 [372-520]	
PTA carotid artery - no./total no.		4/10	
	Pre-EVT (median, [IQR])	**Post-EVT (median, [IQR])**	**p-value**
rSO_2 affected hemisphere (%)	67 [65-72]	69 [67-73]	0.103
rSO_2 non-affected hemisphere (%)	67 [65-68]	67 [63-70]	0.916
MAP (mmHg)	106 [90-119]	101 [90-118]	0.374
SpO2 (%)	98 [96-100]	99 [95-100]	0.779
EtCO2 (kPa)	3.9 [3.7-4.2]	4.0 [3.8-4.2]	0.180
Minute ventilation (L)	6.8 [5.7-8.0]	6.7 [5.2-8.0]	0.180
Heart rate (bpm)	78 [65-93]	78 [57-92]	0.102
Propofol TCI Ce (ug/ml)	3.8 [2.8-4.0]	3.6 [3.1-3.9]	0.655
Remifentanil TCI Ce (ng/ml)	4.0 [3.5-4.0]	4.0 [3.1-4.0]	0.180
Noradrenaline (ug/kg/min)	0.03 [0.02-0.08]	0.03 [0.02-0.04]	0.317

Table 1.

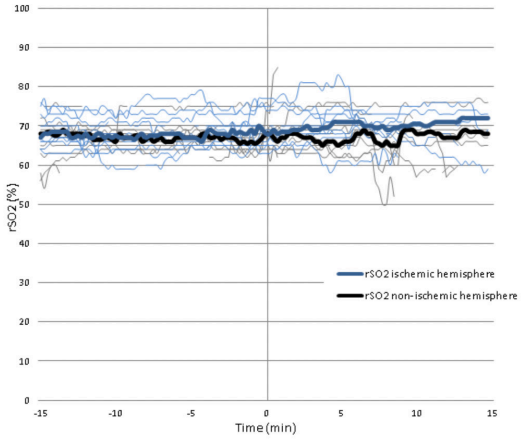


Figure. Line charts of the rSO_2. The blue and black lines (bold = median) are the rSO_2 measurements of the ischemic hemisphere vs. the non-ischemic hemisphere respectively. Moment of definitive recanalization was set at 0 minutes for all patients.

4953

Anesthesiologist's nightmare in the angio suite during Carotid Artery Stenting

Mladic-Batinica I.[1], Žaja A.[1], Hostić V.[1], Kalousek V.[1], Čulo B.[1]
[1]UHC Sestre Milosrdnice - Zagreb (Croatia)

Background: Endovascular neurointerventions is one of the most expanding clinical field during the past few decades. The complexity of conditions treated this way is increasing, creating challenges for neuroanesthesiologists. Carotid artery stenting (CAS) is regarded as a relatively safe, less invasive treatment of internal carotid artery (ICA) stenosis1. Still CAS in calcified arteries carries a higher perioperative risk: cerebral thromboembolic events are the most common complications, while rupture is rare, but generally fatal.
Case Report: We present a case of CAS in 76 yrs old femal with transient ischemic attack. Cerebral angiography revealed a concentric calcification with 90% lumen reduction of ICA. CAS started under local anesthesia. After patient had repeated neurologic deficit due to bad tolerance of balloon occlusion test, it was converted to general endotracheal anesthesia. During the intervention of right ICA iatrogenic rupture occurred. After stent implantation patient remained intubated, analgosedated and on minimal vasoactive support. Urgent CT angiography revealed a normal flow through the right ICA without any great blood vessels occlusion; on cerebral CT no ischemic or hemorrhagic events. Patient was extubated without neurological deficit.
Discussion: Outcome after neurointerventional procedure is dependent on rapid diagnosis and early treatment of intraprocedural complications - the time factor! Severe artery stenosis can be indicative for decreased plaque stretch capability, with increased risk of dissection, rupture and residual stenosis. Some study shows that plaque's ability to undergo stretch is independent of the level of stenosis and strongly depends on the calcification's content. Anesthesiologist as a team member has a role in facilitating neuroradiological procedures, so an understanding of specific neuroradiological procedures, with potential complications, is crucial.
Reference:
1. Vitek J.J, et al: Carotid artery stenting: tehnical considerations. AJNR Am J Neuroradiol 2000; 21:pp. 1736- 1743.
Learning points: In future we need parameters that should be more indicative for patient's interventional risk with the aim of safer classic endarterectomy. In the shadow of the procedure, an anesthesiologist's role is much more than fine drugs titration, accurate BP and respiratory function monitoring - a good plan in dealing with possible complications and close cooperation with neuroradiologist is essential for favourable outcome.

5543

Vascular air embolism in Neurosurgery – A case Report

Carp M.[1], Rodrigues C.[2], Antunes H.[1]
[1]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal), [2]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisboa (Portugal)

Background: Vascular air embolism (VAE) is a feared complication of some invasive procedures, with relevance in neurosurgery. The true incidence of VAE is not known since many cases of VAE are subclinical. This is most often associated with sitting position craniotomies where the brain is in a higher position than the heart. Vascular air embolism may have cardiovascular, pulmonary, and neurologic sequelae that might be lethal. The detection of an ongoing episode is mainly a clinical diagnosis, taking into consideration the circumstances under which clinical alterations occur.
Case report: We report a case of a 71 yo male, ASA 3, proposed to suboccipital craniotomy. Twenty minutes after the beginning of the surgery we found an abrupt decrease of etCO2 and SpO2 (80%). We immediately informed the surgeon, lowered the headboard and institute high-flow 100% oxygen. Fluid therapy has been optimized, preserving hemodynamic stability. A arterial blood gas sample was collected and revealed hypoxemia (paO2 54,3mmHg) and hypercapnia (paCO2 52,4mmHg). There was a fast recover returning to the baseline clinical and laboratorial status. There was no hemodynamic repercussions or further complications until the end of the procedure. At this time a precordial Doppler was made and show small and insignificant air bubbles in the right atrium. We chose to wake up the patient that was uneventfully extubated and transferred to the intensive care unit.
Discussion: Early diagnosis and treatment before catastrophic cardiovascular collapse are of utmost importance. The principal goals of management include prevention of further air entry; a reduction in the volume of air entrapped and hemodynamic support. In this case the clinical suspicion was early recognized and the immediate actions were taken. Transesophageal echocardiography (TEE) is currently the most sensitive monitoring device for detection of air presence and The precordial Doppler (PE) is the most sensitive of the non-invasive monitors. We had no TEE available so PE was our possibility. Decision to transfer to intensive care unit was made for greater surveillance.
Learning points: The optimal management of VAE is prevention. Vascular air embolism is a potentially life-threatening event and clinicians must be aware of this silent but dangerous entity for an early suspicion.
References:
1. Marek A. Mirski, et al.; Diagnosis and Treatment of Vascular Air Embolism; Anesthesiology 1 2007, Vol.106, 164-177.

5751

Propofol post-conditioning after temporary clipping reverses oxidative stress in aneurysm surgery

Xinyi W.[1], Haiyun W.[1], Di G.[1], Yang C.[1]
[1]*Tianjin Third Center Hospital - Tianjin (China)*

Background and Goal of Study: Aneurysm clipping has a potential risk of cerebral ischemia-reperfusion (I/R) injury due to transient clipping of the parent artery to obtain transmural pressure control and avoid bleeding during surgery. Neuron damage induced by oxidative stress is an important pathophysiological mechanism of cerebral I/R injury[1]. Propofol has the capacity to limit lipid peroxidation and improve cellular antioxidative stress systems [2]. Our research group has demonstrated that propofol post-conditioning provides long-term protection against focal cerebral I/R injury in rats [3].This study aims to investigate how propofol post-conditioning may influence cerebral I/R injury in patients and provide evidence for patients in terms of proper selection and combination of anesthetics.
Materials and Methods: 60 patients undergoing intracranial aneurysm clipping were randomized into a propofol post-conditioning group or a sevoflurane group. Sevoflurane (0.5%-2%) was used for maintenance anesthesia in both groups. In propofol group, the inhaled concentration of sevoflurane was reduced after temporary clip removal to keep the bispectral index value between 40-60, and propofol (Cp 1.2 g/ml) was subsequently started. Blood samples were drawn at 6 time points.
Results and Discussion: Between the conclusion of the operation to 7 days after surgery, propofol post-conditioning decreased the serum concentration of OH and 8-isoprostane and micronuclei and nucleoplasmic bridges, furthermore, increased γ-tocopherol, SOD, MMSE and MoCA scores. Additional cognition scales and future studies should be taken into consideration to more fully assess cognition and explore patients' prognoses.
Conclusion: Propofol post-conditioning may protect brain from oxidative stress injury up to 7 days, and the combination of sub-dose propofol and low concentration sevoflurane may have an advantage over sevoflurane alone after aneurysm clipping surgery.
References:
1. Haug T, Sorteberg A, Sorteberg W, et al. British journal of neurosurgery. 2009;23:507-15.
2. Cavalca V, Colli S, Veglia F, et al. Anesthesiology. 2008;108:988-97.
3. Wang H, Luo M, Li C, et al. Journal of neurochemistry. 2011;119:210-9.
Acknowledgements: This study was supported by grants from the National Natural Science Foundation of China, Beijing, China (81071059,81100984,81571054).

5968

Assesment of psychoemotional disoders and autonomic nervous system dysregulation in the early postoperative period in patients with kinking of internal carotid arteries

Malenkova Y.[1], Medvedeva L.[1], Charchyan E.[1], Zagorulko O.[1], Shevtsova G.[2]
[1]*Petrovsky National Research Centre of Surgery - Moscow (Russia),* [2]*I.M. Sechenov First Moscow State Medical University - Moscow (Russia)*

Background and Goal of Study: To compare the severity of psychoemotional disorders and autonomic nervous system dysregulation in the early postoperative period in patients with kinking of the internal carotid arteries(ICA) backdrop of fibro-muscular dysplasia(FMD) and arterial hypertension(AHT).
Materials and Methods: The prospective randomized study included 56 patients who underwent surgical reconstruction of ICA's kinking. Patients with kinking of ICA were divided into 2 groups:the first(1st) group included 27 people with FMD, and the second(2nd)group-29 respondents with AHT. The criteria for excluding patients from the study were:cognitive disorders, mental and acute neurological diseases. Hospital Anxiety and Depression Scale(HADS) was used to evaluate anxiety and depression, considering them if the score was≥10. The assessment of autonomic dysregulation was carried out using the Russian "Questionnaire to identify autonomic nervous system changes" named after A.M. Vein(VQ), considering the autonomic nervous system dysregulation if the score was>15. The evaluation was performed before ICA's kinking surgery,on days 1 and 7[1,2].
Results and Discussion: Prior to the operation, the levels of psychoemotional disorders did not significantly differ and HADS anxiety subscale scores were 15.1±2.1 in the 1st group and 13.2±3.2(p>0.05) in the 2nd, and in the HADS depression subscale scores were 8.5± 3.4 and 7.2±3.2(p>0.05), respectively. On the 1st day after surgery, patients with FMD showed higher levels of anxiety (17.1±4.2 and 12.3±2.2(p<0.05), while the levels of depression did not significantly differ - 9.1±3.1 and 7.9±3.5(p>0.05) in the 1st and 2nd group, respectively. On 7th day, the studied level on the HADS anxiety scale was 14.5±2.1 and 10.3g±3.1(p<0.05), and the depression level was 8.7±2.5 and 6.9±2.7(p>0.05) in the 1st and 2nd groups, respectively. According to VQ, higher scores were found in the group of patients with FMD.At the 1st day after operation scores were 56.3±14.2 and 34.2±11.6 (p<0.05) respectively. On the 7th day studied levels corresponded to 41.7±12.9 21.5±8.2 (p<0.05) respectively.
Conclusion: In the early postoperative period, patients with FMD operated on kinking of ICA are characterized by higher levels of psychoemotional disorders and autonomic nervous system dysregulation.
References:
1. Vejn A.M. Vegetativnye rasstrojstva.M.MIA 2010.
2. Belov Yu.Hirurgiya. 2017: 5:67-75.

6341

Neurophysiology team input to cardiovascular instability approach. Case report of petroclival meningioma

Coelho M.[1], Figueiredo J.[1], Sa S.[2], Amorim P.[2]
[1]*Centro Hospitalar do Baixo Vouga - Aveiro (Portugal),* [2]*Centro Hospitalar do Porto - Porto (Portugal)*

Background: During posterior fossa neurosurgery, cardiovascular instability and heart arrest may occur. Manipulation of medullary reticular formation and floor of the IV ventricle can result in arterial hypertension. Bradycardia may arise when operating in the vicinity of the pons and roots of V, IX and X.1 We report a case of successful multidisciplinary interaction between surgical, anesthesia and neurophysiology teams to halt lesion of brain stem.
Case Report:♀ 42yo, ASA II, history of hypertension, with left hypoacusia and dysphagia. Proposed for excision of a big petroclival meningioma, 44x45mm with significant midline shift and brain stem molding. Submitted to total intravenous general anesthesia with TCI of Propofol/Remiphentanil. Monitored with ASA standards, invasive blood pressure, evoked potentials and electromyography (EMG) of selected cranial nerves (CN). During tumor removal, near CN IX, X and XII, it was observed 5 short periods of bradycardia with hypertension. At the same time inputs were being received through EMG of the tongue (CN XII). The combination of the two signs aimed towards a neurocardiogenic reflex being triggered. That particular area was therefore avoided and no further complications were observed. Preoperative dysphagia resolved.
Discussion: Mass effect distorts normal brain anatomy, rendering it difficult to recognize structures even under microscope.2 Monitoring the integrity of the brainstem during posterior fossa surgery is highly recommended. Recent case reports of severe cardiovascular events in posterior fossa surgery denotes the importance of constant hemodynamic monitoring, integrated carefully and simultaneously, guiding a planned approach to a potential irreversible neurologic lesion.
References:
1. Asian J Neurosurg 2012; 7: 87–89; 2-J of Neurosurg 2017; 126, 281–288.
Learning points: Multidisciplinary team coordination in the OR are crucial for the well-being of the patient.

6082

Perioperative bleeding risk, how to predict the "blind" spots?: case report

Burmuzoska M.[1], Kostov M.[2], Asani E.[2], Gjorchevska E.[1], Lambevska N.[3]
[1]*University Clinic of Anesthesiology, Reanimation and Intensive care Medicine (KARIL) - Skopje - Skopje (Republic of North Macedonia),* [2]*University Clinic of Neurosurgery - Skopje - Skopje (Republic of North Macedonia),* [3]*General Hospital "8th of September" - Skopje - Skopje (Republic of North Macedonia)*

Background: Chronic subdural hematoma is frequent disease in elderly, but it's rare in young patients1. Suspicion of hematological disease, as a predisposing factor, should be made and additional tests and treatment protocol should be applied.
Case Report: A 29 years old male patient was admitted in the Emergency Department. He complained having refractory headache, discomfort, nausea and vomiting urge. He revealed he had a traumatic event, falling from 3m height, nearly 4 months ago. CT scan showed fronto-parieto-occipital subdural hematoma with left to right shift with different density indicating "several bleeding times". Emergency

surgery was performed. During the procedure, unexpected tendency for bleeding was noted and two FFPs were administered along with 1g Ca gluconate. The bleeding continued from every layer of the surgical site, so 1g of tranexamic acid was given and improvement was noted. The patient remained sedated due to risk of further bleeding till the next day. Family members revealed he had few episodes of nose bleeding as a child. There was suspicion for von Willebrand disease so additional tests were done. Ristocetin test showed hypoagglutinatin of the platelets. After 48h additional 500mg of tranexamic acid were administered for drain removal. Two weeks later Light Transmission Aggregometry test with ADP, Collagen and Ristocetin all showed hypoaggregation.
Discussion: Every chronic hematoma in young patients, especially in “several bleeding times”, should steer our thinking towards some hematological disorder as a predisposing risk factor. According to European vWD type 1 study, bleeding history is a better guide for diagnosis than laboratory findings2, because standard coagulation tests have two “blind” spots vWF and FXIII. Standardized bleeding questionnaire is a better predictor for perioperative bleeding risk because bleeding symptoms are more relevant than vWF levels and they shouldn’t be checked routinely in asymptomatic patients2.
References:
1. Luongo M. Hematologic Disturbances and Neurosurgery: Why Don't We Consider Them?. J Blood Disord Transfus 2016,7:2.
2. Sadler J. E. Low von Willebrand factor: sometimes a risk factor and sometimes a disease. Hematology Am Soc Hematol Educ Program 2009:106-112.
Learning points: Standardized Bleeding Questionnaire should be part of every preoperative evaluation of surgical patients.

4778

The role of extracellular signal-regulated kinase (ERK) 5 in spinal cord on pathological pain in mice

Matsuura F.[1], Satoh Y.[1], Kawaguchi M.[1], Endo S.[2], Wang X.[3], Ikeda T.[1]
[1]National Defense Medical College - Tokorozawa (Japan), [2]Tokyo Metropolitan Geriatric Hospital - Tokyo (Japan), [3]The University of Manchester - Manchester (United Kingdom)

Background and Goal of Study: Mitogen-activated protein kinase (MAPK) cascade is a superfamily transducing a broad range of intracellular signals. Extracellular signal-regulated kinase 1 and 2 (Erk1/2) belong to a subfamily of the large MAPK family, and recent findings indicate the different functions of these isoforms in mouse pain models. We previously revealed that, by using isoform specific mutant mice, Erk2 plays a predominant and/or specific role in pain plasticity, the contribution of Erk1 is limited. Erk5, also known as big mitogen-activated protein kinase 1, is a member of another subfamily of large MAPK family. Although accumulating evidence suggests the important roles of Erk5 to pain hypersensitivity, there is no report to study the specific contribution of Erk5 to pain plasticity by using Erk5 mutant mice. Hence, we investigate the function of Erk5 to pain plasticity by using conditional, region-specific, genetic deletion of Erk5.
Materials and Methods: To generate mice deficient for Erk5 specifically in the central nervous system, the floxed Erk5 mouse line was crossed with a Nestin promotor-driven cre mouse line. All mice used in this study were 8-12 weeks male littermates. The partial sciatic nerve ligation (PSNL) model was used as the neuropathic pain model, and allodynia was evaluated by the Von Frey test. Inflammatory pain was assessed by the Formalin test.
Results and Discussion: Although Erk5 mutant mice showed a normal baseline paw withdrawal threshold to mechanical stimuli, these mice had a reduced nociceptive response following a formalin injection to the hind paw. In a PSNL model, these mice showed normal mechanical allodynia and thermal hyperalgesia compared to control mice.
Conclusion: Erk5 in the spinal cord played an important role in inflammatory pain, but did not play an important role in allodynia and hyperalgesia.

4940

Low skeletal muscle mass induces postoperative cognitive dysfunction in middle-aged rats

Nemoto A.[1], Goyagi T.[1]
[1]Akita University Graduate School of Medicine - Akita-city (Japan)

Background and Goal of Study: Postoperative cognitive dysfunction (POCD) which is contributed to the neuroinflammation by activated microglia cell increases with aging. Although it has been indicated multiple risk factors, the relation between POCD and frailty or sarcopenia is unclear. However, they affect dementia therefore we speculate on the relation to POCD and muscle atrophy. In this experiment, we have investigated whether muscle atrophy would induce the POCD in middle-aged rats.
Materials and Methods: All rats were allocated to two groups; tail suspension group (TS) which suspended their tails 2 weeks before surgery and control group. All rats in both two groups underwent hepatectomy and mesenteric manipulation under 3% sevoflurane with 30% oxygen on the day of surgery. Cognitive assessments were conducted by the Morris water maze test (MWM), fear conditioning test, and novel recognition test 7 days after surgery. Immunohistorical staining of iba-1 assessed the activation of microglia. Data were expressed as mean ± SEM. Behavioral test was compared with two-way analysis of variance, followed by the Wilcoxon rank sum test for two group comparison. $P < 0.05$ was considered statistically significant.
Results and Discussion: The swimming latency and length to the plat form in the TS group were significantly higher than the control group while the swimming velocity didn’t have significant difference. There were no significant difference of the freezing time and exploratory preference. Iba-1 in the TS group were increased compared with the control group.
Conclusion: Preoperative muscle mass reduction induces the spatial learning impairment and the neuroinflammation in middle-aged rats. These results indicate that muscle mass is important for the prevention of POCD.

5236

Dosing of Methadone for complex spine patients: Can we achieve personalized dosing using the patient as his own control

Algarra N.[1]
[1]1960 - Gainesville (United States)

Background and Goal of Study: Patients undergoing spine surgery experience significant amount of pain that can interfere with daily activities. Articles in the literature describe the use of methadone as a single dose from 0.2 mg/kg up to 0.5 mg/kg. We want to determine if methadone given in small aliquots until respiratory depression prior to induction of anesthesia can be used to determine a personalized correct dose required.
Materials and methods: The test hypothesis is that titrating methadone to respiratory depression allows the patient to a¬¬ct as his own control determining the dose he will require. After IRB approval, patients undergoing complex spine surgery are randomized to two groups: Group 1: In the OR, with full monitors, the patient receives 0.2 mg/kg of methadone IV based on ideal body weight after intubation. Group 2: In the OR, with full monitors, the patient receives incremental aliquots of methadone up to 0.5 mg/Kg based on ideal body weight titrated to apnea. Each subject receives a 10 mg loading dose then aliquots of 5 mg, given at 5 to 10 minute time intervals. After reaching the apnea threshold as determined by respiratory rate less than 4 breaths/min, induction of general anesthesia and intubation proceeds.
Results and Discussion: We collected intraoperative data: total dose of all anesthetics, length of surgery, number of levels, estimated blood loss, time to extubation, total and type of fluids and vasopressors administered, vital signs and total opioid use. The following post-operative data collected: patient daily pain score for the first 72 hours, total opioid usage, length of stay, time to get out of bed. We will calculate the opioid requirement for each 24-hour period and the whole 72 hours. The study was stopped after 20 subjects due to changes in intraoperative management of complex spine patients and implementation of ERAS protocols that conflicts with the strict adherence to study protocol. The protocol is being revised and requires a new institution review board approval. Statistical analysis: We are currently analyzing the data and will be ready for the poster. We do not have any respiratory depression events.
Conclusion: We describe a novel approach of dosing the long acting narcotic methadone using the patient as his own control to determine the most appropriate, personalized dose. The method appears to be safe and easily reproduceable.

4551

Transcatheter tricuspid valve replacement: a two-patient case report

Martinez Caridad J.[1], Arespacochaga G.[2], Carmona M.[2], Lacaba A.[2], Manzano A.[2], García J.[2]
[1]*Hospital Puerta de Hierro Majadahonda - Madrid (Spain),*
[2]*Hospital Universitario Puerta de Hierro - Majadahonda (Spain)*

Background: Tricuspid regurgitation (TR) is a common valvulopathy most frequently produced by annular dilatation and therefore leaflet tethering with a poor prognosis for severe cases [1]. Many patients are destined to a lifespan of futile pharmacological therapy [2]. Surgical treatment of the tricuspid valve (TV) is infrequently performed but the rise of less invasive, percutaneous therapies intends to end this reality. Transcatheter tricuspid valve replacement (TTVR) remains as a rarity in the therapeutic spectrum of TR.
Case Report: Case 1: Female, 59 years old with a tricuspid prothesis with an absence of coaptation and tenting of the prothesis that produced severe TR. A general anaesthesia was performed with invasive monitorization. A Sapiens3 prothesis was implanted with no incidents. Anticoagulation with enoxaparin was initiated that same day. Transthoracic echocardiography (TTE) after the procedure showed a correct function of the prothesis with a minimal paravalvular leak. Case 2: Female, 74 years old, with TR regardless of a previous double annuloplasty. A general anaesthesia was performed with invasive monitorization. A NaviGate prothesis was implanted with no incidents. The anticoagulation was initiated on the first day with a continuous heparin infusion. The post-procedural TTE showed no TR or leaks.
Discussion: Severe TR remains a rarely treated valvulopathy in spite of its repercussion in patient survival [2]. We are still at a very early stage of endovascular treatment of TR and very few of these procedures have been done worldwide. The importance of these cases relies in the need for a correct anaesthetic approach to these patients. They represent the two only cases that have been performed in Spain.
References:
1. Demir, O. M., et al. (2018). Transcatheter tricuspid valve replacement: principles and design. Frontiers in cardiovascular medicine, 5.
2. Campelo-Parada, F., Lairez, O., & Carrié, D. (2017). Percutaneous treatment of the tricuspid valve disease: new hope for the “forgotten” valve. Revista Española de Cardiología (English Edition), 70(10), 856-866.
Learning points: Patients with a pathological TV bear a low life quality and a poor prognosis, with scarce effective treatment. Percutaneous treatment of the TV is still in its first steps but may be a reasonable option for these patients. The perioperatory management of these patients is delicate due to their polipathology, the strict anticoagulation control needed and the procedure itself.

4565

Severe tricuspid regurgitation treated by percutaneous approach: a case series using transcatheter mitral clip device

Carmona Prieto M.[1], Martínez Caridad J.[1], Lacaba Mazario A.[1], Palamidessi Domínguez J.[1], Manzano Rodríguez A.[1], García Fernández J.[1]
[1]*Hospital Universitario Puerta de Hierro Majadahonda - Majadahonda (Spain)*

Background: Tricuspid valve (TV) dysfunction that causes significant tricuspid regurgitation (TR) is a common heart valve disease with few effective treatment options. Recent evidence seems to indicate that patients undergoing a transcatheter clip procedure due to mitral regurgitation have worse outcomes if concomitant TR is present. (1). Herein, we describe procedural performance, anesthetic considerations and clinical outcomes of this therapy in 7 patients
Case report: 7 patients underwent the procedure. Grade of TR was severe in all cases, most of them had preserved left ventricular ejection fraction and two of them had severe pulmonary arterial hypertension. All were performed through transfemoral access. A clip was placed at the anteroseptal commissure in all patients, adding a second one in 3 of them. The procedure was performed under general anesthesia. Left radial artery and peripheral and venous catheters were cannulated and unfractionated heparin was administered after sheath insertion. All patients were hemodynamically stable during the procedure without needing high doses of vasoactive drugs. Patients were delivered to the intensive care unit (ICU) after procedure in order to hemodynamic monitoring. All patients were extubated on the same day. No intraprocedural deaths or emergent conversions to open-heart surgery occurred. No other serious adverse events were reported. No device migration occurred. There was not in-hospital mortality nor 30 days mortality. Procedural success, defined as clip implantation without detachment or device migration and reduction of TR of ≥1 grade without tricuspid stenosis, was achieved in 6.
Discussion: High risk patients with TR may benefit from TV repair using a percutaneous approach which seems to be a safe, less invasive technique for this patients. Due to the growing interest in this new therapeutic approach, we must know the anesthetic implications of this procedure in this type of patients.
References:
1. Georg Nickenig, Marek Kowalski, Jörg Hausleiter, et al. Transcatheter Treatment of Severe Tricuspid Regurgitation With the Edge-to-Edge MitraClip Technique. Circulation. 2017;135:1802–1814.
Learning points: Despite our short experience and small number of cases treatment of TR using MitraClip devices it seems to be feasible and efficient in selected patients.

4857

Minimal invasive mitral surgery through the Heartport technique: a retrospective single-centre case series

Lacaba A.[1], Palamidessi J.[1], Martínez J.[1], Arespacochaga G.[1], Sánchez C.[1], García J.[1]
[1]*Hospital Universitario Puerta de Hierro Majadahonda - Majadahonda (Spain)*

Background and Goal of Study: In recent years, new surgical procedures regarding minimal invasive approaches in cardiac surgery have become more important. The port-access technique has been overall accepted, due to its surgical safeness and effectiveness. Nonetheless, postoperative outcomes should be taken into consideration. This report aims to present the impact of clinical events over a medium-term follow up.
Materials and Methods: From March 2018 to October 2019, a total of 24 isolated mitral valve repairs (87.5%) and replacements (12.5%) through minimal invasive port-access Heartport technique conducted by mini-right thoracotomy have been performed in our center. Transthoracic echocardiogram control was completed before discharge. Clinical outcomes were studied during hospitalization and prospective cardiology visit.
Results and Discussion: No mortality was registered (0%) after surgery and before discharge. Two cases of bleeding (8.3%) were reported, but only one (4.1%) underwent reoperation. Difficult pain control was experienced in six patients (25%), despite the use of diverse analgesia strategies. 25% of the sample suffered from pulmonary complications and renal failure in the immediate post operatory. Only one case (4.1%) of surgical wound infection was noted. Mean cross-clamp and perfusion time were 111 min and 167 min respectively, taking longer in comparison to our classical mitral replacement procedures series.
Conclusion: Although minimal invasive approach for mitral valve repair and replacement seems to be a promising alternative to sternotomy, with an emphasis on its more aesthetic results, it is not exempt from complications. Regarding the negative clinical outcomes, these might be a consequence of a sharp learning curve and its prolonged cross-clamp times associated. Due to insufficient published evidence, larger prospective randomized trials should be performed to compare the efficiency of port-access techniques to classic sternotomy procedures in terms of increased risk.

5075

SAM after AVR revealed CA; a case report

Ikemoto N.[1], Katayama H.[2], Ohashi I.[2], Ochiai Y.[2]
[1]Kawasaki Medical School - Okayama (Japan), [2]Kawasaki Medical School General Medical Center - Okayama (Japan)

Background: Cardiac amyloidosis can present with asymmetric hypertrophy that resembles hypertrophic cardiomyopathy, and in some cases, with dynamic LVOT obstruction. we report the case of a patient who had cardiac amyloidosis with the echocardiographic appearance of cardiac hypertrophy and evidence of LVOT obstruction that caused dyspnea.
Case Report: We outline the case of a 85 years old Japanese female who was operated Aortic valve replacement and A left ventricular septum biopsy . Preoerative, echocardiograhic examination showed cardiac hypertrophy and LVOT obstruction. After surgery, The patient's initial vital signs were unremarkable, and the lungs were clear and continued treating her with β-blockers. However, post operative day 4, The patient caused episode of dyspnea had lasted a few minutes, and it was preceded by dizziness and palpitations.Doppler echocardiographic examination showed a mildly increased velocity across the LVOT and mitral valve systolic anterior movement.A left ventricular septum biopsy revealed the presence of significant interstitial amyloid deposits.After the diagnosis was established, We discharged her in stable condition for outpatient follow-up.
Discussion: Amyloidosis is a rare condition characterized by extracellular deposition of protein fibers, the so-called amyloids. The target organs for amyloid deposits are especially the kidney, heart, nerves, gastrointestinal tract and liver. The diagnosis of systemic AL amyloidosis with myocardial involvement is based on echocardiography. Frequently, wall thickening is incorrectly referred to as hypertrophy which may potentially lead to the wrong diagnosis of hypertensive heart disease or hypertrophic cardiomyopathy.
References:
1. World J Clin Cases. 2019 Mar 26;7(6):742-752. doi: 10.12998/wjcc.v7.i6.742. Cardiac amyloidosis: A case report and review of literature.
2. Case Report - Interventional Cardiology (2017) Volume 9, Issue 5 View PDF. Download PDF Cardiac amyloidosis: case report.
3. Tex Heart Inst J. 2009;36(1):50-4. Syncope from dynamic left ventricular outflow tract obstruction simulating hypertrophic cardiomyopathy in a patient with primary AL-type amyloid heart disease.
Learning points: Cardiac Amylodosis is associated with a severe AS in rare cases. We must suspect cardiac amyloidosis post operative systolic anterior movement and preoperative left ventricular outflow tract obstruction.

5138

Severe frailty syndrome – risk factor for delirium after transcatheter aortic valve implantation (TAVI)

Kupiec A.[1], Kozera N.[1], Protasiewicz M.[1], Gozdzik W.[1]
[1]Wroclaw Medical University - Wroclaw (Poland)

Background and Goal of Study: Postoperative delirium (POD) is one of the most common complication after cardiac surgery. Transcatheter aortic valve implantation (TAVI) in recommended for patients at high surgical risk, especially for the elderly. This population is particularly at high risk of POD due to advanced age and possible co-occurrence of frailty syndrome. The aim of the study was to evaluate the influence of frailty syndrome and comorbidity on POD occurrence after TAVI.
Materials and Methods: We retrospectively analysed the medical history of 66 patients who underwent TAVI procedure between 01.2018 and 10.2019 at Wroclaw University Hospital. Delirium was diagnosed according to DSM V criteria. Frailty syndrome was identified using 36-item frailty index. (1) Medical comorbidity was measured using Charlson comorbidity index (CCI).
Results and Discussion: All TAVI procedures was transfemoral under general anaesthesia. Of 62 patients enrolled to the analysis, 33,8% (n=21) developed POD. There was no significant difference between age (mean 79,3 vs 79,2, p=0,8) and gender. Higher preoperative comorbidity was not associated with POD (median CCI was 6 vs 5, p=0,25). Mild frailty was diagnosed in 17,7% patients (n=11) and moderate frailty in 54,8% (n=34). Severe frailty was diagnosed in 27,4% (n=17) and it was associated with development of POD (p=0,007). (figure 1)
Conclusion: Preoperative diagnosis of frailty syndrome may help to identify patients at particularly high risk of POD and apply prevention treatment.
References:
1. Clegg A, Bates C, Young J et al. Development and validation of an electronic frailty index using routine primary care electronic health record data. Age Ageing. 2016 May;45(3):353-60.

5674

Treatment of concurrent mitral and aortic para prosthetic valve leaks using a percutaneous approach with transesophageal echocardiography guidance

Flaczyk A.[1], Ramadan R.[2], Kinlay S.[2], Zenati M.[2], Zorca S.[2], Shapeton A.[2]
[1]Massachusetts General Hospital - Boston (United States), [2]Veterans Affairs Boston Healthcare System - Boston (United States)

Background: Symptomatic heart failure secondary to paravalvular leak (PVL) is an uncommon complication of bioprosthetic valve replacement. Patients deemed high risk for open repair who failed medical therapy may undergo a transcatheter approach under fluoroscopic and transesophageal echocardiography (TEE) guidance using an Amplatzer (AVPII) occlusion device. Here we present a case of a two-stage two-valve procedure where aortic and multi-orifice mitral PVLs were successfully corrected with the aid of TEE guidance.
Case Report: A 67-year-old male 6-weeks post aortic and mitral bioprosthetic valve implantation presented with symptomatic heart failure secondary to severe mitral and aortic PVLs. On TEE, two discrete areas of mitral PVL were identified. Initial deployment of a 14mm AVPII resulted in obstructed mitral valve opening. With real-time 3D TEE guidance, two AVPIIs were placed in independent orifices, with substantial improvement in PVL with no impact on mitral valve function (Fig1). The aortic defect was successfully repaired the following day using two additional AVPII devices.
Discussion: Limited data exist comparing best medical treatment of PVL with surgical or percutaneous repair in symptomatic patients1. Transcatheter PVL closure is less invasive than surgical repair, however, it is technically demanding and requires the use of off label devices, a lengthy general anesthetic and high-quality TEE guidance. A meta-analysis of single valve repairs in 362 patients determined the success rate to be 73.7 and 84.1% with mitral and aortic PVLs, respectively2. However, no data exists on the outcomes following bi-valve PVL repair.
References:
1. Genoni M et al. Paravalvular leakage after mitral valve replacement: Improved long-term survival with aggressive surgery? Eur J Cardiothorac Surg 2000;17(1):14.
2. Millan X et al. Transcatheter reduction of paravalvular leaks: a systematic review and meta-analysis. Can J Cardiol 2015;31(3):260.
Learning points: Multi-valve PVL in high-risk patients presents a unique challenge. TEE guidance can help guide the effective deployment of Amplatzer devices despite difficult approaches and the presence of multiple PVL orifices.

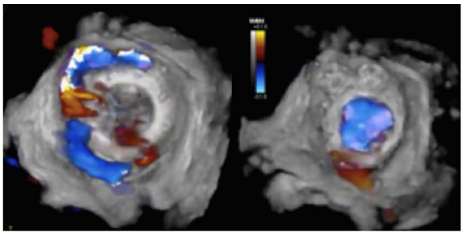


Figure 1: Mitral valve pre (left) and post (right) Amplatzer device deployment

5574

Transcatheter mitral valve repair: a percutaneous approach to severe mitral regurgitation

Muriedas Alfonso F. D. J.[1], Galeano Solís C.[1], Manzano Rodríguez A.[1], Carmona Prieto M.[1], Martínez Caridad J.[1], García Fernández J.[1]
[1]Puerta de Hierro Universitary Hospital - Majadahonda (Spain)

Background and Goal of Study: Mitral regurgitation (MR) is a common heart valve pathology with high morbimortality rates unless accurate treatment is given. Over the past few years, percutaneous techniques have become an important alternative to surgery in severe MR. Multiple treatment options are availale for sytomathic moderate-severe or severe MR: medical treatment, open surgery and transcatheter mitral valve repair (Mitraclip®). Mitraclip is foremost applicable to high surgical risk patients. It is a device that enables the approach of mitral valves with one or more clips, reducing MR area. The main objetive of this study is to evaluate effectiveness and security of this technique in our hospital, attending to MR area reduciton and complications rate.
Materials and Methods: We collected every Mitraclip placed in mitral position in our hospital since April 2018 to September 2019. Mean age, gender, mean ejection of left ventricle (MELV) were recorded. We measured MR area before and after the clip placement, classifying it in four degrees: mild, moderate, moderate-

severe and severe. Duration of the technique (minutes), length of stay (days) and different complications (valve damage, mitral stenosis, infection or endocarditis, clip embolization, stroke) were also recorded.
Results and Discussion: Mean age was 67,6 ± 9,1 years, 90% (27) were men. Before Mitraclip placement, all patients presented severe MR with mean ejection fraction of left ventricle 32 ± 12%; after the technique, 56,6% (17 patients) presented mild MR, 36,6% (11) presented moderate MR, and 3,3% (1) severe MR. 6,6% (2 patients) suffered mitral damage; 3,3% (1) required cardiac surgery with mitral valve replacement; 3,3% of patients suffered mitral stenosis after Mitraclip placement. No cases of clip embolization, endocarditis or stroke were recorded. Average duration was 157 ± 66 minutes and length of stay, 6 ± 6.1 days. As we can see in this study, almost every patient reduced MR degree, with small rate of complications. As these patients are high risk patients (porcelain or highly calcified aorta, patient frailty, severe pulmonary hypertension and severe liver disease), it seems a very good alternative to surgery.
Conclusions: It seems that Mitraclip represents an effective and secure therapeutic option for patients with severe mitral regurgitation and high surgical risk.

5960

Chylothorax and chylopericardium after aortic valve replacement

Mirón Alonso P.[1], Park S. H.[1], Veiras Del Rio S.[1], Otero Castro F. P.[1], Alvarez Escudero J.[1]
[1]University Hospital of Santiago de Compostela - Santiago de Compostela (Spain)

Background: Both chylothorax and chylopericardium are rare but severe complications of cardiac surgical procedures. They may be caused by an injury in the thoracic duct or its tributaries and result in a substantial increase in morbidity and mortality.
Case Report: We report a case of a 58-year-old male patient diagnosed with severe aortic stenosis who underwent scheduled metallic valve replacement. During his immediate recovery in our perioperative intensive care unit we observed. Pleural effusion had a milky-serous appearance so differential diagnosis was made between chylothorax, empiema and Dressler syndrome. Pleural fluid analysis was assessed for cell count, glucose, LDH, total protein, triglyceride and cholesterol, cytology and microbiologic culture. A concentration of tryglicerides of 264mg/dl and colesterol/triglyceride ratio of <1 cought our attention. Initial treatment consisted in medium chain triglycerides diet with total parenteral nutrition and the maintenance of chest drains. Due to favorable evolution the patient was discharged to cardiac surgery ward, where he newly developed dyspnea and hypotension within a period of 10 days. A TTE was performed with the diagnosis of pericardial effusion. The patient underwent reesternotomy to evacuate the chylopericardium and search for its origin to control it. Thereafter, he had a favorable evolution until his full recovery.
Discussion: Chylothorax and chylopericardium are infrequent complications but severe enough to always have them in mind making our differential diagnosis. Their presence is suggested by a milky opaque effusion with laboratory findings including a trygliceride level >500mg/dL, colesterol/triglyceride ratio of <1, negative cultures and cytology, lymphocyte predominance and fat globules. Initial treatment depends on the presence of symptoms. In the absence of clinical symptoms, dietary modifications sometimes associated with off-label use of somatostatin would be enough. Refractary effusions will require surgical therapy to prevent cardiac tamponade, dyspnea or malnutrition.
Learning points: Chylopericardium and chylothorax are rare complications of cardiothoracic surgery, associated with significant morbidity and mortality; prompt diagnosis and treatment are of critical importance. The diagnosis is confirmed following pericardial and thorax fluid analysis. Surgical treatment should not be delayed in symptomatic patients.

6105

State of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction with cardioprotection by electrical fibrillation and intermittent aortic clamping

Sharlai K.[1], Kharenko Y.[2], Khartanovych M.[2]
[1]Kharkiv National Medical University - Kharkiv (Ukraine), [2]Heart Institute Ministry of Health of Ukraine - Kiev (Ukraine)

Background and Goal of Study: The aim of the work is to analyze the state of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction with cardioprotection by electrical fibrillation and intermittent aortic clamping.
Materials and Methods: We examined 45 patients with mitral valve insufficiency admitted to the Heart Institute Ministry of Health of Ukraine for surgical correction of the defect. All patients underwent an operation of mitral valve replacement, and the local protocol of the protection of myocardium was performed by applying electrical cardiac fibrillation and intermittent clamping of the aorta. Patients were fixed at the end of cardiopulmonary bypass, before being transferred to (intensive care unit) ICU, after leaving ICU the end systolic, end diastolic and stroke index (EDI, ESI, SI) of the left ventricle, left ventricular ejection fraction (EF), cardiac index (CI), systolic pressure in the pulmonary artery (PPAs) and global longitudinal myocardial strain (GLS).
Results and Discussion: The EDI was not statistically significantly altered during the study. At the stages of the study, the ESI gradually decreased and, before being transferred from an ICU, became significantly lower than the baseline ($p < 0.03$), although such dynamics did not affect the SI. The EF at the end of cardiopulmonary bypass was unreliable ($p > 0.3$) increased to 53.6 ± 4.1% and then remained almost at the same level: 53.2 ± 5.4% before being transferred to the ICU and 54.2 ± 6, 2% before transfer from ICU. The GLS module at the end of cardiopulmonary bypass significantly ($p < 0.003$) decreased to 7.9 ± 0.8%, then gradually returned to the previous level. PPAs after correction of the defect and at the end of cardiopulmonary bypass significantly and significantly decreased to 36.8 ± 2.6 mm Hg. ($p < 0.0001$), further, before transferring to the ICU, it became still significantly ($p < 0.004$) lower. All CI changes during the study were unreliable.
Conclusion: These indicators indicate that the cardioprotection method used did not have a negative effect on myocardial contractility and central and intracardiac hemodynamic parameters.

6142

State of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction using crystalloid cardioplegia in the perioperative period

Sharlai K.[1], Kharenko Y.[2], Khartanovych M.[3]
[1]Kharkiv National Medical University - Kharkiv (Ukraine), [2]Shupyk National Medical Academy of Postgraduate Education - Kiev (Ukraine), [3]Heart Institute Ministry of Health of Ukraine - Kiev (Ukraine)

Background and Goal of Study: The purpose of our work was to study the state of intracardiac and central hemodynamics in patients with mitral valve insufficiency during surgical correction using crystalloid cardioplegia in the perioperative period.
Materials and Methods: We examined 40 patients with mitral valve insufficiency admitted for surgical correction of the defect. Patients underwent therapy and surgery (mitral valve replacement). Patients were fixed at the end of cardiopulmonary bypass, before being transferred to (intensive care unit) ICU, after leaving ICU the end systolic, end diastolic and stroke index of the left ventricle, left ventricular ejection fraction, cardiac index, systolic pressure in the pulmonary artery and global longitudinal myocardial strain.
Results and Discussion: The left ventricular ejection fraction at the exit from the cardiopulmonary bypass decreased to 50.7 ± 5.2% ($p = 0.09$ compared with the initial level). Then it increased insignificantly: to 51.7 ± 5.0% before transferring to intensive care unit and to 52.4 ± 5.8% ($p > 0.7$ compared to baseline) after transferring from intensive care unit. The global longitudinal myocardial strain module after correction of the defect and withdrawal from cardiopulmonary bypass significantly decreased from - 12,4±0,8 % to - 11,3±0,7 ($p < 0.001$) and then did not significantly change statistically until the end of the study being transferred from intensive care unit - 11,7±1,1 % ($p < 0.005$ compared with baseline). Systolic pressure in the pulmonary artery after correction of the defect and after leaving the cardiopulmonary bypass decreased significantly and reliably to 35.8 ± 3.0 mm Hg. Art. ($p < 0.0001$) and then not significantly changed (35.3 ± 2.8 mm Hg. before transferring to intensive care unit and 35.1 ± 2.7 mm Hg. before transferring from intensive care unit). Despite this, the integral indicator of the circulatory system -

cardiac index - was below 2.5 l / min · m2 in only 5 (12.5 ± 5.2%) patients, while not being below 2.2 l / min · m2, which was due to a compensatory increase in heart rate (maximum - up to 96 min 1) and the appointment of sympathomimetic therapy.
Conclusion: Surgical correction was accompanied by the greatest changes in global longitudinal myocardial strain, systolic pressure in the pulmonary artery and left ventricular ejection fraction at the exit stage of cardiopulmonary bypass.

6265

Systolic anterior motion after mitral valve reconstructive surgery in non obstructive hypertrophyc cardiomyophaty

Iglesias Guitián R.[1], Cabrera M.[1], Amaro P.[1], García Ortega R.[1], Aragonés L.[1], Alvarez Rementeria R.[2]
[1]Fundación Jiménez Díaz - Madrid (Spain), [2]Fundacion Jiménez Díaz - Madrid (Spain)

Background: Systolic anterior motion (SAM) of the mitral valve refers to the paradoxic movement of the anterior leaflet or chordae toward the interventricular septum during systole and it can be a life-threatening condition. The SAM is typically observed in patients with hypertrophic cardiomiophaty (HCM) or in patients following mitral valve reconstructive surgery.
Case Report: We present a case of a 42 years old men with a history of bipolar disorder a moderate psychomotor disability. Other disease were hernia hyatus and iorn deciciency anemia. The patient was scheduled for mitral valve reconstructive surgery. The relevant findings of intraoperative transesophageal echocardiography (TEE) reveal mitral valve with prolapse of the posterior leaflet with defects of coaptation that cause eccentric mitral insufficiency of wide regurgitation jet toward the atrial ceiling. There was no evidence of hypertrophic cardiomiophaty or left ventricular hypertrophy. Mitral valve repair surgery was implantation of tendon neochordae an annuloplasty. When extracorporeal circulation was discontinued severe SAM was evident by TEE (fig 1). Volemia was optimized and beta blocker was administer, the haemodynamics situation was normalized but anatomic alteration of left ventricular outflow tract persisted. Rerepair of mitral valve was decided and resection and sliding plasty of posterior leaflet was carried out. The technique performed solved the SAM (fig 2). The postoperative evolution was favourable. One month later the patient is asymptomatic with no SAM or mitral regurgitation on tranthoracic echocardiography.
Discussion: SAM rates after mitral repair vary from 4% to 8% in the literature (1). When SAM is developed early medical management (volumen loading, beta blocker therapy) usually resolve this situation and surgical intervention is not required. In our patient the decision for mitral valve rerepair was made by the clear structural alteration of the LVOT showed in TEE. As our patient has hyatus hernia and for that reason aortic flow measurements could not be made.
References:
1. Loulmet DF. J Thorac Cardiovas Surg 2014.
Learning points: SAM is a well-recognized complication after mitral valve reconstructive surgery. The absence of hypertrophic cardiomyophathy not exclude the presence of SAM.

4396

Remimazolam (CNS 7056) compared to Propofol/ Sevoflurane for anaesthetic induction - a post-hoc analysis of haemodynamic differences in a Phase II pilot trial in patients during elective cardiac surgery

Fechner J.[1], Bevilaqua C.[2], Eibel S.[3], Linke J.[4], Schippers F.[5], Probst S.[6]
[1]FAU University Erlangen-Nuremberg - Erlangen (Germany), [2]Helios Center for Cardiac Surgery - Leipzig (Germany), [3]Johannes Gutenberg-Universität - Mainz (Germany), [4]CCR Private Institute for Creative Clinical Research GmbH - Berlin (Germany), [5]PAION AG - Aachen (Germany), [6]AMEOS Clinics - Bernburg (Germany)

Background and Goal of Study: Remimazolam (CNS 7056), a benzodiazepine, is rapidly metabolized by tissue esterases (CESA1A) to CNS 7054 with a context-sensitive halftime of about 7 minutes (1). In a randomized, single-blind, Phase II pilot trial (NCT 01937767) Remimazolam was compared with Propofol/Sevoflurane (P/S) during induction and maintenance of general anaesthesia. We compared haemodynamics from anaesthetic induction (IND) until 30 min after intubation (INT).
Materials and Methods: 90 pat. scheduled for elective cardiac surgery were randomized into three treatment groups. All pat. received 0.2 mg of Fentanyl and either 2-2.5 mg/kg Propofol (P/S) or Remimazolam 6 mg/kg/h (R6) or 12 mg/kg/h (R12) for intravenous IND. For maintenance after INT P/S pat. received an infusion of Propofol for 20 min, then Sevoflurane was used. Pat. in R6 or R12 received 1-3 mg/kg/h of Remimazolam. All pat. received Remifentanil (RF). Narcotrend index (NCI), heart rate (HR) and mean arterial pressure (MAP) were monitored. To treat hypotensive episodes Norepinephrine (NE) was given at the discretion of the anaesthetist. Analysed time intervals were restricted to start of IND (0) until 30 min after INT to minimize confounding parameters. RF dose, NCI, HR, MAP, amount of fluid given and NE dose (Mean+/-SD) were compared (ANOVA, mixed model, logistic regression or Wilcoxon test, p<0.05).
Results and Discussion: All pat. were anaesthetised sucessfully. 9 pat. were excluded from further data analysis, as they had received other vasoactive drugs. Biometric data, also baseline values of NCI, HR and MAP were not different. During analysed time intervals (start of IND to 20 min and 30 min after INT) RF dose, amount of fluid and NCI were not different. MAP also was not different, but we found a highly significant difference in the total dose of NE given per KG BW (tbl.1).

Cumulative dose NE (µg/kg)	P/S (n=26)	R6 (n=33)	R12 (n=22)	P (all groups)
Start-INT+20 min	0.28+/-0.4	0.06+/-0.16	0.17+/-0.22	0.0095
Start-INT+30 min	0.59+/-0.66	0.13+/-0.3	0.27+/-0.32	0.0006

Conclusion: A significantly lower NE dose was administered when Remimazolam compared to Propofol/Sevoflurane was used for IND and maintenance in patients undergoing cardiac surgery until 30 min after INT (p=0.0006).
References:
1. Wesolowski AM et al., Pharmacotherapy 2016, 36(9):1021-7.

4746

Intravenous versus inhalational maintenance of anaesthesia on tissue oxygenation in cardiac surgery

Ozay H.[1], Demir Z. A.[2], Balcı E.[1], Bahcecitapar M.[3], Ozgok A.[1]
[1]Ankara City Hospital, Department Of Anesthesiology - Ankara (Turkey), [2]Ankara City Hospital, Department Of Anaesthesiology - Ankara (Turkey), [3]Hacettepe University, Faculty Of Science, Department Of Statistics - Ankara (Turkey)

Background and Goal of Study: The aim of this study was to evaluate the effect of total intravenous anaesthesia (TIVA) and inhalational anaesthesia techniques on tissue oxygenation. For this purpose, the effects of midazolam-based TIVA or sevoflurane-based inhalation anaesthesia maintenance on intraoperative central and peripheral tissue oxygenation parameters were compared in patients undergoing coronary bypass surgery (CABG).
Materials and Methods: Ethics Committee and written informed consent were obtained. A total of 104 adults were randomized (n=52 per group). Induction with 10 µgkg-1 fentanyl,0.15mgkg-1 midazolam,0.8 mgkg-1 of rocuronium were performed. During the anesthesia maintenance of groupTIVA,3µgkg-1fentanyl,0.01-0.05mgkg-1midazolam,0.2mgkg-1rocuronium were applied throughout the operation to keep BIS40-60, in every 30-45min.In SEVOgroup,2-3%sevoflurane,3µgkg-1fentanyl,0.2 mgkg-1 rocuronium were applied with BIS guidance. During CPB, sevo vaporizer designed for the pump was used. Cerebral and left forearm NIRS values, central jugular and left forearm venous oxygen saturations were recorded. Measurement periods were: T1;5min after anesthesia induction, T2; after the cannulation, T3; at the 10th min of cardiopulmonary bypass (CPB),T4;10min after cross removal,T5;10 min afterCPB,T6;sternum closing.
Results and Discussion: Demographic data were similar in both groups. Forearm NIRS values were higher in SEVO group (2nd,3rd,6th measurement periods p=0.029,0.028,0.032). Forearm venous oxygen saturations were not found significantly different between the groups, although it was observed higher in the sevo group. Central venous oxygen saturation in SEVO group, were significantly higher in the 2nd, 3rd,4thperiods, compared to TIVA (p=0.019, 0.006, 0.045). In both groups, the right-left cerebral NIRS values did not differ from the other. In the SEVO group, extubation time was significantly shorter (9.58±5.39;7.95±4.66). ICU and hospital stay were not different between the groups.
Conclusion: Concomitant with advances in anesthetic methods, there have been efforts to elucidate the nonanesthetic effects of anesthesia drugs, focusing on the adequacy of organ perfusion. The effects of midazolam-based TIVA and sevoflurane-based inhalation anesthesia maintenance on intraoperative central and peripheral tissue oxygenation parameters were compared in patients undergoing CABG, and it was found that sevoflurane-based anesthesia provides more ideal tissue oxygenation than TIVA.

4963

Total IntraVenous Anesthesia (TIVA) for Epicardial Ablation in a Brugada Syndrome Patient

Steinberg I.[1], Ferrero D.[2], Trompeo A. C.[2], Pasero D.[2], Brazzi L.[1]
[1]University of Turin - Torino (Italy), [2]A.O.U. Città della Salute e della Scienza di Torino - Torino (Italy)

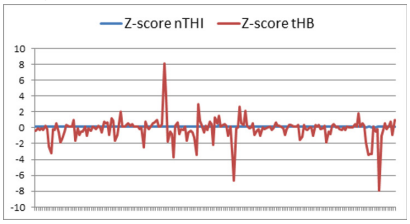
Background: Brugada syndrome (BrS) is a channelopaty associated with sudden cardiac death. Drugs used for induction and maintenance of general anesthesia (GA) have been reported to produce Brugada-like EKG and ventricular arrythmia (VA). Propofol is listed as drug best to avoid but reports describe its use in controlled dosage for induction (1). One case describes its use for TIVA for emergency appendectomy (2).
Case Report: Our patient was a 45y male scheduled for epicardial ablation due to BrS. In order to maintain patient's immobility and regular breathing, as requested by cardiologists, patient gave consent for GA. Monitoring 12 lead EKG, IBP, SpO2, etCO2 and BIS, GA was induced with Midazolam 1,5 mg, Thiopental 2,5 mg/kg, Remifentanil 0,25 γ/kg/min and Rocuronium. Failure of the ventilator led to use a backup that was not equipped for vaporizing anesthetic gas. Therefore, remaining within current best practice borders (3) GA was maintained with Propofol 2,5 mg/kg/h and Remifentanil 0,15-0,2 γ//kg/min to achieve BIS between 60 and 40. Vitals were monitored and arterial blood gas analysis performed every 30 minutes to detect metabolic abnormalities. The procedure was successfully completed in 120min.
Discussion: To the best of our knowledge this is the first documented TIVA with propofol during epicardial ablation with ajamaline injection to induce arrhythmias. Warnings against Propofol are based on description of Brugada-like EKG followed by VA in patient receiving high dosage of the drug and clinical reports of VA in patient with known BrS receiving propofol with no record of dose (2). In this case, the short procedure and the use of a different drug for induction allowed to conduct a TIVA with low total dosage of propofol. No arrhythmogenic effect was observed except those evocated intentionally with ajmaline. No VA occurred despite two best to avoid drugs.
References:
1. G.Ciconte et al., JACC Clin. Electrophysiol. 4, 518–530 (2018).
2. S.-Y. Lee, C. Park, M.-Y. Kim, S. Park, Y. S. Bang, Korean J. Anesthesiol. 65, S65 (2013).
3. G. Dendramis et al., Am. J. Cardiol. 120, 1031–1036 (2017).
Learning points: There is increasing evidence of Propofol being used in low dose in BrS patient. In this particular case 12 lead EKG was monitored for the procedure so any alteration would have been noticed. This case adds to the evidence in favor of propofol being safe in low dose under close monitoring in patient with BrS.

4968

Incongruous effect of phenylephrine on changes in cerebral blood volume measured by near-infrared spectroscopy indicating extracranial contamination

Vandermeulen J.[1], De Hert S.[1], Moerman A.[1]
[1]Ghent University - Ghent (Belgium)

Background and Goal: Near-infrared spectroscopy (NIRS) enables noninvasive monitoring of cerebral blood volume and oxygenation. However, concerns have been raised about extracranial contamination of the signal. We aimed to assess the occurrence of extracranial disturbance of the NIRS signal during administration of phenylephrine (PE). The study is performed with NIRO 200NX (Hamamatsu, Japan) which employs both the original Modified Beer-Lambert (MBL) method to measure concentration changes in total hemoglobin (tHb, expressed in μM), and the Spatially Resolved Spectroscopy (SRS) method to measure the total hemoglobin content (nTHI, expressed in arbitrary units). Although both parameters generally provide concordant values, SRS has a higher cerebral specificity and tends to not be affected by extracranial blood flow. We hypothesized that extracranial contamination of NIRS values is plausible when PE induces more pronounced changes in MBL than in SRS.
Materials and Methods: After ethical committee approval, 20 consenting patients undergoing cardiac surgery with extracorporeal circulation were included. Two NIRO sensors were placed bilaterally on the forehead for continuous registration of nTHI and tHb. PE was administered when clinically indicated. Posthoc, the means of 15 values just before and 90 seconds after each administration of PE were calculated. To adjust for the difference in raw scale units, Z-scores were calculated. The nTHI and tHb values pre- and post-PE, and the differences between nTHI and tHb were analysed with paired and unpaired t-test, respectively.
Results and Discussion: A total of 191 data sets were obtained in 20 patients (10 male, 65±15 yr, 77±16 kg, 166±11 cm). Both nTHI and tHb decreased significantly after administration of PE (respectively, from 0.95±0.19 to 0.94±0.16 (p<0.001), and from -5.12±8.90 to -5.84±8.96 (p<0.001). The SRS and MBL values differed significantly (0.16±0.02 and -0.16±1.40, for SRS and MBL, respectively, p<0.001), with a higher variability in the Z-scores of tHb.



Conclusion: The results indicate that NIRS might be prone to extracranial contamination. SRS is probably more reliable than MBL after administration of PE.

5328

Preoperative predictors of immediate hypersensitivity reactions in cardiac surgery

Akselrod B.[1], Gubko A.[1], Menshih N.[1], Goncharova A.[1], Vachnadze D.[1]
[1]Russian Research Center of Surgery - Moscow (Russia)

Background and Goal of Study: Anesthesia care in cardiac surgery is often associated with elevated risk of immediate hypersensitivity reactions (IHR) due to application of various drugs, such as heparin, protamine, etc. Despite many publications concerning evaluation of IHR risk there's still no consensus about causes of increase in IHR. The goal of a study is to identify predictors of IHR reactions in cardiac surgery.
Materials and Methods: The study included 740 cardiac surgery patients. We evaluated 37 factors, which were considered as potential predictors. Logistic regression was used with calculation of odds ratio (OR), 95% confidence interval (95% CI) and significance level (p) for each factor to determine the prediction model of the development of immediate hypersensitivity reactions. These factors were considered as predictors of immediate hypersensitivity reactions at p-value < 0.05. Sensitivity, specificity and significance level were determined for quantitative variables using ROC analysis.
Results and Discussion: Risk factors of immediate hypersensitivity reactions are previous allergic events (OR 2.96 (1.68—5.23), p=0.00019), in particular hypersensitivity reactions to food products (OR 4.61 (1.74—12.18), p=0.0021), local anesthetics (OR 5.26 (1.59—17.42), p=0.0066), NSAIDs (OR 4.37 (1.36—14.08), antibiotics (OR 2.54 (1.07—6.01), previous blood components transfusion (OR 3.74 (1.18—11.79), p=0.025). Unreliable factors of immediate hypersensitivity reactions were anaphylaxis (OR 1.25 (0.28—5.49), p=0.77), contrast allergy (OR 2.96 (0.82—10.76), p=0.099), use of beta-blockers (OR 0.74 (0.42—1.3), p=0.29), use of angiotensin converting enzyme inhibitors (OR 0.52 (0.25—1.09), p=0.084), asthma (OR 1.13 (0.14—8.93), p=0.91), coronarography (less then 3 days before surgery) (OR 1.29 (0.53—3.15), p=0.57), allergic rhinoconjunctivitis (OR 1.47 (0.33—6.57), p=0.61) and domestic allergy (OR 1.13 (0.26—4.94), p=0.87).
Conclusion: Patients with known previous allergic reactions to drugs and food products should be evaluated more precisely. Identifying risk factors of IHR can be necessary to develop the allergic prophylaxis guidance protocol.

5404

Comparison of the effects of dexmedetomidine and remifentanil used in cardiac surgery on dynamic thiol-disulphide homeostasis

Izgi M.[1], Basaran B.[2], Bayir T.[3], Akca B.[1], Celebioglu B.[1]
[1]Hacettepe University School of Medicine Department of Anaesthesiology and Intensive Care - Ankara (Turkey), [2]University of Health Sciences, Konya Education and Research Hospital Clinics of Anaesthesiology and Intensive Care - Konya (Turkey), [3]Ankara University Faculty of Veterinary Medicine Department of Biostatistics - Ankara (Turkey)

Background and Goal of Study: Thiols are organic compounds containing the sulphydryl group and have antioxidant effect on dynamic thiol-disulphide homeostasis (DTH). Paraoxonase-1 (PON-1) has an antioxidant effect on DTH, similar to thiol. Remifentanil and dexmedetomidine used to increase the depth of anesthesia and provide hemodynamic stability during cardiac surgery have been shown to have antioxidant effects (1). The aim of this study was to investigate the effects of remifentanil and dexmedetomidine on TDH and PON-1 as adjuvant

agents in patients undergoing coronary artery bypass graft surgery (CABG) with cardiopulmonary bypass (CPB).
Materials and Methods: A total of 100 patients undergoing CABG under elective conditions were included in the study. Induction was performed with propofol, fentanyl, and rocuronium. Sevoflurane-remifentanil (Group R) or sevoflurane-dexmedetomidine (Group D) was used for the maintenance of anaesthesia. Central venous blood samples were taken immediately after internal jugular vein catheterization (T1), immediately after cross-clamp insertion (T2), when warming of the patient started (T3), 10 minutes after completion of protamine infusion (T4) and on post-op 1st day (T5) Total thiol, native thiol, disulphide, and PON-1 levels were studied.
Results and Discussion: Demographic data of both groups were similar. Total thiol, disulphide, PON-1, native thiol/total thiol, total thiol/disulphide, and native thiol/disulphide levels were similar in all time periods measured between the two groups. Native thiol levels were found significantly higher in T3 and T5 in Group D than in Group R (p = 0.017, p = 0.027, respectively). Sevoflurane-dexmedetomidine combination is more effective than sevoflurane-remifentanil combination in preventing damage during extracorporeal circulation. In a study by Turktan et al., it was shown that the cardioprotective effect of dexmedetomidine was greater than that of remifentanil (1). The underlying cause of this effect is the protection against ischemia-reperfusion injury. Luyten et al. showed that antioxidant capacity during CPB increased contrary to expectations, but argued that the increase was lower than the increase in oxidative effect (2).
Conclusion: We think that in CABG with CPB, dexmedetomidine should be the first choice as an adjuvant.
References:
1. Türktan M et al. Turk J Med Sci (2017)47:1403-9.
2. Luyten CR et al. Eur J Cardiothorac Surg (2005)27:611-6.

5455

Long-term effect of esmolol on the coronary arteries´ structure

Martín Oropesa R.[1], Pazó L.[2], Arnalich A.[2], Solchaga I.[2], González M.[3], Quintana B.[2]
[1]Hospital Central de la Defensa Gómez Ulla - Madrid (Spain), [2]Hospital General Universitario Gregorio Marañon - Madrid (Spain), [3]Universidad Autónoma de Madrid - Madrid (Spain)

Background and Goal of Study: The morbidity and mortality associated with hypertensive patients are related to coronary remodeling. At present, several drugs have been demonstrated to be useful in the regression of ventricular remodeling after chronic treatment. Our group previously demonstrated that short-term treatment (48 h) with esmolol produces early regression on coronary artery remodeling, although the long-term effect has not been studied yet (1). The aim of our study was to show the effects of short-term treatment with esmolol (48h) on coronary arteries´ structure in an experimental model of arterial hypertension and compensated left hypertrophy. Likewise, we wanted to know if this effect might remain in the long term.
Materials and Methods: Fourteen-month-old¬ male spontaneously hypertensive rats (SHR) were randomized into 6 groups: three therapy groups with esmolol (300 µg/kg/min during 48h), one of them analyzed 48h after treatment, another one 7 days after treatment and the last one after 1 month (SHRE-48h, SHRE-7d and SHRE-1m), and three placebo groups for each therapy group (SHR-48h, SHR-7d and SHR-1m). 48 hours, 7 days and 1 month after treatment, we studied the coronary artery remodeling (geometry and composition of the left anterior descending coronary artery) using a confocal microscopy method (using the nuclear dye DAPI). Results and Discussion: The external diameter, the wall width and the cross-sectional area from coronary artery were significantly lower in the esmolol group after 48h of treatment, and these findings remained after one week and one month. Likewise, we found a decrease in the thickness, the number of muscle cells and cell density of the middle layer after 48h of treatment; these findings remained after one week and one month except the cell density that showed no changes over time.
Conclusion: Short-term treatment with esmolol significantly attenuated coronary artery remodeling. These changes remain in the long term. The next goal will be to explain why this happens.
References:
1. Quintana-Villamandos, B. et al. Early regression of coronary artery remodeling with esmolol and DDAH/ADMA pathway in hypertensive rats. Hypertens Res 39, 692–700 (2016) doi: 10.1038 / hr.2016.57.
Acknowledgments: This work was supported by a grant from FIS 16/02069 and Fondos FEDER, Spain.

5548

Impact of low-opioid anesthesia on inflammatory response and clinical endpoints in cardiac surgery: a prospective study

Maruniak S.[1], Loskutov O.[1], Druzhyna O.[1], Malysh I.[1], Kolesnykov V.[1]
[1]Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine)

Background and Goal of Study: During coronary artery bypass grafting, patients are subjected to additional risk, which is caused by both conduction of surgical treatment and pathophysiological changes in homeostasis, provoked by the action of anesthetics and cardiopulmonary bypass.
Materials and Methods: The research involved 60 patients, who had been subjected to coronary artery bypass grafting with cardiopulmonary bypass. All patients were divided into two groups: the first group (30 patients) – low-opioid scheme of anesthesia and the second group (30 patients) – standard scheme of anesthetic management. Determination of IL-6 level in the blood was conducted before and after completion of CPB by ELISA test.
Results and Discussion: Having compared values of IL-6 between investigated groups after completion of cardiopulmonary bypass, it was established that the levels of IL-6 were reliably higher by 27.51% (p=0.001) in patients of the first group compared with the results of patients in the second group. Patients in the first group had significantly less time of mechanical ventilation compared to the second group (2 h (2;3) vs 4 h (3;5), p=0.021). Low cardiac output syndrome was significantly less frequently reported in patients of the first group (10.0% vs 33.3%, p=0.028). In addition, patients in the first group had significantly less time spent in ICU (2 days (1; 3) vs 3 days (3; 4), p=0.044).
Conclusion: The using of multimodal low-opioid anesthesia was associated with significantly lower IL-6 at the end of surgery, less mechanical ventilation duration, less frequent low cardiac output syndrome and a need for catecholamines, shorter ICU stays.

5820

Successful Opioid Free Anesthesia in patients cardiac surgery, with and without cardiopulmonary bypass

Ozgok A.[1], Demir Z. A.[1]
[1]Ankara City Hospital, Department Of Anaesthesiology - Ankara (Turkey)

Background: Contemporary perioperative medicine is progressing with increasing questioning of current clinical practice. One of these is routine perioperative opioid use. An opioid-based anesthesia has been the cornerstone of intra-and postoperative management for a long time. Opioid-free anesthesia (OFA) is a technique in which non-opioid multimodal analgesics are used to provide adequate pain control in the perioperative period.The authors present 3 cases of successful implementation of an OFA regimen in cardiac surgery.
Case report: First case;a 43-year-old female patient was scheduled beating heart coronary surgery. Second case; 49-year-old male patient was listed CABGx2 with cardiopulmonary bypass (CPB).Third case: 49-year-old female patient was scheduled mitral valve replacement(MVR)with CPB. Patients had average adult weight and had no history of any disease, only MVR patient had atrial fibrillation. OFA protocol:0.25µg/kg iv dexmedetomidine was given for 10min in the preoperative period. A 50ml solution containing 50µg dexmedetomidine, 50mg ketamine, 500mg lidocaine was prepared. Just before induction,1ml/10kg/10min infusion was performed from this solution. Then anesthesia was induced with propofol-rocuronium. For maintenance, this solution was continued throughout the operation by reducing the dose to 1ml/10kg/h and sevoflurane was administered with BISguidance.50mgketamine was added just before surgery.1.5g magnesium was given before CPB.1g paracetamol was given during sternum closing. Local anesthesia was performed with bupivacain in the chest drain regions of our patients. At the end of the operation, solution dose was reduced to0.5ml/10kg/h and continued in postoperative period. Paracetamol was administered every6-8h for first 24h.When the VAS score was over4, contramal1mg/kg was administered. Only, the 2nd patient needs 2 times contramal. The patients were extubated within 2-3h. NSAID was not administered due to not convenient for cardiac surgery. Patients were successfully discharged from ICU and hospital.
Discussion: Cardiac surgery patients experience pain in many places, including sternotomy, drainage tubes, vascular access sites, saphenous graft harvest sites. If there is no efficient pain control, sympathetic activation occurs in this vulnerable patient population and may cause unstable hemodynamics, increased O2 demand.
Learning points: Our cases show that OFA technique can adequately control pain, provide effective hemodynamic stability in cardiac surgery.

5880

Open abdominal aortic aneurysm repair surgery conducted using an opiod free anaesthesia (OFA) protocol

Kalogiannis E.[1], Danassi D.[1], Fotopoulou G.[1], Pantazopoulos C.[1], Ntoka P.[1], Lampadariou A.[1]
[1]Laiko General Hospital of Athens, Greece - Athens (Greece)

Background: The implementation of an OFA protocol in a patient undergoing an open abdominal aortic aneurysm repair surgery. The patient had already been undergone an EVAR operation in the past when a 8 cm aortic aneurysm was diagnosed. Due to a type 1 endoleak an open abdominal approach was considered mandatory. The patient was also treated for coronary disease-10 years ago he had experienced a STEMI and was submitted to CABG surgery. The preoperative echocardiogram was normal with a preserved LV function (LVEF>55%).
Case Report: We present the case of a 69 year old male with a medical istory of ischaemic heart disease. He was admitted for an open abdominal aortic aneurysm surgery repair (elective). He hasn't any history of smoking, BMI=20 and spirometry values were good (FVC=98%/FV1=99%).He was on aspirin, amlodipine, valsartan, atorvastatin and metoprolol. He was considered ASA III due to the ischaemic heart disease. An OFA protocol was used.Regional anaesthetic techniques were excluded except the infiltration of the surgical wound with ropivacaine.The application of the protocol consisted of 2 stages: the preoperative and the intraoperative.In the preoperative stage, pregabalin was administered in 2 doses of 150 mg each, the night before and the day of the operation.In the intraoperative stage,both induction and maintance of anaesthesia were conducted according the OFA protocol by Mulier et al.Heart rate and arterial blood pressure were managed using esmolol,glycerine trinitrate and phenylephrine infusions titrated according to patient response.The hemodynamic monitoring was conducted using a "FloTrac" system and the depth of anaesthesia was measured using BIS. The operation lasted 4 hours, with no major comlpications. The patient was extubated and transferred to ICU. The postoperative pain was mild (VAS =6) and managed using a PCA with morphine.
Discussion: We adopted a protocol based in Mulier's technique with the exception of dexmetomidine. The main points could be compressed in sympatholysis and multimodal analgesia.
References:
1. Mulier et al, Non-opiod surgical anaesthesia, JEPU Conference,2014 / Albrecht et al, Anaesthesia 2013;68(1): 79-90 / Guinot et al. BMC Anesthesiology (2019) 19:136.
Learning points: OFA provides cardiovascular stability and adequate intraoperative stress management with minimal needs in postoperative opiods.Further evidence however is needed.

5575

Anesthetic management of a patient with peripartum cardiomyopathy in cesarean delivery

Selcuk Sert G.[1], Karadeniz U.[2], Demir A.[2]
[1]Ankara City Hospital - Ankara (Turkey), [2]Ankara City Hospital - Ankara (Turkey)

Background: Peripartum cardiomyopathy (PPCM) is a rare life-threatening cardiomyopathy of unknown cause that occurs in the peripartum period in previously healthy woman. The incidence varies widely depending on geographial region and ethnic background.
Case Report: We present a 23-year-old gravida four, parity two pregnant woman who presented to the health center with palpitation and dyspnea at the 27th week of pregnancy. Ejection fraction was 30% which was revealed by echocardiography. Pregestational ejection fraction was normal and peripartum cardiomyopathy was diagnosed and she was hospitalized. Metoprolol was given once a day. In follow up echocardiography at 31st week, ejection fraction decreased to 15-20% , left ventricular diastolic diameter was 5.5 cm, TAPSE was 1.5 cm, Systolic pulmonary arterial pressure was 28. She had increased symptoms and heart and obstetric team decided to perform a cesarean section delivery as soon as possible. Following ECG, invasive blood pressure measurement, cardiac output measurement and pulse oximetry monitoring, the patient was covered under sterile conditions and inducted with 1mg / kg ketamine, 0.1mg / kg midazolam, 1mg / kg propofol and 0.6mg / kg rocuronium. Surgery started after endotracheal intubation and delivery was performed. Dobutamine was started at 3 mcg / min due to the decrease in blood pressure from 120/70 to 86/40mm Hg and cardiac output decrease from 3.1 liters/min to 2.4 liters/min immediately after the baby emerged. At the end of the case, the patient was extubated without any complications and taken to the coronary intensive care unit. The patient, who had received a hypotensive course received 0.1g/kg/min of levosimendan and 0.1g/kg/min noradrenaline infusion during the follow-up, was transferred to the ward on the tenth day.
Discussion: General anesthesia rather than regional anesthesia could be used in delivery of the baby of a patient with PPCM and we wanted to emphasize that anesthesia management can be performed with invasive monitoring and induction of anesthesia according to the patient and cardiac condition without the need for Ecmo or left ventricular assist device could be achieved.

4877

Plasma cardiac-specific cell-free DNA concentrations confirm myocardial injury in patients with silent postoperative troponin elevation

Alekberli T.[1], Khader R.[1], Shemer R.[2], Dor Y.[2], Landesberg G.[1]
[1]Hadassah Medical Center - Jerusalem (Israel), [2]Hebrew University - Jerusalem (Israel)

Background and Goal of Study: Whether silent postoperative myocardial troponin elevation (SPTE) reresents irreversible myocardial injury is debated. We used a novel method that uses epigenetic fingerprint, to measure changes in plasma concentrations of cardiac-specific cellfree DNA (CS-cfDNA) as a marker of myocardial cell death.
Materials and Methods: High cardiac risk patients, requiring intra-arterial line (AL) for hemodynamic monitoring and at least 24 hours in the PACU or ICU after surgery undergoing major noncardiac surgery were studied. Blood samples were obtained simultanelously from the AL for hs-troponin-T (hstnT) and CS-cfDNA before surgery, one hour after surgery, at midnight, and in the morning after surgery. HsTnT was measured routinly in the hopsital's lab. Samples for CS-cfDNA were centrifuges twice and plasma was stored for later batch analyses. CS-cfDNA measurement is based on comparative methylome analysis of genomic loci that are unmethylated only in cardiomyocytes. By using specific primers, PCR and deep DNA sequencing thechnologies, the cardiac specific methilomes allow to quantify circulating CS-cfDNA derived from dying cardiac cells (1).
Results and Discussion: 117 patients were studied and they consisted of 4 goups based on their troponin results: Gr. 1 - 77 (66%) with low pre and postoperative troponin elevlas; Gr. 2 - 18 (15%) with low pre but increased troponin levels after surgery; Gr. 3 - 16 (14%) patients with high troponin leveles both pre and post surgery; and Gr. 4 - 6 (5%) with elevaed preoperative troponin levels that decreased after surgery.

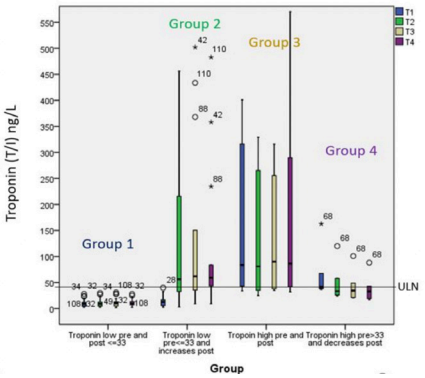


Table shows the amount of CS-cfDNA copies/ml in each group before and after surgery.

Cardiac-specific cfDNA before and after surgery in each group

	Preoperative	Postoperative	*P* value
Group 1	8.5 ± 6.5	27.6 ± 22.2	0.067
Group 2	29.7 ± 50.4	178.0 ± 215.6	0.039
Group 3	25.5 ± 178.1	179.8 ± 253.7	0.090
Group 4	53.8 ±104.4	126.1 ± 141.2	0.30

Conclusion: CS-cfDNA increases early after surgery, particularly in patients SPTE.
References:
1. Zemmour H. Nat Commun. 2018 Apr 24;9(1):1443.

5063

Remote ischemic preconditioning reduces the amounts of angiogenic proteins in human plasma and increases the numbers of Tie2 positive circulating monocytes

Fritze L.[1], Parczany K.[1], Berndt R.[1], Hummitzsch L.[1], Albrecht M.[1], Zitta K.[1]
[1]UKSH-Kiel - Kiel (Germany)

Background and Goal of Study: Remote ischemic preconditioning (RIPC) is achieved by the application of brief episodes of non-lethal ischemia and reperfusion on a limb. RIPC protects various organs from ischemic damage, but its role in angiogenesis remains unclear. The numbers of non-inflammatory resident monocytes in ischemic tissue after stroke are increased by RIPC [1] and recent work of our group suggests that cell types derived from monocytes such as PCMO and MREG also possess angiogenic potential [2] [3]. The aim of the study was to evaluate whether RIPC regulates the relative amounts of proangiogenic proteins in human plasma and if the numbers of positive proangiogenic angiopoietin receptor (Tie2) expressing monocytes is regulated by RIPC.
Materials and Methods: Ten healthy volunteers were subjected to RIPC using a blood pressure cuff inflated to >200mmHg for 3x5min on the upper arm. Peripheral blood monocytes were isolated by negative magnetic bead sorting (MACS) before RIPC (noRIPC), 3h after 1x RIPC (RIPC1) and at the end of one week of daily RIPC (RIPC7). The plasma was screened using proteome profiling arrays and the presence of Tie2 was analyzed on the surface of living monocytes by fluorescence-activated cell scanning (FACS).
Results and Discussion: RIPC1 decreased the amounts of 16/25 (64%) of angiogenic proteins in plasma. While 3/25 (24%) of the investigated factors were increased, 6/25 (12%) remained unaffected. The effect of RIPC7 was even more pronounced (76% decrease, 4% increase and 20% unaffected; Fig. A). The top five RIPC regulated angiogenic plasma proteins (RIPC1/noRIPC; RIPC7/noRIPC) were: Artemin (0.36; 0.26), PD-ECGF (0.39; 0.23), Pentraxin (0.49; 0.42), Angiopoietin 2 (0.50; 0.39) and Angiopoietin 1 (0.52; 0.41) (Fig. B). FACS analyses of circulating monocytes revealed a significant increase in the numbers of Tie2 positive monocytes after RIPC7 (RIPC7 40.63±6.93% vs noRIPC 23.70±6.05%; P<0.05).
Conclusion: Our data show that while RIPC decreases the relative amounts of most of the angiogenic plasma proteins, it increases the proangiogenic Tie2 receptor on human monocytes. Further studies have to evaluate whether RIPC has the potential to influence angiogenesis via monocytic Tie2.
References:
1. Liu, et al. CNS Neurosci Ther, 2016. 22(1): p. 43-52.2. Berndt, et al. Stem Cell Res Ther, 2018. 9(1): p. 117. 3. Hummitzsch, et al. Stem Cells Int, 2019. 2019: p. 3725863.

5204

Myocardial injury in non-cardiac surgery (MINS), a new entity with a bad prognosis. Preliminary results after two years of recruitment in a tertiary hospital

Beltrán de Heredia S.[1], Rueda M.[1], Sabaté S.[2], Recasens L.[1], Bachero A.[1], Mases A.[1]
[1]Parc de Salut Mar - Barcelona (Spain), [2]Fundació Puigvert. IUNA - Barcelona (Spain)

Background and Goal of Study: MINS is defined as a troponin value ≥30ng/L with a rise and/or fall ±20% regarding baseline due to perioperative myocardial ischemia. The goal of this study was to evaluate the incidence, characteristics and 30 postoperative (postop) day prognosis of patients who presented MINS.
Materials and Methods: Prospective single center cohort study, that included all patients over 45 years undergoing elective high cardiac risk non cardiac surgery or intermediate cardiac risk non cardiac surgery with cardiovascular risk factors from May 2017 to May 2019. Troponin was obtained at baseline, 3 hours postop and on the 1st, 2nd and 3 postop days. Follow-up was carried out until 30 days postoperatively. Dependent variables were MINS at 30 days after surgery. Mann-Whitney U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.
Results and Discussion: A total of 746 patients were recruited. Demographic and perioperative data are summarized in figure 1.

		No MINS N=587		MINS N=158		P
Demographic and preop data:						
Age (years)	Media+(IQ)	70	(63-77)	76	(69-83)	<0.0001
Gender (male)	n (%)	388	66.1	114	72.2	0.15
Physical status	n (%)					<0.0001
ASA I-II		168	28.6	14	8.9	
ASA III-IV		422	71.4	144	91.1	
Preoperative conditions:						
Preoperative haemoglobin(g/dL)	Media+(IQ)	13.3	(11.8-14.8)	12.3	(10.8-13.9)	<0.0001
Cronic kidney disease	n (%)	108	18.4	67	43.4	<0.0001
Hypertension	n (%)	396	67.6	131	82.9	<0.0001
Diabetes mellitus	n (%)	209	35.7	78	49.4	0.002
Dislipidaemia	n (%)	330	56.3	90	57	0.9
Ischemic heart disease	n (%)	141	24.4	45	28.8	0.3
Preoperative heart failure	n (%)	48	8.2	32	20.3	<0.0001
Preoperative dysrhytmia	n (%)	94	16.1	43	27.2	0.001
Peripheral artery disease	n (%)	203	34.6	72	45.6	0.012
Stroke	n (%)	108	18.4	29	18.4	1
Previous pulmonary embolism	n (%)	14	2.4	5	3.2	0.57
Perioperative data:						
Blood loss (Liters)	Media+(IQ)	200	(100-400)	300	(175-500)	<0.0001
Basal troponins	Media+(IQ)	0	(0-16)	25	(17-36)	<0.0001

Figure 1. Demographic and perioperative data:

The incidence of MINS was 21% (N=158). No differences were observed according to the type of anaesthesia (general or regional). Type of surgery with higher incidence of MINS were major vascular surgery (36/106 patients, 22.8%) and major orthopaedic surgery (30/84 patients, 19%). Patients with MINS had a higher incidence of major adverse cardiovascular events (MACCE) at 30 day postoperatively than those without MINS (24.7% MINS vs 6.9% MINS) (Figure 2).

	No MINS N= 587		MINS N= 158		P
	n	%	n	%	
MACCE 30 days postoperatively	40	6.9	38	24.7	<0.0001
Acute myocardial infarction	3	0.5	12	7.8	<0.0001
Angor pectoris	7	1.2	4	2.6	0.26
Heart failure	10	1.7	16	10.4	<0.0001
New cardiac arrhythmia	15	2.6	8	5.2	0.12
Stroke	6	1	2	1.3	0.68
Pulmonary embolism	2	0.3	2	1.3	0.20
Non-fatal cardiac arrest	0	0	5	3.2	<0.0001
Exitus	13	2.2	6	3.8	0.26

Figure 2: Cardiovascular complications at 30 days follow-up:

Conclusion: MINS is a common perioperative complication in patients over 45 years undergoing elective high cardiac risk non cardiac surgery or intermediate cardiac risk non cardiac surgery with cardiovascular risk factors. Patients with MINS have higher risk of MACCE 30 days postoperatively.

5406

Remote ischemic preconditioning affects lipopolysaccharide-induced release of inflammatory cytokines from human monocytes

Monnens J.[1], Fritze L.[1], Steinfath M.[1], Hummitzsch L.[1], Albrecht M.[1], Zitta K.[1]
[1]UKSH-Kiel - Kiel (Germany)

Background and Goal of Study: Remote ischemic preconditioning (RIPC), during which repeated episodes of non-lethal ischemia/reperfusion (I/R) are applied, has been shown to be protective against I/R injury in distant organs. Although the underlying mechanisms of RIPC are only partially understood, recent studies suggest effects of RIPC on circulating monocytes which are also involved in lipopolysaccharide (LPS) induced inflammation and sepsis [1,2]. Aim of the study was to evaluate the effects of RIPC on the LPS induced release of inflammatory cytokines from human monocytes cultured in-vitro.
Materials and Methods: 10 healthy volunteers were enrolled in the present study. RIPC was induced daily for a total of 7 consecutive days by inflating a blood pressure cuff (3x5min, >200mmHg), which was placed on the upper arm. Blood samples were obtained before RIPC (No RIPC), directly after RIPC treatment (RIPC1) and after 7 treatments (RIPC7). Conditioned (RIPC1, RIPC7) and unconditioned (No RIPC) monocytes were isolated by a standardized protocol and cultured with or without LPS (100ng/ml). After 24h, supernatants were collected and cytokine secretion was evaluated using proteome profiler arrays (A).
Results and Discussion: Incubating monocytes (No RIPC) with LPS resulted in an increased secretion of 17/105 (16%) cytokines. The release of 6/105 (6%) cytokines was reduced, whereas 82/105 (78%) cytokines were not regulated by LPS treatment. Upon the top 10 LPS up-regulated proteins, 3 cytokines, which are described to play a role in inflammation and sepsis [3], were selected: TNF-α (210-fold), IL19 (97.6-fold) and IL10 (5.3-fold) (B). While a single in-vivo treatment with RIPC was associated with an increased in-vitro cytokine secretion of 4.9-fold for IL10 and 2.5-fold for IL19 (No RIPC+LPS vs. RIPC1+LPS), a seven-day treatment resulted in an increase of 8.1-fold for IL10 and 2.9-fold for IL19 (No RIPC+LPS vs. RIPC7+LPS). The LPS induced secretion of TNF-α was not influenced by RIPC-treatment (C).

Conclusion: We could show that the in-vivo application of RIPC affects the inflammatory cytokine secretion of human monocytes in-vitro. This proposes RIPC as a possible treatment of inflammatory diseases.

References:
1. Yang, J., et al. J of Neuroscience 2019; 39: 7778-7789.
2. Guha, M., et al. Cell Signalling 2001; 13: 85-94.
3. Akdis, M., et al. J of Allergy and Clinical Immunology 2016; 138: 984-1010.

5550

Reverse myocardial remodeling following multichannel blocker by inhibiting nuclear factor of activated T-cells and improving plasmatic oxidative status

Pazó-Sayós L.[1], Gómez De Diego J. J.[2], Delgado-Baeza E.[2], Rodríguez-Rodríguez P.[3], González M. C.[3], Quintana-Villamandos B.[4]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [2]Instituto de Investigación Sanitaria Gregorio Marañón (IiSGM) - Madrid (Spain), [3]Physiology Department, Faculty of Medicine, Universidad Autonóma de Madrid - Madrid (Spain), [4]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: Left ventricular hypertrophy (LVH) is a problem in the clinical setting. Dronedarone is an antiarrhythmic agent that was recently approved for the treatment of atrial fibrillation. However, its effect on regression of LVH have not been reported. We tested the hypothesis that administration of dronedarone induces regression of LVH by inhibiting nuclear factor of activated T-cells (NFATc4) and attenuating plasmatic oxidative stress.
Materials and Methods: Ten-month-old male SHRs were randomly assigned to an intervention group (SHR-D), where animals received dronedarone treatment for a period of 14 days, or to a control group (SHR) where rats were given vehicle. A third group with normotensive control rats (WKY) was also added. At the end of the treatment we studied the cardiac structure and function using transthoracic echocardiogram, cardiac metabolism using the PET/CT study and size of myocyte by histological analysis. After treatment, a new biomarker of plasmatic oxidative stress was studied, and then left ventricular tissue was processed for Western blot analysis.
Results and Discussion: SHR-D rats showed statistically significant lower values in comparison to SHR group for left ventricular mass, glucose myocardial uptake and size of myocytes. There were no significant differences in the E/A ratio or ejection fraction. Dronedarone showed decreased levels of p-NFATc4, p-ERK1/2 and p-AKT compared to SHR and decreased protein thiolation index. All these values obtained in SHR-D rats were similar to the values measured in the normotensive WKY control group.
Conclusion: In the present study we show that short-term administration of dronedarone reversed LVH in SHR by downregulation NFATc4/ERK/AKT pathway and decreased of thiol-specific oxidative stress. If the results of this study are confirmed in humans, this effect should be very interesting in clinical practice in patients with atrial fibrillation and LVH induced by chronic hypertension.
Acknowledgments: Study financed by the Health Research Fund FIS PI16/02069 and Fondos FEDER.

5757

The effect of retrograde autologous priming method on intraoperative global tissue oxygenation in open cardiac surgery

Demir Z. A.[1], Balci E.[1], Aykut A.[1]
[1]Ankara City Hospital , Department Of Anaesthesiology - Ankara (Turkey)

Background and goal of the study: Nowadays, the management of the cardiopulmonary bypass(CPB) has been focusing on countering the high incidence of blood transfusion, and the problem of acute haemodilution, induced by the addition of the priming volume. Studies have demonstrated the efficacy of retrograde autologous priming(RAP) in the reduction of blood transfusion requirement. The main purpose of this prospective observational study, was to investigate the impact of RAP on the intraoperative global tissue oxygenation. The second aim was to evaluate intraoperative blood transfusion requirement.
Materials and Methods: Elective 108 patients scheduled for cardiac surgery were randomly divided into liberal & RAPgroups. The RAPgroup was treated with CPB using RAP, while the liberal group was treated with conventional CPB. The intraoperative time course of oxygen delivery (DO2), consumption (VO2) were evaluated. As surrogate markers of oxygen balance, the central venous oxygen saturation (ScvO2), venoarterial PCO2 difference (PvaCO2),lactate were investigated. Parameters were recorded at 3 timepoints (after anesthesia induction, at the lowest temperature during CPB, sternum closing).
Results and discussion: RAP was used in 58patients and compared with 50liberals. Demographic-perioperative data were similar in both groups. Intraoperative global tissue oxygenation parameters;DO2,VO2,ER,ScvO2,PvaCO2,lactate were not different between the groups. However, erythrocyte (ES) transfusion and diuretic medication requirements were significantly higher in the liberal group compared the RAPgroup (p=0.043,0.046,respectively).Although more ES transfusions were performed in liberal group, hemoglobin values were significantly lower during the measurement periods (p<0.001).There was no difference between the groups in terms of postoperative complications and mortality.
Conclusions: RAP is an effective adjunct to decrease the EStransfusion, however,no effect on intraoperative oxygenation parameters was observed. Since DO2,VO2,ERparameters are numerical calculations, increase in hemoglobin value by RAP or EStransfusion may result in similar results.ScvO2,PvaCO2,lactate were not affected by the administration of RAP or transfusion in the acute intraoperative period, but possibly the adverse effects of transfusion or positive effects of RAP could be observed if they were followed up postoperatively or longer. To our knowledge, there is no study in the literature that investigated tissue oxygenation during RAP.

5822

Downregulation of ketone body catabolism exacerbate cardiac ischemia-reperfusion injury under obesity

Deng Y.[1], Xie M.[1], Ou W.[1], Li T.[1]
[1]West China Hospital of Sichuan University - Chengdu (China)

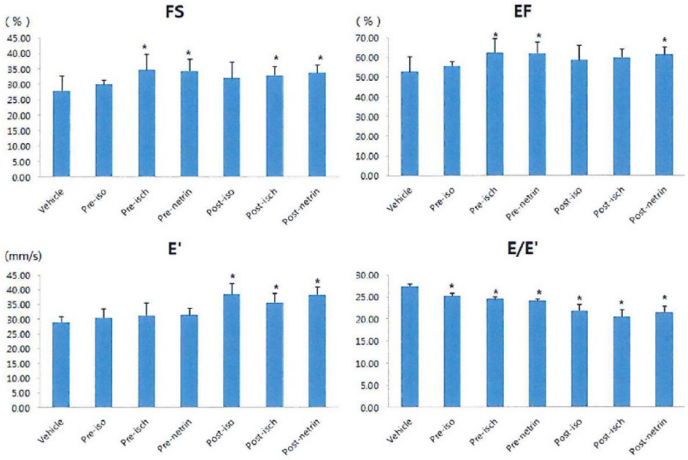
Background and Goal of Study: Epidemiological studies indicate that obesity is a high risk factor for cardiovascular disease. Ketone body β-hydroxybutyrate (β-OHB) is produced in the liver and serves as an alternative energy source for the extrahepatic tissues during nutrient deprivation. Recent studies show that the heart increases reliance on β-OHB as an alternative energy source during hypertrophy and heart failure. However, whether this cardiac fuel switch happened in obese mice and the impact on acute stress are unclear. Therefore, this study was designed to investigate the cardiac β-OHB metabolic profile and explore the role of β-OHB in myocardial ischemia-reperfusion (I-R) injury under obesity.
Materials and Methods: Three-month-old male mice of SV129 background were fed with either chow diet or high-fat diet (HFD, D12492, Research Diets) containing (kcal) 20% protein, 20% carbohydrate and 60% fat for 12 weeks. The in vivo I/R insult was induced by 30-min left anterior descending coronary artery (LAD) ligation and 24-h reperfusion. For carbon-13 (13C) nuclear magnetic resonance (NMR) spectroscopy, isolated mouse hearts were perfused with 13C-labeled mixed-substrate KH buffer ([2,4-13C2] β-OHB, [U-13C] mixed long-chain fatty acids, lactate, glucose and insulin).
Results and Discussion: With a more rapid increase of body weight, the mice under HFD developed glucose intolerance within 3 months (Figures 1A-1C). Also, the HFD-fed mice were sensitive to in vivo cardiac I-R injury, as evidenced by reduced ejection fraction and a larger infarct size (Figures 1D and 1E). By performing carbon-13 (13C) isotopmer analysis of tissue extracts by nuclear magnetic resonance (NMR), we found a significant reduction of β-OHB oxidation in the heart from the HFD-fed mice (Figures 1F). This decreased β-OHB utilization was companied with a downregulation of protein abundance of β-hydroxybutyrate dehydrogenase 1 (BDH1), the enzyme that catalyzes the first step of β-OHB catabolism in mitochondria. Besides, the expression of other ketolytic enzymes succinyl-CoA:3-ketoacid CoA transferase (SCOT) and acetyl-CoA acetyltransferase 1 (ACAT1) remained unchanged.
Conclusion: Together, these data indicate an exacerbated cardiac I-R damage under obesity, which is associated with a BDH1-mediated suppression of β-OHB utilization.

5852

Conditioning with netrin-1 in Acute myocardial infarction model of rat improves diastolic left ventricular dysfunction

Song S.[1], Kim S.[1], Woo S. J.[1], Jeong M.[1]
[1]Daegu Catholic University Medical Center - Daegu (South Korea)

Background and Goal of Study: To evaluate the improvement of systolic and diastolic left ventricular(LV) dysfunction by preconditioning and postconditioning with netrin-1 after acute myocardial infarction(MI) in rat model, we examined the changes of echocardiographic parameters and compared with them before and after MI.
Materials and Methods: Male, 8-to 9-week-old, Spraque-Dawley rats with a mean body weight of 277.40 ±9.48 g were anesthesized with intraperitoneal injection of pentobarbital at a dose of 65 mg / kg, followed by intubation and positive pressure ventilation for 15 minutes as a stabilizing period. After 30 minutes of ischemia in the acute MI model, netrin-1(5mcg/kg) was slowly injected into MI group but vehicle(normal saline) into another MI group via tail vein. Netrin-1 preconditioning was administered intravenously 3 minutes before the induction of ischemia and 3 minutes after the induction of ischemia. Netrin-1 postconditioning was administered intravenously 5 minutes before the end of ischemic induction for 3 minutes and pentobarbital 35 mg / kg after 2 hours of reperfusion. And the echocardiographic evaluation was performed. Using Vevo2100, Echocardiographic studies were performed before surgery and After 120 minutes of reperfusion. Echocardiographic parameters matched systolic function with fractional shortening(FS) and ejection fraction(EF), but diastolic function with E' and E/E' ratio.
Results and Discussion: Fractional shortening values were significantly increased in the pre-isch, pre-netrin, post-isch and post-netrin groups compared to the vehicle group. The EF (ejection fraction) , And in the post-netrin group, the left ventricular systolic function was improved. E '(initial diastolic velocity) values were significantly higher in the post-iso, post-isch, and post-netrin groups than in the vehicle group. E / E' , Post-isch, post-isch, and post-netrin, respectively.



Conclusion: Preconditioning and postconditioning with netrin-1 makes meaningful improvemet of systolic dysfunction with significant increase with FS and EF after acute MI. Also it helps E' recovery for LV diastolic function and E/E' ratio for left atrial pressure.

5983

Acute hypobaric hypoxia attenuates myocardial ischemia reperfusion injury through HIF1-α

Terada H.[1], Hirata N.[1], Yoshikawa Y.[1], Sawashita Y.[1], Yamakage M.[1]
[1]Sapporo Medical University School of Med - Sapporo (Japan)

Background and Goal of Study: Ischemic heart diseases (IHDs) are one of the major causes of morbidity and mortality for patients all over the world. Many approaches have been conducted to reduse ischemic reperfusion injury (IRI). The discovery of preconditioning has arguably been the most important development in the field of ischemic biology. Many studies showed that chronic intermittent hypobaric hypoxia (CIHH) preconditioning exert a cardioprotective effect. However, the effect of acute hypobaric hypoxia (AHH) preconditioning is still unclear. The aim of this study is to investigate the effect of AHH preconditioning by exposing rats to simulated high altitude.
Materials and Methods: Wistar rat (n=24) were randomly devided into three groups: Control group (normobaric normoxia, n=8), Hypobaric Hypoxia group (HH group, n=8), and Normobaric Hypoxia group (NH group, n=8). Rats in HH group were exposed for 6 hours to simulated high altitude at 60.8 kPa in a hypobaric chamber, in NH group rats exposed for 6 hours to hypoxic circumstance (fraction of inspiratory oxygen12.6%, 101.3 kPa), and rats in Control group remained at 101.3 kPa for 6 hours. After left thoracotomy was performed, the left anterior descending (LAD) coronary artery was ligated and subjected to 30 minutes ischemia followed by 60 minutes reperfusion. Infarct size was assessed by 2% Evans Blue dyeing and TTC (1% 2,3,5-triphenyltetrazolium chloride) staining. The presence and expression levels of Hypoxia Inducible Factor 1-α (HIF1-α) were assessed by Western blotting.
Results and Discussion: Hypobaric hypoxia preconditioning and Normobaric Hypoxia preconditioning significantly reduced %IS/AAR. The expression levels of HIF1-α in HH group and NH group were significantly higher than in Control group.

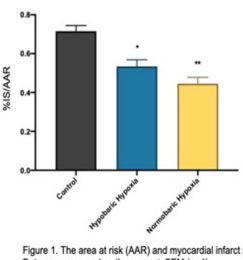


Figure 1. The area at risk (AAR) and myocardial infarct size (IS) in three groups.
Date are expressed as the mean ± SEM (n=4).
* P < 0.001 vs control, ** P < 0.0001 vs control

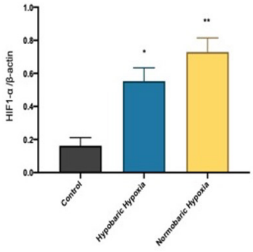


Figure 2. The presence and expression levels of HIF1-α.
Date are expressed as the mean ± SEM (n=8).
* P < 0.05 vs control, ** P < 0.01 vs control

Conclusion: The exposure to simulated high altitude for 6 hours might attenuate myocardial ischemia reperfusion injury. HIF1-α is an important role for cardioprotective effect.

6034

Comparison between an oxidative stress score and individual biomarkers for diagnose patients with left ventricular hypertrophy

González Del Pozo I.[1], Pazó Sayós L.[2], Arnalich Montiel A.[2], Rodríguez-Rodríguez P.[3], González M. C.[3], Quintana-Villamandos B.[2]
[1]Hospital Central de la Defensa Gomez Ulla - Madrid (Spain), [2]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [3]Universidad Autónoma de Madrid - Madrid (Spain)

Background and Goal of Study: Left ventricular hypertrophy (LVH) is a common manifestation of cardiovascular disease, which has been related to stroke, serious arrhythmias, and sudden cardiac death. Oxidative stress plays a key role in patients with LVH. A recently developed global index or score of oxidative stress status takes into account a combination of plasma biomarkers of oxidative damage and antioxidant capacity has been validated in several pathologies however not in LVH. The objective of this study was to compare the performance of oxidative stress score with those of its individual components in patients with LVH.
Materials and Methods: Seventy consecutive patients were recruited in the cardiac surgery section of our institution and each was assigned to one of the two study groups: control group (without LVH) and LVH group (with LVH), based on an echocardiography study. Biomarkers plasmatic related to antioxidant defense systems (total thiols, reduced glutathione, total antioxidant capacity, dismutase superoxide and catalase), and oxidative damage (malondialdehyde and protein carbonyls) were assessed. The global index of oxidative stress related to LVH was calculated using the statistical methodology previously described (1). The ability of the score and individual biomarkers to discriminate LVH patients from control group was tested by the area under the ROC curve analysis. All procedures were approved by the Ethics Committee of Hospital Gregorio Marañón, Madrid, Spain.
Results and Discussion: The ROC analysis of each biomarker shows the lack of capacity of individual biomarkers to discriminate between the two clinical groups: AUCGSH 0.378; AUCSOD 0.430; AUCthiols 0.374; AUCTAC 0.382; AUCcatalase 0.508; AUCMDA 0.624, and AUCS-thiolated proteins 0.641, however ROC curve for the global index (a combined measure of all biomarkes) was 0.742 (95% confidence interval [CI] 0.626–0.858; P < 0.001) with sensitivity of 68.6% and specificity of 68.6%.
Conclusion: The ability of score to detect patients with LVH was high that individual biomarkes. These results suggest that a global index could represent a valuable tool and a promising target in the prevention, diagnosis and the treatment of LVH.
References:
1. Veglia F et al. Methods Mol Biol 2010; 594: 197-213.
Acknowledgements: Study financed by the Health Research Fund FIS PI16/02069 and Fondos FEDER.

4507

Oxygen uptake (VO2) by CPET before lung resection – our experience in one year

Karadza V.[1], Spicek-Macan J.[1], Kolaric N.[1], Milisic Jasarevic I.[1], Magas Vadlja J.[1], Katancic J.[1]
[1]KBC Zagreb - Zagreb (Croatia)

Background and Goal of Study: Lung resection, main therapy of lung cancer, has, as a consequence, changed lung function and exercise capacity depending on size of resection and time passed after resection (1). Forced expiratory volume in one second (FEV1) and carbon monoxide lung diffusion capacity (DLCO) are mainstay of patient selection before lung resection (1). Cardiopulmonary exercise test (CPET) is a high-tech test and golden standard of preoperative assessment for thoracic surgery patients at risk (1). The main result of CPET is oxygen uptake (VO2) usually expressed in mL/kg/min (1). No single test of lung function has absolute prognostic value in lung resection (1). Hypothesis: Patients with predicted postoperative VO2 (ppoVO2) values of 10-15 mL/kg/min calculated after preoperative VO2 measured by CPET, can safely undergo major lung resection.
Materials and Methods: We retrospectilely collected values of VO2 measured by CPET testing and we callculated (formula as in Brunelli et al.) predicted postoperative values of VO2 (ppoVO2) for patients undergone lung resection in one year and one month on our Clinic for thoracic surgery Jordanovac, Zagreb, Croatia (1). Results are correlated to hospital complications.
Results and Discussion: There were 17 lung resection patients needed CPET during preoperative assessment between Sept. 1th 2018. and Oct. 1th 2019. Indications for CPET were low preoperative/predicted postoperative FEV1 and/or DLCO values and/or anamnesis of poor exercise tolerance and/or planned pulmectomy or bilateral lobectomy or prior lung resection. Preoperative VO2 values were between 5.81 and 33.7 (median 17.4) mL/kg/min and ppoVO2 4.59-20.5 (median 12.82) mL/kg/min. There was sublobar resection in 2, lobectomy in 11, bilobectomy in 1 and pulmectomy in 3 patients. One patient died after left pulmectomy from cerebrovascular insult. He had preoperative VO2 23.5 mL/kg/min and ppoVO2 12.37 mL/kg/min.
Conclusion: Our data shows that it may be possible for patients with low preoperative VO2 and ppoVO2 to safely undergo lung resection to the extent of lobectomy, but we suggest thorough clinical evaluation of comorbidities.
References:
1. Brunelli A, Kim AW, Berger KI, Adrizzo-Harris DJ. Physiologic evaluation of the patient with lung cancer being considered for resectional surgery: diagnosis and management of lung cancer, 3rd ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest.1013;143(5):166-90.

4415

High-dose Nitroglycerin Administered during Rewarming Preserves Erythrocyte Deformability in Cardiac Surgery with Cardiopulmonary Bypass

Wu H.[1], Tai Y. H.[2], Chu Y. H.[3], Lu C. C.[1], Tsou M. Y.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan), [2]Shuang Ho Hospital - New Taipei City (Taiwan), [3]National Defense Medical Center - Taipei (Taiwan)

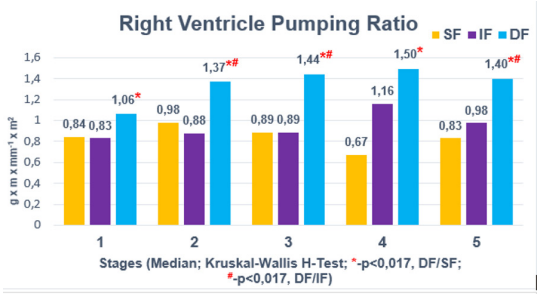
Background and Goal of Study: It remains unclear whether exogenous nitric oxide affects the molecular determinants of cellular deformability and improves red blood cell deformability in cardiac surgery with cardiopulmonary bypass. We aimed to determine whether high-dose nitroglycerin, a nitric oxide donor, preserves erythrocyte deformability during cardiopulmonary bypass and examine the signaling pathway of nitric oxide in erythrocytes.
Materials and Methods: In a randomized and controlled fashion, forty-two patients undergoing cardiac surgery with hypothermic cardiopulmonary bypass were allocated to high-dose (N=21) and low-dose groups (N=21). During rewarming period, patients were given intravenous nitroglycerin with an infusion rate 5 and 1 μg·kg-1·min-1 in high-dose and low-dose groups, respectively. Tyrosine phosphorylation level of non-muscle myosin IIA in erythrocyte membrane was used as an index of erythrocyte deformability and analyzed using immunoblotting.
Results and Discussion: Tyrosine phosphorylation of non-muscle myosin IIA was significantly enhanced after bypass in high-dose group (3.729 ± 1.700 folds, p = 0.011) but not low-dose group (1.545 ± 0.595 folds, p = 0.076). Phosphorylation of aquaporin 1, vasodilator-stimulated phosphoprotein, and focal adhesion kinase in erythrocyte membrane was also upregulated in high-dose group after bypass. Besides, plasma nitric oxide level was highly correlated with fold change of non-muscle myosin IIA phosphorylation (Pearson's correlation coefficient 0.8708).
Conclusions: High-dose nitroglycerin administered during cardiopulmonary bypass improves erythrocyte deformability through activating phosphorylation of aquaporin 1, vasodilator-stimulated phosphoprotein and focal adhesion kinase in erythrocytes.

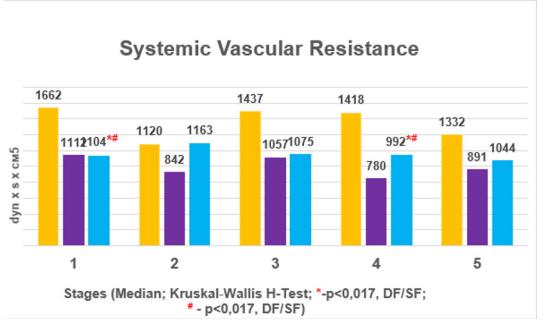
4656

Assessment of the effect of inhalation anesthetics to the efficiency of gas exchange in thoracic surgery

Kabakov D.[1], Bunyatyan A.[1], Vyzhigina M.[1], Bazarov D.[1], Zhukova S.[1], Kavochkin A.[1]
[1]Petrovsky National Research Centre of Surgery - Moscow (Russia)

Background and Goal of Study: Maintenance of effective gas exchange in thoracic surgery using one-lung ventilation during general anesthesia with halogen anesthetics is one of the priorities.
Materials and Methods: 60 patients were included to the study. All patients were undergone to general anesthesia with CMV and endobronchial intubation; as a hypnotic component were used desflurane (DF, n=23), sevoflurane (SF, n=14), isoflurane (IF, n=23, retrospective group). According to the study stages, the indicators of systemic, pulmonary, intracardiac hemodynamics (Swan-Ganz), gas exchange and metabolism from the radial artery and mixed venous blood were analyzed. Stages of the study: stage 1- after anesthesia induction, both lungs ventilation (CMV); stage 2 - one-lung ventilation (OLV) not less 30 minutes; 3 and 4 stages – 60 and 80-120 minutes of OLV respectively; stage 5: 20-30 minutes after returning to both lungs ventilation (CMV).
Results and Discussion: The severity of changes in systemic, pulmonary hemodynamics and gas exchange hadn't significant differences. The identity of pre- and postcapillary resistances (Ra, Rv) in the DF and SF groups indicates that the difference in the gas exchange level isn't determined by the state of pulmonal gas exchange blood flow. Differences in systemic vascular resistance (SVR) in DF from SF on the 1rd and 4th stages significantly better than the right ventricle pumping ratio (RVPR) in the group of DF at all stages of the study and the physiological dead space (VD) shows the inclusion in the organization-level gas exchange blood flow reserve additional regions such as the bronchial blood flow system closely associated with pulmonary blood flow and non-capillary perfusion vessels.
Conclusion: the main difference of conditions to maintain effective gas exchange in the lungs with the DF is the inclusion in the gas exchange in addition to the pulmonal blood flow vessels systemic blood flow vessels (bronchial blood flow and extracapillary perfusion) which are dilated under the DF in comparison with SF allowing DF to show cardioprotective properties in comparison with IF and SF more effectively.





4679

The changes of pulmonary circulation in pregnant rats with PAH during the post-partum period

Jing H.[1], Lu J.[2]
[1]Beijing Anzhen Hospital - Beijing (China), [2]Beijing Anzhen Hospital - Capital Medical University - Beijing (China)

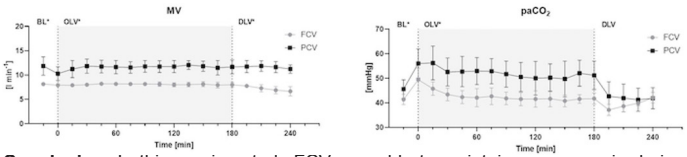
Background and Goal of study: Maternal mortality of pregnant women with PAH remains high nowadays, especially during the post-partum period. We plan to observe the changes on pulmonary circulation in pregnant rats with PAH during the post-partum period in order to contribute to further study on the exact cause of death .
Materials and Methods: 120 female rats were randomly assigned into 2 groups: In pregnant MCT group, we performed MCT(40 mg/kg) subcutaneously over necks of the rats at 7 weeks old. Pregnant group was the control group and we only used saline in the same dose.The rats of both groups mated at 9 weeks old. Hemodynamic data and pulmonary tissues of the successful mated rats were collected at 12 weeks old(T1), 1 day after termination of pregnancy(T2), 3 days after termination of pregnancy(T3), 7 days after termination of pregnancy(T4). At last we had 15 samples at each time point from both two groups.
Results and Discussion: Compared with pregnant group, pregnant MCT group had greater PAP ($p<0.01$), PVR ($p<0.05$), relative medial thickness ($p<0.05$), occluded arterial density ($p<0.001$), as well as lower non-thickened arteries density ($p<0.001$) at each time point. Compared with data at T1, PAP and PVR at T2, T3 and T4 had no significant changes in pregnant group ($p > 0.05$), but increased gradually in pregnant MCT group($p<0.05$). Compared with data at T1, relative medial thickness and non-thickened arteries density of both groups at T2, T3 and T4 had no significant changes($p > 0.05$), but occluded arterial density of the pregnant MCT group at T2, T3 and T4 increased significantly($p<0.05$).We noted prominent proliferative and occlusive changes in pulmonary arteries, which lead to increased PVR during pregnancy. There was no significant proliferative changes after pregnancy, but PVR increased gradually. It is noteworthy occluded arterial density increased significantly after pregnancy. Proliferation in pulmonary arteries were very difficult to change in a short time, but the occluding of the pulmonary arteries could be affected by many other factors. We considered there might be some factors that could dilate pulmonary arteries, and might weakened or disappeared after pregnancy, which cause occluded arterial density and PVR increase.
Conclusions: PVR increased gradually in pregnant rats with PAH during the post-partum period. Further etiological research may contribute to improve survival outcome of pregnancy with PAH.

4918

Improved decarboxylation in one lung ventilation with flow controlled ventilation (FCV) compared to standard of pressure controlled ventilation (PCV) – preliminary data of a prospective, randomized porcine study

Spraider P.[1], Abram J.[1], Ranalter M.[1], Mathis S.[1], Putzer G.[1], Martini J.[1]
[1]Medical University of Innsbruck - Innsbruck (Austria)

Background: Flow controlled ventilation is a ventilation method established to guarantee a continuous stable flow during the whole ventilation cycle. Additionally, in FCV direct intratracheal pressure measurement allows to determine lung mechanic limits and therefore individually optimize ventilation. Aim of this study was to investigate FCV compared to PCV in a porcine model of simulated thoracic surgery requiring one lung ventilation (OLV).
Methods: Thoracic surgery was simulated with left sided thoracotomy and collapse of the left lung after the left main bronchus was blocked with an endotracheal bronchus-blocker. After 3 hours of OLV the bronchus-blocker was removed and double lung ventilation (DLV) observed for one hour. Ventilation was performed with compliance guided PEEP and peak pressure settings in FCV. PCV was established with compliance guided PEEP setting and peak pressure set to achieve a tidal volume of 7 ml kg-1 at baseline (BL), DLV and 6 ml kg-1 during OLV.
Results: 14 pigs were analyzed (FCV n=6, PCV n=8). Animals in the FCV group maintained normocapnia despite a significantly lower respiratory minute volume (8.1±0.1 vs. 11.6±0.4 l min-1, $p<0.001$) compared to the PCV group, where permissive hypercapnia had to be accepted during OLV (paCO2 42.8±2.4 vs. 52.2±2.1 mmHg, $p<0.001$). Tidal volume was not different (5.9±0.2 vs. 6.0±0.1 ml kg-1, $p=0.23$) and air trapping was ruled out with repeated measurements of intrinsic PEEP. Horowitz index was comparable in both groups (335±6.8 vs. 307±14.6, $p=0.08$) as well as pulmonary shunt fraction (5.0±0.8 vs. 7.0±1.9 %, $p=0.15$) during OLV. After switching to DLV comparable oxygenation was observed in both groups; however, as already observed in OLV, normocapnia was achieved with a significantly lower respiratory minute volume in FCV (7.14±0.48 vs. 11.62±0.27 l min-1, $p<0.001$).



Conclusion: In this porcine study FCV was able to maintain normocapnia during OLV within a significant reduction of respiratory minute volume, whereas permissive hypercapnia had to be accepted in PCV. We hypothesize this finding is due to active control of expiratory flow, which is a novelty in FCV compared to PCV.

4976

The efficacy of endobronchial blocker ez-blocker for selective lobar ventilation: case report

Ceraolo E.[1], Galatà M.[2], Rosboch G.[1], Giunta F.[2], Guerrera F.[2], Brazzi L.[2]
[1]Department of Anesthesia, Intensive Care and Emergency, Turin, Italy - Turin (Italy), [2]University of Turin - Department of Anesthesia, Intensive Care and Emergency - Turin (Italy)

Background: One lung ventilation is an anesthesiological technique. Endobronchial blocker is an efficient alternative for one lung ventilation. EZ blocker(EZB)is a Y shape semi rigid endobronchial blocker[1] described by Rispoli et al[2].
Case Report: We report a case of 51 year old man involved in a high impact road accident. TC total body was performed and showed: subdural hematoma in left front parietal region, IV-VII rib fractures, diaphragmatic rupture and herniation of the stomach into the thoracic cavity, hemothorax and left basal pulmonary contusion. He underwent laparoscopic-assisted right hemicolectomy. The patient was subsequently transported to ICU for acute respiratory failure,(P/F=70),intubated with selective lung ventilation through tracheostomy. A thorax CT scan showed hidropneumothorax. In the ICU room two chest tubes were inserted for a persistent postoperative pulmonary air leak. Due to continuous air leak and without evidence of site lesion on CT [fig1],an exploratory thoracotomy was planned. Preoperative P/F=69.Due to worsening respiratory distress and the need of OLV (one-lung ventilation), we decided to change over double-lumen tube to single lumen tube (8 mm) and use the EZB placed in the left airways to achieve lobar selective ventilation. We had set up VV-ECMO as rescue therapy. The EZB was advanced under fiberoptic guidance (flexible scope Ambu® aScope™ 4 Broncho Slim 3.8/1.2) into the tracheostomy tube until the carina of left mainstem bronchus was visualized [fig2].Then the cuff was alternative inflated to achieve selective and sequential ventilation of superior and lower left lobe. This also allowed the surgeon to reach the lesions intraoperative. After identifying pulmonary lesions (two anterior and one posterior on the left superior lobe),the suture of lung lacerations was made. The patients had stable hemodynamic,SpO2 96%,EGA: pH 7.36,pCO2 72 mmHg,pO2 86 mmHg. After removing the EZB at the end of surgery, the lung recruitment manoeuvres were performed and the patient was admitted to ICU(P/F=180).
Discussion: This is the first report describing use of EZB for selective and sequential lobar exclusion. It is an attractive approach in patients with low breathing reserve and when it is not possible to detect preoperatively lesion's site.
References:
1. Moritz et al. Journal of Cardiothoracic Surgery (2018) 13:77.
2. Rispoli et al. J Clin Anesth. 2016;31:288–90.
Learning points: EZ blocker, one-lung ventilation, difficult airway.

5180

Severe Refractory Respiratory Acidosis During Extrapleural Pneumonectomy

Pérez Requena A.[1], Mur Irízar M.[1], García Domínguez M.[1], Sánchez García S.[1], Sneyers Closa M.[1], Osorio Salazar E.[1]
[1]Hospital Universitari Arnau de Vilanova - Lleida (Spain)

Background: We exposed a case of acute respiratory acidosis despite lung recruitment maneuvers during a extrapleural pneumonectomy.
Case Report: A 68-year-old male, COPD with Adenocarcinoma T4N2M0 was indicated left pneumonectomy. Spirometry and ergometry: FEV1/FVC 74, FEV1 68%, basal DLCO 68%, VO2max >13mL/kg/min. Selective ventilation was done, using a double-lumen left tube. Protective ventilation parameters were initiated, obtaining a peak pressure (Pp) 29 cmH20, plateau pressure (Ppl) 25 cmH2O and driving pressure (DP)17 cmH2O. Despite optimization of respiratory rate and PEEP, he progressed towards persistent hypercapnia and hemodynamic instability. Fluidtherapy was not effective and norepinephrine was initiated. Extrapleural pneumonectomy with wide resection of chest wall and pericardium was performed. In the ICU, weaning was unsuccessful and he started with atrial fibrillation (Afib) with rapid ventricular response, multiorgan dysfunction and death.

Parameter	Preop.	Intraop. 4h	Intraop. 6h	Intraop. 8h	Immediate Postop.	ICU arrival	ICU 4h	ICU 24h	ICU 60h
Arterial Blood Gas									
pH		7.12	7.17	7.07	7.16	7.09	7.20	7.31	7.04
pCO2 *(mmHg)*		79	61	73	55	66	63	50	65
pO2 *(mmHg)*		91	113	135	226	96	103	82	89
HCO3 *(mmol/L)*		25.7	22.3	21.2	19.6	20	24.6	25.2	14.3
BE *(mmol/L)*		-5	-7.1	-10.2	-9.5	-10.4	-4.1	-1.5	-15.7
Lactate *(mmol/L)*		1	2.4	4.2	6.3	6.6	6.3	3.4	15.6
PaO2/FiO2 *(ratio)*					377	137			127
CR *(mg/dL)*	0.91	0.9		1.29		1.45	1.62	3.13	4.71
eGFR *(mL/min/1.73m2)*	86.29	87.45		56.59		49.13	42.97	19.38	11.82
K *(mmol/L)*	4.26	5.17		5.91		6.3	4.59	5.57	5.42
Hb *(gr/dL)*	14.1	13.1	12	11.8		12	11.5	11.4	8.8
PT *(ratio)*	1.15	1.15		1.18		1.14	1.15	1.33	1.74
GOT/GPT/GGT *(U/L)*								162/51/69	18581/1362/85
hs-Tn *(pg/mL)*								178	198
CK *(U/L)*								5189	3453

Preop: Preoperative, Intraop: Intraoperative, Postop: Postoperative, ICU: Intensive Care Unit, pH: Acidity/alkalinity, pCO2: Partial pressure of carbon dioxide, pO2: Partial pressure of oxygen, HCO3: Bicarbonate, BE: Base excess, PaO2/FiO2: Ratio of partial pressure arterial oxygen and fraction of inspired oxygen, CR: Creatinine, eGFR: Estimated glomerular filtration rate, K: Potassium, Hb: Hemoglobin, PT: Prothrombin time, GOT: Glutamic oxaloacetic transaminase, GPT: Glutamate-pyruvate transaminase, GGT: Gamma-glutamyltransferase, hs-Tn: High-sensivity Troponin, CK Creatinkinase.

Discussion: During the surgery, we followed a strategy of permissive hypercapnia, protective ventilation with tidal volume 6 ml/kg and PEEP 8 cmH2O (1) to limit the Pp to 30 cmH2O and the DP<13 cmH2O (1,2). In recent studies, DP has shown benefits on mortality in patients undergoing thoracic surgery (3). The appearance of Afib due to mediastinal shift, severe respiratory acidosis and multiorgan dysfunction led to death. The main factors that influenced refractory acidosis were intrapulmonary shunt, V/Q alteration and the degree of surgical inflammation (1).
References:
1. Hackett, S. et al. Anaesthesia for pneumonectomy. BJA Education, Vol 19, Issue 9,297 -304.
2. Pérez Nieto, O. et al. www.medigraphic.org.mx Driving pressure: Main objective for alveolar protection.222-227.
3. Coppola S, Froio S, Chiumello D. Protective lung ventilation during general anesthesia. Crit Care. 2014;18(2):210.
Learning points: Pneumonectomy is lung cancer surgery with the highest postoperative mortality rate. The suitability criteria should be determined based on functional tests. Protective ventilation, permissive hypercapnia and PD control are currently validated measures for ventilatory management during thoracic surgery.

5283

Comparative effects of flow- vs. volume-controlled one-lung ventilation on respiratory variables in normo- and hypovolemic pigs

Wittenstein J.[1], Scharffenberg M.[1], Huhle R.[1], Ran X.[1], Koch T.[1], Gama De Abreu M.[1], Pulmonary Engineering Group Dresden
[1]University Hospital Carl Gustav Carus Dresden - Dresden (Germany)

Background and Goal of Study: Flow-controlled ventilation (FCV) enables the control of inspiratory and expiratory flow. Since the decrease in airway pressure is constant during expiration, FCV can improve gas exchange and reduce mechanical power. We hypothesized that one-lung ventilation (OLV) with FCV improves the arterial partial oxygen pressure (PaO2) compared with volume-controlled ventilation (VCV) in normo- and hypovolemic pigs.
Materials and Methods: We randomly assigned 16 juvenile anaesthetized pigs to one of two groups (n=8/group): 1) intravascular normovolemia and 2) intravascular hypovolemia. For induction of hypovolemia, 25% of the calculated blood volume (blood volume=70 ml/kg x body weight) was drawn through a central venous line. A right-sided thoracotomy was performed and 0.5 µg/kg/h E. coli lipopolysaccharide continuously infused. Subsequently, animals received OLV according to one of two sequences (60 min/ each mode, random sequence): I) VCV-FCV; II) FCV-VCV. Tidal volume of 5 ml/kg, fraction of inspired oxygen (FIO2)=1.0 and positive end-expiratory pressure (PEEP) of 5 cmH2O were used. Gas exchange, hemodynamics, respiratory variables and regional distribution of ventilation (electro impedance tomography) were determined every 20 min.
Results: PaO2 did not differ between modes (P=0.881). In the normovolemia group during FCV, the corrected expired minute volume (P=0.022) and PEEP (P<0.001) were lower compared with VCV. The minute volume (P≤0.001), respiratory rate (P≤0.001), total PEEP (P≤0.001), and mechanical power (P≤0.001) were lower during FCV than VCV irrespective of the volemia status. The distribution of ventilation along the ventro-dorsal axes (centre of ventilation) did not differ between ventilation modes (P=0.103).
Conclusion: In normo- and hypovolemic pigs under OLV, FCV reduced the mechanical power compared with VCV, without effects on oxygenation. In normovolemic pigs, the efficiency of ventilation was higher in FCV compared to VCV.

5538

Oxygen reserve index (ori) during one lung ventilation in patients undergoing thoracic surgery

Bialka S.[1], Copik M.[2], Rzecki Z.[3], Misiolek H.[2], Dabrowski W.[3]
[1]Medical University of Silesia - Zabrze (Poland), [2]Department of Anaesthesiology and Intensive Care School of Medicine with Divsion of Dentistry in Zabrze Medical University of Silesia in Katowice, Poland - Zabrze (Poland), [3]Department of Anaesthesiology and Intensive Therapy Medical University of Lublin, Poland. - Lublin (Poland)

Background and Goal of Study: Rapid one lung collapse during thoracic surgery disturbs cardiovascular system and gas exchange. Oxygen reserve index (ORI) is a novel, noninvasive and sensitive parameter to measure of patient's oxygen status in moderate hyperoxia with PaO2 ranges between 100 and 200 mmHg. It's decrease below 0.24 suggests a fall of PaO2 below 100 mmHg with SpO2 > 98% [1]. The aim of this study was to compare the changes in ORI and SpO2 in patients undergoing thoracic surgery with one lung ventilation.
Materials and Methods: Adult patients undergoing thoracic surgery due to lung tumour were enrolled. A general anaesthesia and mechanical ventilation with FiO2 1.0 were used during anaesthesia and surgery. ORI and SpO2 were measured using Masimo device in seven time points: 1/ just before anaesthesia, 2/ just after anaesthesia induction in horizontal position, 3/ just before an open of the chest and lung collapse, 4/ just after the beginning of one lung ventilation, 5/ just after the end of one lung ventilation, 6/ just after lung re-expended and 7/ after surgery and anaesthesia.
Results and Discussion: 39 patients (15 female and 24 male) aged 43 – 86 were studied. At time point 1, median value of ORI and SpO2 were 0.62 [0.47; 0.7; quartile 1 and 3] and 100% [99, 100], respectively. ORI decreased from time points 2 to 5 and 7. The greater decrease was noted at time point 4. (Figure1) ORI correlated with SpO2 at time points 4 and 7 ($r = 0.4$, $p < 0.05$ and $r = 0.5$, $p < 0.001$, respectively).
Conclusion: One lung ventilation impair patients oxygen status measured with ORI. Decrease in patients oxygen status correspond with SpO2 only during one lung ventilation and after anaesthesia and surgery.
References:
1. Applegate RL, Dorotta IL, Wells B, Juma D, Applegate PM. The relationship between oxygen reserve index and arterial partial pressure of oxygen during surgery. Anesth Analg 2016; 123(3): 626-633.

5659

A randomised controlled trial comparing high-flow nasal oxygen with standard oxygen therapy for conscious sedation during transfemoral transcatheter aortic valve implantation

Govender P.[1], Scheuermann S.[1], Pack J.[1], Aston D.[1], Klein A. A.[1]
[1]Royal Papworth Hospital NHS Foundation Trust - Cambridge (United Kingdom)

Background and Goal of Study: Transfemoral transcatheter aortic valve implantation (TAVI) is increasingly popular as a minimally invasive alternative to surgical aortic valve replacement in patients with symptomatic severe aortic stenosis. Conscious sedation and regional anaesthesia is preferred to general anaesthesia. Hypoxia commonly occurs and is confounded by patient comorbidities, supine procedural positioning and possible deep sedation. The aim of our study was to determine whether high-flow nasal oxygen (HFNO) improves gas exchange as measured by arterial PaO2. Secondary outcomes included intraoperative cerebral desaturation and neurological events during valve deployment, perioperative oxygen therapy duration, hospital length of stay, patient device satisfaction scores and complications.
Materials and Methods: We carried out a randomised controlled trial from 1 June 2019 to 1 April 2021. Ethical approval and written informed consent were obtained. 66 patients will be randomised to either HFNO (50-70L/min, FiO2 0.3, OptiFlow®, Fisher and Paykel, Auckland) or standard oxygen therapy (SOT, nasal cannula, 2-8 L/min, FiO2 0.3). Conscious sedation with remifentanil infusion titrated to a Ramsay sedation score of 2-3 and regional anaesthesia were provided. Arterial blood gases were performed at induction and at 30-minute intervals. The study is powered for a 30% increase in PaO2, from a baseline of mean (SD) 10.1 (5.2) kPa; with an alpha of 0.05 and with 90% power. Interim analysis of 25 patients was performed using descriptive statistics, T-tests +/- Welch correction, Chi-squared tests and linear regression from Prism 8 (GraphPad Software Inc., California, USA).
Results and Discussion: Demographic and clinical variables were comparable between the groups. Table 1 shows the comparison of primary and secondary outcomes between the HFNO and SOT groups. There was no significant difference between the remaining outcomes.

Table 1: Comparison of primary and secondary outcomes in HFNO vs SOT group. Values are mean (SEM), number (proportion) or median (IQR[range]).

	HFNO (n=12)	SOT (n=13)	p value
Arterial PaO_2 (KPa)			0.04
• Induction	12.45 (0.85)	16.37 (1.17)	
• 30 minutes	14.53 (1.70)	13.40 (1.04)	
• 60 minutes	17.93 (2.84)	12.40 (1.04)	
Duration of perioperative oxygen therapy (time; min)	139 (105.30-173.8 [86-198])	151 (112-392 [78-879])	<0.0001
Cerebral desaturation and syncope	1 (8%)	3 (23%)	
Patient device satisfaction score (1=excellent to 4=poor)	1 (1-2 [1-2])	2 (2-3 [2-4])	0.05

Conclusion: HFNO significantly improved oxygenation, reduced perioperative duration of oxygen therapy, was associated with less neurological events and higher patient device satisfaction scores in this cohort.

4538

Swan-Ganz fracture in an open heart surgery

Lee C.[1], Yang C.[1], Kuo P.[1], Cheng Y.[1], Chang R.[1]
[1]Tzu Chi General Hospital - Hualien City (Taiwan)

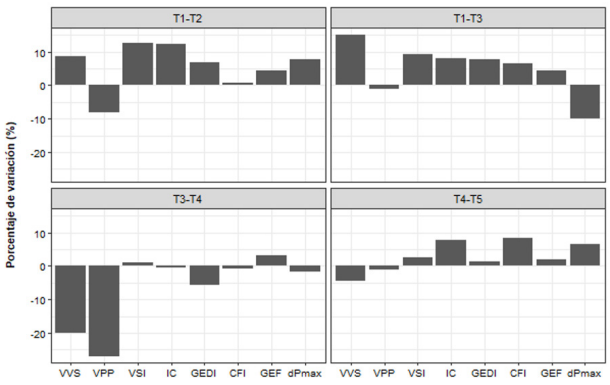
Background: The Swan-Ganz (SG) catheter has been replaced by less invasive monitors. Young doctors have less experience of placing and handling complications. We report a case of SG fracture in the cardiac surgery with delayed notice.
Case Report: The 51-year-old man had rheumatic heart disease and MV prolapse for 5 years under control. He had fever and exertional dyspnea after dental treatment. IE with severe MR was diagnosed by TEE. After antibiotics treatment, he still had severe MR and fatigue easily. Therefore, he was scheduled for MV repair. The patient received GA with invasive monitors as arterial blood pressure and SG catheter smoothly. His initial PA pressure was 29/19 mmHg. The surgical procedure was followed by sternotomy, aortic cannulation, right atrium two incisions for SVC and IVC cannulations, hypothermia and antegrade cardioplegia with CPB support. Left atrium was open for MV repair with a ring. During warming, tiny blood leaked from thermistor connector of SG catheter was noted. The post-CPB period was smooth and fast. His vital signs at arriving SICU was heart rate of 97 bpm, blood pressure of 137/95 mmHg and PA pressure of 18/7 mmHg. However, routine CXR was recognized of a detached SG locating at PA trunk to right PA.(Fig 1) He was sent for percutaneous intravascular foreign retrieval via right femoral vein. A 28 cm fractured SG was retrieval and remained SG was removed without injury.(Fig 2) He was discharged 5 days after surgery.
Discussion: Complications of SG catheter include life threatening PA rupture, dysrhythmia, thrombosis and technique complications.1 Our case had accidental cutted catheter during cannulations.
References:
1. Circulation. 2009;119:147–152.
Learning points: Early evaluation of blood from wrong lumen though it could be clot after protamine reversal. Low PA pressure could be another hint for incorrect position of SG catheter.

4559

Dynamic description of hemodynamic variables during lung resection surgery

Miñana A.[1], Carbonell J. A.[2], Parra M. J.[2], Soro M.[2], Ferrando C.[3], Belda J.[2]
[1]Francesc de Borja Hospital - Gandia (Spain), [2]Hospital Clinic of Valencia - Valencia (Spain), [3]Hospital Clinic of Barcelona - Barcelona (Spain)

Background: During lung resection surgery, patient is in lateral position, open chest and one-lung ventilation with tidal volume (VT)<8ml/kg. Under these conditions, dynamic pulse parameters are not validated. Our objective is to make a description of the evolution of hemodynamic variables at different times studied during lung surgery.
Materials and Methods: Observational and unicentric study approved by Scientific Committee of Clinic Hospital of Valencia. We included 25 patients scheduled for lung resection surgery. Monitoring with transpulmonary monitor PiCCO (Pulsion Medical Systems) to obtain cardiac output (CO) and hemodynamic parameters. Data collection times: T1: 10 min after anesthetic induction, bipulmonary ventilation (VT 8ml / kg), supine position and closed chest.T2: supine position with one-lung ventilation (VT 6ml/kg) and closed chest.T3: lateral position, bipulmonary ventilation (VT 8ml/kg), closed chest.T4: lateral position, one-lung ventilation (VT 6ml/kg), closed chest. T5: lateral position, one-lung ventilation (VT 6ml/kg) after 15 min with open chest. Hemodynamic variables of figure 1 were collected. We analyze the correlation and mixed linear regression between hemodynamic variables at different times.
Results: Pulse pressure variation (PPV) correlation coefficients showed statistically significant differences between times T1-T2 (r=0.58; p-value=0.008), T1-T3 (r=0, 70; p-value <0.001) and T3-T4 (r=0.70; p-value <0.001). In the interval T3-T4 a negative difference of 3.39% (variation percentage -27%) was estimated with statistically significant difference. (p=0.01, 95%CI [-6.23,-0.55]). Pearson's correlation of stroke volume variation (SVV) was statistically significant between times T1-T3 (r=0.78) and T3-T4 (r=0.79). In mixed linear regression model, non-significant differences were found. However, a negative difference of 2.50% (variation percentage -20%) was estimated between T3-T4 (95%CI [-5.16, 0.15]; p-value=0.07). In other hemodynamic variables, statistical significance were not observed.



Conclusion: One-lung ventilation with VT 6ml/kg in lateral position causes a 25% decrease in dynamic pulse parameters PPV and SVV.

4893

Impact of aortic insufficiency due to percutaneous left ventricular assist device on heamodynamics: A retrosective study

Hotta N.[1], Tsukinaga A.[1], Yoshitani K.[1], Ohnishi Y.[1]
[1]National Cerebral and Cardiovascular Cen - Suita, Osaka (Japan)

Background and Goal of Study: Impella® is an antegrade left ventricular assist device with a pump catheter used in the left ventricle. Impella is placed across the aortic valve leading to a potential risk of aortic insufficiency (AI), Consequently, total flow of Impella may not be enough to the end-organ. Few studies have evaluated AI volume by Impella. Therefore, , we evaluated the AI volume in this study.
Materials and Methods: Using medical charts, we collected consecutive patients undergoing Impella 5.0 insertion surgery during April 2016 to September 2019. Patients whose aortic valve didn't open during systolic phase by echocardiography or pulse pressure < 10 mmHg were reviewed to calculate AI volume accurately. AI volume was defined as difference between the expected flow displayed on the Impella controller (Expected Impella flow) and continuous cardiac output measured by the pulmonary artery catheter (thermodilution technique).
Results and Discussion: Impella 5.0 was inserted in 19 patients, in which nine patients were diagnosed as no spontaneous cardiac output. The median expected Impella 5.0 flow was 4.6 L/min [first quartile, third quartile: 4.4, 4.9 L/min] and the median continuous cardiac output was 3.3 [first quartile, third quartile: 3.1, 3.6 L/min]. The median difference was 1.4 L/min [first quartile, third quartile: 0.5, 1.6 L/min] which was 30.4% of median expected Impella 5.0 flow rate. Moreover, focused on six patients assisted with maximum support level P9 by Impella, the median difference and the portion were 1.5 L/min [first quartile, third quartile:1.3, 1.7 L/min] and 30.9%. The six of nine patients added venoarterial extra-corporeal membrane oxygenation (VA-ECMO) for maintaining adequate total blood flow. No patients had AI before Impella 5.0 insertion, but three patients developed mild AI after Impella 5.0 placement.
Conclusion: New-onset AI decreased effective Impella 5.0 flow by 1.4 L/min (30.4%) in patients without spontaneous cardiac output. Some cases need to consider combining with other circulatory assist device such as VA-ECMO.

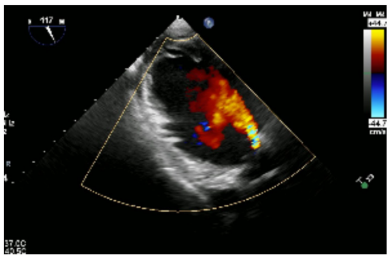


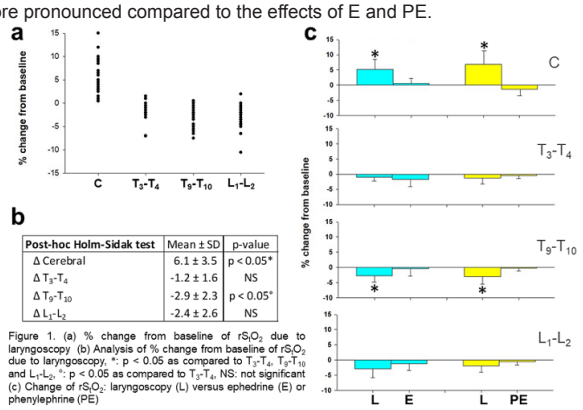
Figure. Aortic Insufficiency

4978

Differential effects of blood pressure increase due to intubation versus ephedrine or phenylephrine on cerebral and paraspinal tissue oxygen saturation, as measured with near-infrared spectroscopy

Bafort V.[1], Vanpeteghem C.[1], Moerman A.[1], De Hert S.[1]
[1]Universitair Ziekenhuis Gent - Gent (Belgium)

Background and Goal of Study: Using near-infrared spectroscopy (NIRS), regional tissue oxygen saturation (rStO2) can be estimated. It is recognized that blood pressure affects rStO2, but it is still unknown if physiological and pharmacological stimuli exert the same effect on different measurement sites. We therefore measured cerebral oxygen saturation (rScO2) and paravertebral oxygen saturation (rSpvO2) at 3 levels (T3-T4, T9-T10 and L1-L2) and assessed the effects when blood pressure was increased by laryngoscopy, ephedrine (E) or phenylephrine (PE).
Materials and Methods: After ethical approval and written informed consent, 28 patients undergoing arterial dilation of the lower limb were included. If following laryngoscopy, MAP dropped by at least 20% from the preoperative MAP, boli of either E or PE were administered according to the randomization, until blood pressure was restored. rScO2 and rSpvO2 were measured before and after laryngoscopy and E or PE administration. rStO2 before and after laryngoscopy were analyzed with one-way analysis of variance (ANOVA) and Holm-Sidak post hoc test. Changes in rStO2 following laryngoscopy were compared to the changes after administration of E or PE with Student's t-test. A p-value < 0.05 was considered statistically significant.
Results and Discussion: Following laryngoscopy, rScO2 increased significantly whereas rSpvO2 tended to decrease (Fig. 1a and 1b). When comparing changes in rStO2 depending on the source of blood pressure increase (Fig. 1c), a significantly higher increase in rScO2 was observed during laryngoscopy compared to rScO2 change following administration of E and PE. The opposite was observed for rSpvO2 at T9-T10, where the decrease was more profound during laryngoscopy compared to administration of E and PE. However, the study protocol dictated a strict control of blood pressure with E and PE, in contrast to the uncontrolled hypertension following laryngoscopy.
Conclusion: Blood pressure increase due to laryngoscopy had a differential effect on cerebral and paravertebral rStO2. The effect of laryngoscopy on rStO2 seems to be more pronounced compared to the effects of E and PE.



Post-hoc Holm-Sidak test	Mean ± SD	p-value
Δ Cerebral	6.1 ± 3.5	p < 0.05*
Δ T_3-T_4	-1.2 ± 1.6	NS
Δ T_9-T_{10}	-2.9 ± 2.3	p < 0.05*
Δ L_1-L_2	-2.4 ± 2.6	NS

Figure 1. (a) % change from baseline of rS_tO_2 due to laryngoscopy (b) Analysis of % change from baseline of rS_tO_2 due to laryngoscopy. *: p < 0.05 as compared to T_3-T_4, T_9-T_{10} and L_1-L_2. *: p < 0.05 as compared to T_3-T_4. NS: not significant (c) Change of rS_tO_2: laryngoscopy (L) versus ephedrine (E) or phenylephrine (PE)

5059

Assessment of left ventricular contractility (LV) based on pressure-volume loops obtained by invasive arterial blood pressure measurement instead of LV end-systolic pressure (ESP)

Iturriagagoitia X.[1], Vandenheuvel M.[1], Mauermann E.[2], Wouters P.[1]
[1]University Hospital Ghent - Gent (Belgium), [2]Basel University Hospital - Basel (Switzerland)

Background and Goal of Study: Pressure-volume (PV) loops provide the most reliable experimental method for quantifying ventricular contractility through the calculation of preload recruitable stroke work (PRSW) and the slope (Emax) of the end-systolic pressure-volume relationship (ESPVR). A limitation of bringing PV-loops into clinical practice is the need for invasive LVP measurement. The aim of this study was to compare PRSW and Emax obtained by using LVP vs the use of invasive arterial blood pressure measurements.
Materials and Methods: After approval by the local ethics committee, data from a pig animal study were selected for the current analysis. LV volumes were assessed using 3D transesophageal echocardiography, while fluid-filled catheter pressure measurements were obtained in the LV, the ascending aorta and the femoral artery. PRSW data were generated by clamping of the inferior caval vein. LVESP was defined by the registrated software as the left upper point of the PV-loop. Using Bland Altmann analysis the values of PRSW and Emax with pressure measurement in the ascending aorta and in the femoral artery were compared to the values with pressure measurement in the LV cavity. Experimental data were recorded at baseline and under 2 µk.kg.min-1 dobutamine.
Results and Discussion: Ten high-quality data sets were used for the present analysis. Pearson correlation between LVP-derived and aortic pressure-derived data was 0.78 (y = 0.83x + 0.18) for Emax ($p < 0.05$) and 0.86 (y = 0.62x + 0.27) for PRSW ($p < 0.05$). Using femoral aortic pressure data correlations were respectively 0.78 (y = 0.77x + 0.21) ($p < 0.05$) for Emax and 0.75 (y = 0.94x + 9.84) ($p < 0.05$) for PRSW. Comparing LVP vs central aortic-derived data, Bland Altman analysis indicated a bias of 0 [limits of agreement (LOA): -1 to 1) for Emax and of -8 [LOA: -22 to 5] for PRSW. Using the femoral artery pressure data, bias was 0 [LOA: -0.8 to 0.8] for Emax and -10 [LOA: -28 to 8] for PRSW.
Conclusion: The results of this preliminary study suggest that calculation of Emax and PRSW using aortic pressure and femoral artery-derived pressure data yielded similar information as when using LVP data. Further studies are planned to further characterize the relationship in various experimental conditions.

5239

Unusual suture and migration of a pulmonary artery catheter to the left mammary vein

Marin J.[1], Valero W.[2], Valero D.[2]
[1]Universidad Militar Nueva Granada - Bogotá (Colombia),
[2]Clínica Universitaria Colombia - Bogotá (Colombia)

Backgroud: Invasive Pulmonary Artery Catheter (PAC) monitoring is frequently used in cardiovascular anesthesia. We report an unusual PAC migration to the left internal mammary vein, which later was accidentally sutured by the wire cerclage for sternotomy during the thoracic closure, in a female patient with history of cardiac surgery underwent a mitral valve replacement.
Case Report: 43 years old woman was scheduled for mitral valve replacement. General anesthesia induction was made. The left jugular vein was canalized with a high flow catheter echo-guided without complications, continuing with the passage of the PAC, which advanced smoothly. Nonetheless, it was not possible to inflate the balloon, then three attempts to inflate the balloon were made, all unsuccessful. Central venous pressure, ventricular pressure and pulmonary artery pressure were absent, blood return was obtained through all catheter ways. It was decided to fix it at 30 cm. The transoperatory process happened without complications. Three days after the surgery the attempt to remove the PAC was unsuccessful; a chest X-ray showed the catheter in an inappropriate location. CT angiography was done showing PAC into the left internal mammary vein, and the image of the cerclage wire was seen adjacent to the catheter. The patient underwent to a second-look surgery; during the procedure, was identified that the catheter was pierced by the wire of the sternal cerclage, the withdrawal was uneventful. The patience had a satisfactory progress and finally discharged in adequate conditions.
Discussion: The migration of a catheter to a lower tributary vein of the brachiocephalic vein is more frequent on the left side for two reasons: first there are more venous branches on the left side, second, the drainage site of these branches is exactly in front of the left internal jugular vein drainage site, where the PAC emerges if it is advanced from the left side.
References:
1. Kanter G, Connelly NR: Unusual positioning of a central venous catheter. J. Clin. Anesth. 17:293–5, 2005.
2. Tena B, Gomar C, Fontanalsc J, et al: Complicaciones graves de tipo mecánico asociadas al catéter de arteria pulmonar en cirugía cardiovascular y torácica. Rev. Esp. Anestesiol. Reanim. Elsevier, 55:487–92, 2008.
Learning Points: Before completing a surgical procedure that the PAC is not included in vascular, myocardial or sturnum sutures

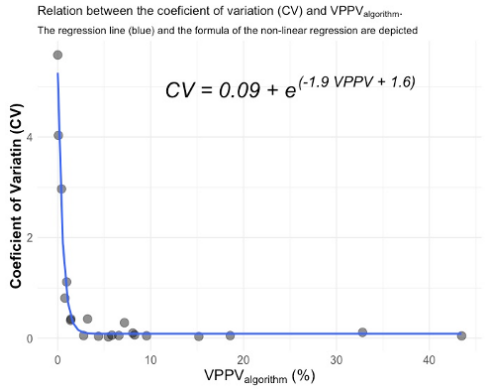
5421

Assessing the measurement error of a method to quantify pulse pressure variation (PPV) in atrial fibrillation. Preliminary results

Njuguna S. K.[1], Wyffels P.[2], De Hert S.[2], Wouters P.[2]
[1]University Hospital Ghent - Gent (Belgium), [2]University Hospital Ghent - Ghent (Belgium)

Background and Goal of Study: We previously presented an algorithm to quantify Ventilation induced Pulse Pressure Variation (VPPV) in patients with atrial fibrillation [1, 2]. While the model showed predictable behaviour in response to volume changes, its precision and accuracy are yet to be determined. This study was designed to assess measurement error of the new algorithm for quantification of VPPV in atrial fibrillation.
Materials and Methods: After ethical approval and written informed consent we retrospectively built a database of perioperative haemodynamic records of patients with atrial fibrillation under general anaesthesia with full mechanical ventilation. From each subject, a stable data segment of 60s was randomly selected to calculate VPPV (VPPValgorithm). Replicates were then generated (VPPVrepl) from the original parameter (VPPValgoritm), by omitting 1 value of the original dataset for each reanalysis (Jackknife technique). The aggregate of the replicates was used to assess bias and variance of calculated VPPValgorithm. Both measures of uncertainty were checked for proportionality.
Results and Discussion: Twenty-one patients were selected. The values of VPPValgorithm ranged from 0% to 43%. The bias, assessed as the difference between the mean of VPPVrepl and the VPPValgorithm , was 0 % (sd 0.4%). The coefficient of variation (CV), calculated as standard deviation of VPPVrepl divided by the mean of VPPVrepl , ranged from 0.026 to 5.63. There was a significant inverse relation between CV and the VPPValgorithm. (see figure). A non-linear least squares regression analysis revealed that CV rapidly regressed towards 0.09 (+/- 0.06).
Conclusion: Our preliminary findings show that, using a jackknife resampling technique, the new algorithm provides reliable measurements with minimal bias and an acceptable CV.

References:
1. Wyffels et al ESA2019 01AP17-7.
2. Wyffels et al. Am J Physiol-Heart Circ Physiology 2016.



6246

Pulmonary artery catheter usage during adult cardiac surgery: a single center experience

Povsic Cevra Z.[1], Klaric V.[1]
[1]SB Magdalena - Krapinske Toplice (Croatia)

Background and Goal of Study: Pulmonary artery catheter (PAC) remains standard monitor tool in cardiac surgery. It's been stipulated that not only that PAC does not improve outcome of patients but that patients who are monitored with PAC have more complications. In order to determine whether PAC improves outcome in cardiac surgery patients or rises risks we analyzed data from our hospital.
Materials and Methods: Study design: a single center retrospective observational study. Institutional board of Clinic Magdalena approved the study. There were 1218 heart operation in our institution during period 2016-2018. We compared preoperative, intraoperative variables and outcomes between patients who underwent cardiac surgery and were monitored with or without PAC. In order to maximally homogenize groups, we included only patients who underwent aortic valve replacement (AVR). Among 360 patients with AVR there were 323 patients with complete data. Categorical variables were analyzed using Pearson Chi-square test, continuous variables were analyzed using an unpaired T-test. The p value below 0.05 was considered statistically significant. Propensity score matching resulted in 93 patients in either group.
Results and Discussion: We found preoperative hemoglobin level, CRP and creatinine level to be statistically different. Severenes of preoperative status also showed difference (EF and Euro score II, as well as comorbidities COPD, DM type II, chronic renal disease). Patients monitored with PAC had longer ICU stay, were more transfused and had higher inotrope usage. We found no difference in mortality between groups. After propensity score matching we found neither clear clinical benefit nor more complications.
Conclusion: PAC usage in patients who underwent AVR did not cause increased rate of complications. In our institution PAC usage is procedure dependent, operator dependent and patient dependent. Overall usage is 63,6%. Although we did not find clear clinical benefit of PAC it is still strong diagnostic tool and we belive that PAC can provide clinical information that could be detrimental for patient management.
References:
1. Chiang Y, Hosseinian L, Rhee A, Itagaki S, Cavallaro P, Chikwe J. Questionable benefit of the pulmonary artery catheter after cardiac surgery in high-risk patients. J Cardiothorac Vasc Anesth 2015;29:76–81.

6044

From simple tilting to hemodynamic instability: case report

Burmuzoska M.[1], Kokareva A.[1], Jovanovski-Srceva M.[1], Angjushev D.[1], Spirovski Z.[2], Despotovski D.[2]
[1]University Clinic of Anesthesiology, Reanimation and Intensive care Medicine (KARIL) -Skopje - Skopje (Republic of North Macedonia), [2]University Clinic of Thoracic and Vascular surgery - Skopje - Skopje (Republic of North Macedonia)

Background: Pectus excavatum is a congenital chest wall deformity and is quite challenging for anesthetic management due to progressive compression and restriction of the heart and lungs. Good preoperative assessment is essential before surgery.
Case Report: A 58 years old male patient was scheduled for elective left sided thoracotomy with suspicion for tumor. His medical history revealed he was on beta-blocker therapy with Bisoprolol, Losartan, ASA and Atorvastatin. He had sinus rhythm with heart rate 90 beats/minute and BP 130/75mmHg. His pulmonary function tests showed restrictive pattern with FVC 68% predicted, FEV1 64% and FEV1/FVC 98% indicating restrictive lung disease. Patient had severe pectus excavatum with compression on the right side of the heart. At the day of the surgery he had HR 74 beats/minute, BP 126/70mmHg and SaO2 96% and a right sided double lumen endotracheal tube was placed and verified bronchoscopically. He was placed in right decubitus position and surgery was started. Thirty minutes after the requested collapse, a hemodynamic instability occurred with drop in the systolic blood pressure up to 60mmHg and gradually increasing heart rate up to 120 beats/min. Additional fluid bolus was administered along with phenylephrine boluses. Surgeons considered that the heart looked quite empty besides this intervention like it was failing to fill with blood. Than we noticed that the operating table was tilted additional 15° to right for better surgical view, probably as a reason for the instability. After tilting it back there was improvement in the blood pressure but the tachycardia remained. After the reexpansion he stabilized and was extubated in the OR.
Discussion: Pectus excavatum can be demanding condition for perioperative anesthetic management. Even though patients can be quite asymptomatic before surgery, placing them in specific operating positions can provoke dynamic positional obstruction of the right heart due to compression of the large blood vessels. This can lead to impaired venous blood return or to impaired right ventricular outflow presenting as abrupt hemodynamic instability1.
References:
1. Underwood K., Vorsanger M., Saric M and Skolnick A.: Positional Right Ventricular Obstruction in Pectus Excavatum. Am J Cardiol 2017; 119:1288-1289.
Learning points: This conditions should be assumed and noticed quickly and prompt reaction is required.

6196

Cardiac tamponade after central venous catheterization: a report of two clinical cases

Lloret i Villas B.[1], Pla Escriva G.[1], Rodriguez Maurell C.[1], Ricart Herněndez A.[1], Baca Pose B.[1], Ramos Polo R.[1]
[1]Doctor Josep Trueta - Girona (Spain)

Background: Central venous catheter (CVC) is an indispensable tool in the management of critical patients. Of its complications, cardiac tamponade is one of the most infrequent with an incidence of 0,2% and a mortality around 90%. Daily use of these devices and the terrible prognosis of this complication, turn it into a significant iatrogenic injury.
Case Report: Case 1: 67 yo woman having emergency surgery because of a bowel obstruction. A peripheral access CVC was catheterized through basilic vein. After 36 hours, she had hypotension, profuse sweating, poor general health and bilateral jugular ingurgitation. A transthoracic echocardiogram was performed and cardiac tamponade was seen. 575 ml of serohematic liquid was drained and was categorized as a glucose solution, confirming the traumatic myocardial perforation. After the extraction of the CVC and continuous pericardial drainage, the lesion was resolved in 48 hours. Case 2: 43 yo man who had a tunneled CVC for hemodialysis catheterized through the internal jugular vein. After the first ultrafiltration, he was hypotensive and extremely bradycardic needing the rapid response team for his stabilization. The CT showed that the dialysis catheter was at the inferior cava and also a severe pericardial effusion. 350 ml of serohematic liquid was drained. The patient presented a favorable evolution the next 24 hours.
Discussion: The bibliography situates the incidence of traumatic perforation without cardiac tamponade between 0,4% and 1% of the catheterizations and has a 12% mortality, whilst the traumatic lesion with tamponade, occurs at 0.2% and has a 90% mortality. The main risk factors that predispose these lesions are the excessive CVC introduction and the perforation due to the use of Seldinger wires. Therefore, we consider vital the implementation of secure measures during the catheterization of these devices and the early check of its position, with the aim of diminish the complications associated with this technique done frequently in our care units.
References:
1. Kusminsky RE. Complications of Central Venous Catheterization. Vol. 204, Journal of the American College of Surgeons. 2007. p. 681–96.
Learning points: Because of the mortality of this complication is vital to guarantee the optimal catheterization and the best manage of any CVC. The use of ultrasound, the x-ray verification and the clinical suspicion play an important role in the prevention of these complications.

4438

Preoperative use of angiotensin-converting enzyme inhibitors versus angiotensin receptor blocker: Is there any difference in postoperative renal function after elective cardiac surgery procedures?

Ampatzidou F.[1], Ioannidis R.[2], Stamatopoulou M.[1], Kyriakidis V.[1], Nastou M.[1], Asteri T.[1]
[1]General Hospital of Thessaloniki "Georgios Papanikolaou" - Thessaloniki (Greece), [2]University General Hospital of Alexandroupoli - Alexandroupoli (Greece)

Background and Goal of Study: Our aim was to investigate if there is any difference in postoperative renal effects between angiotensin-converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARBs) in cardiac surgical patients.
Materials and Methods: Patients who underwent cardiac surgery procedures with the use of cardiopulmonary bypass in our Cardiothoracic Department from February 2016 to April 2019 were retrospectively investigated. Patients were divided in 2 groups based on preoperative medication: ACEi group and ARBs group. The following postoperative factors were investigated: Acute kidney Injury (AKI- KDIGO criteria), need for renal replacement therapy because of AKI (RRT) and e-GFR decline during hospital stay (Exit GFR < GFR at admission). MDRD formula was used for GFR estimation. Chi-square test was used for statistical analysis.
Results and Discussion: After excluded 58 urgent/emergent cases, 1760 patients were investigated. A total of 1062 patients were ACEi or ARBs preoperative users. ACEi group consisted of 635 patients [mean age 65.5±9.6, mean Euro score II 2.2±2.6 and 224 patients (35.3%) with a history of Diabetes mellitus]. ARBs group consisted of 427 patients [mean age 68.2±9.1, mean Euro score II 2.3±3.1 and 158 patients (37%) with a history of Diabetes mellitus]. Results are shown in table 1.
Conclusion: No statistical significant difference was found between ACEi and ARBs preoperative users regarding the postoperative incidence of AKI, AKI requiring renal replacement therapy and the decline in e-GFR during hospital stay.

4572

Microvascular effects of hypoxia, hyperoxia, hypocapnia and hypercapnia measured by vascular occlusion test in healthy volunteers: a post-hoc analysis

Niezen C.[1], Vos J.[1], Bos A.[1], Scheeren T.[1]
[1]UMCG - Universitair Medisch Centrum Groningen - Groningen (Netherlands)

Background & Goal of Study: Changes in oxygen and carbon dioxide concentrations in blood or tissues are common during general anaesthesia. Tissue oxygen saturation (StO2) can be measured by near-infrared spectroscopy during ischaemic provocation of the microcirculation by a vascular occlusion test (VOT). During occlusion one can estimate muscle oxygen consumption (downslope angle), after occlusion microvascular reactivity (recovery angle) followed by hyperperfusion (post-ischaemic hyperaemia phase). We aimed to assess whether hypoxia and hypercapnia will affect any of these variables.
Materials & Methods: Twenty healthy volunteers were included after local IRB approval in this observational study. A four-minute VOT was performed on the lower arm with StO2 measured ipsilaterally on the thenar muscle. VOTs were performed at room air (baseline), during hyperoxia (FiO2 1.0), mild hypoxia (FiO2 ≈ 0.14), and after a second baseline VOT, during hypocapnia (etCO2 2.5-3.0 vol%) and hypercapnia (etCO2 7.0-7.5 vol%) at room air. Downslope angle was measured in decline of StO2 in %/min, recovery angle as incline in %/sec, and the area under the curve of the post-ischaemic hyperaemia phase (AUC-H) as absolute values. We

analysed the data using repeated measures ANOVA.
Results: The values of the sequential VOT procedures are shown in Table 1. Hypoxia and hyperoxia did not influence the downslope and recovery angles. In contrast, the AUC-H during hypoxia was lower when compared to baseline and hyperoxia (Table 1, p=0.005), meaning less hyperperfusion after ischaemia occurred. Neither hypocapnia nor hypercapnia influenced any of the VOT characteristics.
Conclusion: In healthy volunteers at rest, exposure to either hypoxia, hyperoxia, hypocapnia and hypercapnia did not influence microvascular O2 consumption or reactivity. Apart from hypoxia, none of the instances influenced post-ischaemic hyperaemia.

VOT	Baseline StO_2 (%)	Downslope Angle (decline in %/min)	Recovery Angle (incline in %/sec)	AUC-H
Baseline	81 (78-88)	12.0 (10.8-14.3)	1.82 (1.36-2.29)	1520 (1002-1997)
Hyperoxia	87 (82-90)	11.4 (10.2-13.8)	1.77 (1.44-2.35)	1702 (891-2459)
Hypoxia	82 (80-86)	12.0 (10.2-13.8)	1.53 (1.23-1.93)	963 (485-1570)*
Baseline 2	86 (83-89)	12.6 (11.6-15.0)	2.19 (1.60-2.84)	1162 (876-1347)
Hypocapnia	87 (85-91)	14.4 (11.3-17.7)	2.21 (1.89-3.01)	569 (432-1047)
Hypercapnia	87 (83-92)	11.7 (10.1-21.3)	2.55 (1.18-3.24)	885 (463-1364)

Table 1: Overview of the VOT characteristics in each VOT performed. Median (IQR). VOT: Vascular occlusion test. AUC-H: AUC of the post-ischaemic hyperaemia phase. * p=0.005.

4573

The effect of low dose Dexmedetomidine on the incidence of Acute Kidney Injury (AKI) in cardiac surgery: Secondary subanalysis of a randomized clinical trial

Knapen A.[1], Khalifa C.[1], Lemaire G.[1], Tircoveanu R.[1], Jacquet L. M.[1], Momeni M.[1]
[1]Cliniques universitaires Saint Luc; Université Catholique de Louvain - Brussels (Belgium)

Background and Goal of Study: Cardiac surgery-associated AKI can occur in up to 30% of the patients. A meta-analysis showed that Dexmedetomidine (DEX) decreased cardiac surgery-associated AKI.1 We investigated the effect of a low dose DEX on the incidence of AKI in cardiac surgery.
Materials and Methods: This is a secondary subanalysis of a randomized double-blinded trial of DEX vs Placebo (PL) in patients ≥ 60 y undergoing surgery with cardiopulmonary bypass (CPB) (NCT03388541). At the closure of chest, patients either received a continuous infusion of PL or DEX at a concentration of 0.4µg/kg/h. The study drug was administered at 5ml/h during 10h in all patients. AKI was defined according to the serum creatinine (sCreat) and the GFR criterion of the RIFLE classification. The criteria that led to the worst possible classification during the entire hospital stay were used .A Mann-whitney U test, a Chi square or Fisher's Exact test were used to compare both groups.
Results and Discussion: 420 patients were randomized (210 each group). 12 subjects did not receive the study medication for various reasons. Table 1 shows patients' characteristics.

Variable	PL(N=203)	DEX(N=205)	P
Age(y)	70(65-76)	71(66-75)	0.943
Baseline sCreat	1.0 (0.86-1.2)	1.01 (0.86-1.17)	0.996
Baseline GFR	72(57-84)	71(58-84)	0.843
EuroscoreII(%)	1.99 (1.15-3.59)	1.75 (1.11-3.35)	0.561
CPB time(min)	104(78-131)	96(73-127)	0.256

Data are expressed in median(P25-P75) and N(%).
Table 2 illustrates the incidence of RIFLE criteria.

	PL (N=203)	DEX (N=205)	P
Risk	17 (8.4)	13 (6.3)	0.423
Injury	2 (1)	2 (1)	1.0
Failure	0	1 (0.5)	1.0
Loss	0	0	1.0
End-stage	0	0	1.0

Conclusion: Our results show no difference in the incidence of AKI between patients receiving DEX vs PL. However AKI in this study occurred in a low percentage of patients and the study was not powered for this subanalysis.
References:
1. Shi R, et al. Crit Care 2017; 21:198.

4839

Hemolysis in patients undergone cardiac surgery required cardiopulmonary bypass; its association with postoperative acute kidney injury

Hokka M.[1], Egi M.[1], Mizobuchi S.[1]
[1]Kobe University Hospital - Kobe (Japan)

Background and Goal of Study: Postoperative acute kidney injury(pAKI) is common after cardiovascular surgery(CVS) with cardiopulmonary bypass(CPB). Hemolysis due to CPB leads to an increase of plasma free hemoglobin(fHb). If serum haptoglobin(Hp), which is a fHb scavenger, is not high, excess fHb may cause nitric oxide depletion and vascular dysfunction, which may contribute to risk of pAKI. This prospective study aim to observe perioperative fHb and Hp, and to assess those association with the risk of pAKI in this cohort.
Materials and Methods: We screened patients planed CVS required CPB from 2016 to 2019 in our hospital. We excluded patients with preoperative serum creatinine level over 2mg/dl. We measured fHb and Hp concentrations at the following 6 points:after anesthesia induction, 60 and 120 minutes after initiation of CPB, 30 and 120 minutes after wean from CPB, and at postoperative day 1. We defined pAKI according to AKIN criteria (an increase in creatinine level of 0.3 mg/dl or more above the preoperative value, or an increase of 50% or more). We divided patients into groups with and without pAKI. The comparison of changes in fHb and Hp concentration between two groups was performed using two way repeated ANOVA. Additionally, perioperative maximum fHb concentration (Max-fHb) was compared using t-test. A P value<0.05 was defined as a statistically significant difference.
Results and Discussion: We included 102 patients in this study, and 38 patients who received haptoglobin administration were excluded. Finally, 64 patients were included in the analysis. pAKI occurred in 21 patients (32.8%). Perioperative fHb concentration in AKI group was significantly higher than that in non-AKI group (p=0.0001)(figure A). Max-fHb in AKI group was 0.13±0.03g/dL, which was significantly higher than 0.087±0.04g/dL in non-AKI group (p<0.001). Perioperative Hp concentration in AKI group was significantly lower than that in non-AKI group (p=0.03)(figure B). These results may suggest the potential association of hemolysis with the risk of pAKI.
Conclusion: Increased fHb and decreased Hp were significantly associated with the risk of pAKI in patients with CVS requiring CPB.

Figure A Changes of perioperative serum free Hemoglobin

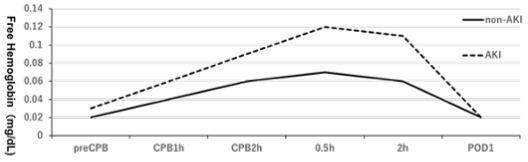
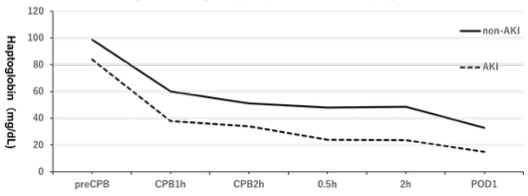


Figure B Changes of perioperative Serum Haptoglobin



4355

Management of General Anesthesia in a Patient with COL4A1 Mutation During Cardiac Surgery: a case report

Oshiro A.[1], Kanda H.[2], Otemachi Hospital-Fukuoka (Japan)
[1]Otemachi Hospital - Kitakyushu (Japan), [2]Asahikawa Medical University - Asahikawa (Japan)

Background: COL4A1 mutation was recently identified as a monogenic cause of the basement vascular membranes, which results in small vessel disease including hemorrhagic stroke, arteriovenous malformation, and aneurysms. There is no report on general anesthesia for cardiac surgery in a patient with COL4A1 mutation. In this report, we describe the case of a child with COL4A1 mutation who required general anesthesia for cardiac surgery.
Case Report: A 2-year-old male with a history of porencephaly, epilepsy controlled on antiepileptic drugs, left ventricular outflow tract obstruction (LVOTO) and moderate mitral regurgitation secondary to hypertrophic obstructive cardiomyopathy required cardiac surgery for worsening LVOTO. He was diagnosed with COL4A1 mutation with a genetic test at 3 months. At 2 years of age, he had a pneumonia that had

caused acute worsening of his LVOTO that did not improve upon resolution of his pneumonia. LVOT velocity was 4.0-6.5 m/s and the mean LVOT pressure gradient was 80-130 mmHg. He required resection of left ventricular abnormal myocardium and mitral valve repair. Of note, the patient had history of rhabdomyolysis with respiratory infections. General anesthesia was therefore induced by fentanyl, midazolam, rocuronium, and was maintained with continuous dosing of remifentanil, midazolam, and a bolus of rocuronium. Resection of left ventricular abnormal myocardium and edge-to-edge repair for the mitral valve was performed. LVOT velocity declined to 2.0 m/s. His perioperative course was uneventful.
Discussion: This is the first report of general anesthesia for cardiac surgery in a patient with COL4A1 mutation. The relationships between COL4A1 mutation and congenital heart disease or rhabdomyolysis have not been previously reported. Patients with COL4A1 mutation present with a variety of clinical features because of abnormalities in the structual integrity of the basement vascular membranes. They should be individually evaluated and carefully managed in the perioperative period according to their specific risk profile.
References:
1. Childs Nerv Syst (2014) 30:1467-1469. Dev Med Child Neurol 54(6): 569-574.
Learning points: Patients with COL4A1 mutation have an increased risk of intracranial hemorrhages so it is vital to maintain a normal perioperative blood pressure.

5739

Prediction model with panel data to calculate the risk score of acute kidney injury after cardiac surgery with cardiopulmonary bypass

Takaki S.[1], Morishige A.[1], Kunikata M.[1], Watanabe Y.[1], Misumi T.[2], Goto T.[1]
[1]Yokohama City University Hospital - Yokohama (Japan), [2]Yokohama City University School of Medicine, Biostatistics - Yokohama (Japan)

Background and Goal of Study: Cardiac surgery with cardiopulmonary bypass affects renal function in short and long time period. Incidence rate of acute kidney injury (AKI) following cardiac surgery is 5–30%. It is said that 1-2% of the AKI patients need renal replacement therapy after cardiac surgery. However, to predict AKI after cardiac surgery is difficult due to postoperative hemodilution. Currently, panel data such as continuous vital signs are essential factors for personalized healthcare. The aim of this study was to determine the predict factors of AKI and to construct the model with panel data to calculate the risk score of AKI with using panel data such as continuous vital signs.
Materials and Methods: We retrospectively collected data of patients who underwent cardiac surgery with cardiopulmonary bypass at Yokohama city university hospital from 2017 June to 2019 Sep. AKI was defined by the KDIGO criteria using the change of sCr from baseline.: (1) increment of ≧0.3mg/dl (within 48 hours) (2); increment of ≧150% (within 7 days). Patients were divided into AKI and non-AKI group, and we collected the trend patterns of vital signs (systolic and diastolic blood pressure, heart rate and respiratory rate) about the two groups. In this report, we applied a functional logistic regression for constructing a model to predict AKI. All repeated measurements of vital signs were incorporated into the model as smoothed curves, and patients were classified into two groups by the calculated risk score (0.5≧ group and 0.5< group).
Results and Discussion: 92 patients were enrolled for this study. 21 patients were divided into AKI group and 71 patients were divided into non-AKI group. We constructed prediction models to calculate the risk score of AKI. The best area under the receiver operator characteristic curve (AUC) was achieved by the estimated model which used diastolic blood pressure, systolic pressure and heart rate (AUC=0.91, 95% bootstrap CI: 0.82-0.98). However, this model was not validated by test set. Therefore, it may have the risk of overfitting, and further study will be needed.
Conclusion: We constructed prediction model with panel data as continuous vital signs was useful for predicting AKI after cardiac surgery.

5742

Acute kidney injury in neonates after arterial switch operation using autologous umbilical cord blood

Chernyshuk S.[1], Yemets H.[1], Zhovnir V.[1]
[1]The Scientific-Practical Children's Cardiac Center - Kyiv (Ukraine)

Background and Goal of Study: The rate of acute kidney injury (AKI) in cardiac surgery is 9,6%-59%. Cardiac surgery with the cardio-pulmonary bypass (CPB) during the first hours of life and umbilical blood comprises significantly lower level of hemoglobin (Hb), consequently, lower oxygen delivery in comparison with the usage of donor's blood. Taking this into account, study of AKI may relatively reflect the level of hypoxemia during CPB. The goal of the study was to compare the rate of AKI in two groups of neonatal patients who received umbilical or donor's blood.
Materials and Methods: The study was performed on neonates with Transposition of Great Arteries who underwent arterial switch operation. Study group – 21 patients who underwent cardiac surgery during the first hours of life and received umbilical blood during CPB, control group – 38 patients who were treated with the conventional approach. Primary results were analyzed by the rate and stage of AKI. Secondary results were analyzed by the level of serum lactate and its correlation with AKI.
Results and Discussion: Patients who received umbilical blood had higher level of fetal Hb and more significant hemodilution during CPB due to restricted volume of umbilical blood. Median of serum creatinine (SCr) level in study and control groups were 57,5 and 59,6 mmol/l, accordingly. Both groups experienced growth of SCr level at 24 hours and its decline at 48 hours after surgery. More significant hemodilution in study group led to decrease in SCr for 18% from baseline compared to 6% change in control group. Trend in lactate change was almost equal in both groups – 5% growth after the surgery, 21% and 29% decline in 24 hours, and 10% increase during the next 24 hours. Overall level of lactate in absolute units in study group was higher. In both groups the maximum of lactate level was observed at the time of the end of the surgery and the maximum of SCr – after 24 hours. There were no significant difference in the AKI rate in both groups – p-value – 0,61, CI 5-95%.
Conclusion: There were no statistically significant difference in the rate of AKI in neonates after cardiac surgery with CPB with UB or donor's blood. More significant hemodilution had no results on the rate of AKI in neonates. Higher levels of the lactate level in study group had no effect on the AKI, it may be assumed that the lactate level is the result of higher level of fetal Hb, but this statement needs to be studied more.

6333

Use of Modern hydroxyethyl starch and Acute Kidney after cardiac surgery in high-risk patients: a prospective multicenter cohort

Vives M.[1], Nagore D.[2], Alvarez J.[3], Monedero P.[4], Tamayo E.[5], Candela A.[6], On behalf of the Spanish Perioperative Cardiac Surgery Research Group
[1]Hospital Universitari Josep Trueta - Girona (Spain), [2]Bart's Heart Center - London (United Kingdom), [3]Hospital Universitario Santiago Compostela - Santiago (Spain), [4]Clinica Universidad de Navarra - Pamplona (Spain), [5]Hospital Clinico de Valladolid - Valladolid (Spain), 6Hospital Ramon y Cajal - Madrid (Spain)

Background and Goal of Study: Cardiac surgery-associated acute kidney injury (CSA-AKI) is associated with increased short- and long-term mortality. Data on the intraoperative and postoperative use of modern tetrastarch products in the cardiac surgical setting are limited. Given the uncertain generalizability of data from critically ill patients to the surgical population, we conducted a multicenter prospective cohort study to determine the association of intraoperative and postoperative modern tetrastarch (6% HES 130/0.4) use, with postoperative renal function in high-risk patients undergoing cardiac surgery.
Materials and Methods: This study was a multicentre prospective cohort study at 15 cardiac surgery centres in Spain and in the UK. The study cohort included all consecutive high-risk patients for developing CSA-AKI (Cleveland Score =>4), aged 18 yr or older (n=262) who underwent cardiac surgery between 15th of january 2017 and 15th of september 2018. The cohort was divided into two groups, namely patients who received (n=96) or did not receive (n=166) 6% HES 130/0.4 intraoperatively and postoperatively. To confirm these regression-based analyses, we also conducted a complementary propensity score-matched pairs analysis.
Results and Discussion: Of the overall cohort (n=262), 96 (36.7%) were exposed to 6% HES 130/0.4 either intraoperatively or postoperatively. Postoperative AKI occurred in 145 patients (55.5%). Patients in the HES group had greater burden of comorbidity (e.g. higher weight, lower estimated Glomerular filtration rate (eGFR), higher chronic kidney disease (CKD) and slightly higher Cleveland score). In the multivariable logistic regression analysis, there is no significant difference between

groups with regard to AKI (OR 0.98, 95% CI 0.50-1.92, p=0.96) and RRT ((OR 0.70, 95% CI 0.27-1.80, p = 0.47). In the propensity score matching analysis (n= 94 vs 94), there is no statistically significant difference between groups with regard to neither AKI (OR 0.91, 95% CI 0.77-1.08, p=0.32) nor to RRT (OR 0.95, 95% CI 0.94-1.15, p=0.41). The variables used for the matching were the ones with most clinical impact.
Conclusion: The intraoperative and postoperative use of modern hydroxyethyl starch 6% HES 130/0.4 was not associated with increased risks of AKI and dialysis after cardiac surgery in our multicentre cohort of high-risk patients for developing CSA-AKI with Cleveland Score =>4.

6395

Giant axillary pseudoaneurysm in a patient with Alport syndrome

Arroyo Rubio J. J.[1], Castellar Cuesta T.[1], Ruiz De Castañeda Zamora M. D.[1], Villanueva Carpintero M. G.[1], Martinez-Galan Fernandez L.[1]
[1]HGU de Ciudad Real - Ciudad Real (Spain)

Background and Goal of Study: describe the anesthesic management of urgent surgery of giant left axillary pseudoaneurysm (PSA) in a patient with Alport sydrome. Materials and Methods: 45-years-old male patient with Alport syndrome who develops long-standing chronic renal failure (CRF), in need of blood dialysis. Renal transplantation is performed 3 times, the last one in 2009, working well. He has previously presented PSA of venous artery fistula (AVF) in upper left limb (MSI) correcte by ligation. Subsequently he develops aneurysm of the brachial artery in MSI performing resection plus axillary brachial graft with PTFE. Currently the patient develops a giant left axillary PSA partially thrombosed, confirmed by angioTAC. It is decided to intervene urgently due to the high risk of breakage. It crosses blood. General anesthesia. Induction by rapid sequence, with propofol, succinylcholine,fentanest and, maintenance with TCI (target controlled infusion system) fo propofol, adjusting the doses according to BIS (bispectral index). The right radial artery, right jugular venous catheter, two peripheral pathways, and bladder catheter are channeled. Open surgery with PSA, resection and aubclavian artery bypass to previous axillary prosthesis. Incident-free procedure, with little bleeding, remaining hemodynamically stable.
Results and Discussion: Alport syndrome is an inherited disease that affects the basement membranes, due to the alteration of type IV collagen. Prevalence of 1:50000. Aneurysms of the thoracic and abdominal aorta have been reported, and a case of intracranial aneurysms. It is associated with progressive glomerular disease, sensorineural hearing loss and eye abnormalities. They need blood dialysis for end-stage renal disease and transplantation when appropriate. Uncommon development of aneurysms or PSA in AVF in the general population. These PSAs can evolve to thrombosis, infection, compression of neighboring structures, compartment syndrome and rupture. In small PSA the treatment is endovascular and in the large it is open surgery.
Conclusion: repeating pseudoaneurysms could be related to Alport syndrome. TIVA-TCI anesthesia with invasive blood pressure control was safe and effective in the case presented.

4471

Perioperative management for pheochromocytoma resection in a patient with untreated cyanotic congenital heart disease: a case report

Liang P.[1], Wang S.[1]
[1]Department of Anesthesiology, West China Hospital, Sichuan University - Chengdu (China)

Background: Perioperative management for pheochromocytoma resection remains a challenge for anesthesiologists due to dramatic catecholamine fluctuation during surgery. Patients with untreated cyanotic congenital heart disease usually have complex cardiac and respiratory physiology, which might lead to severe problems. We presented a rare case of pheochromocytoma resection in an adult patient with untreated cyanotic congenital cardiac disease.
Case Report: A 22-year-old female complained of abdominal pain for 10 months and headaches for 4 months. CT showed distal pancreatic and bilateral adrenal masses. Plasma norepinephrine, urinary epinephrine and dopamine was dramatically higher than norm. The patient was diagnosed with pheochromocytoma and prescribed phenoxybenzamine. The patient was born with cyanotic congenital heart disease with double outlet right ventricle, but untreated and presented progressive cyanosis and increased hypoxemia on exertion. Baseline SpO2 was 78% on room air. The patient presented obvious blue lips and clubbing fingers. Norepinephrine was continuously infused after induction to maintain systemic blood pressure. During pheochromocytoma manipulation, ABP drastically increased to 205/108 mmHg and SpO2 dropped to 70%. Nitroglycerin infusion was started and boluses of phentolamine, sodium nitroprusside and esmolol was given. ABP gradually decreased to normal whereas SpO2 was still around 75%. We administered an additional 100 μg bolus of nitroglycerin against to pulmonary vasoconstriction, and SpO2 gradually raised back to 87%. Patient was extubated in the OR and was discharged on postoperative day 13.
Discussion: Perioperative management of patient with untreated DORV and pheochromocytoma is rarely reported. Meticulous perioperative management is essential. Two widely used medications are nonselective α-antagonist phenoxybenzamine and selective α1-antagonist doxazosin. We infused crystal fluid for fluid expansion before induction and started norepinephrine infusion to maintain systemic blood pressure. Real-time intravascular volume status and myocardial contractility were monitored with TEE and ProAQT. Goal-directed fluid expansion strategy along with vasopressors and vasodilators infusion prevented the patient from extreme hemodynamic changes during surgery.
Learning points: Physiology and preparation of pheochromocytoma. Physiology of untreated cyanotic congenital cardiac disease (DORV).

4591

Impact of gender on postoperative morbi-mortality in cardiac surgery children

Havaux M.[1], Willems A.[1], Van Der Linden P.[1]
[1]Hopital Universitaire des enfants Reine Fabiola - Jette (Belgium)

Background and Goal of Study: Impact of gender on postoperative mortality in children undergoing congenital heart disease surgery remains debated (1,2). Most studies have been realized in the US while data for European populations are scarce. This study aims to assess the influence of sex difference on postoperative morbi-mortality in children operated in a tertiary university hospital in Belgium.
Materials and Methods: This retrospective cohort study included all children undergoing cardiac surgery with cardio-pulmonary bypass (CPB) between January 2006 and December 2015. Jehovah's witnesses' patients were excluded. Anaesthetic, CPB and surgical techniques were standardized. The primary objective was a composite outcome comprising in-hospital mortality or severe postoperative morbidity combining at least two of the following events: respiratory, cardiac or renal failure (3). A propensity score has been realized to compare males and females through matching of 11 clinically relevant preoperative variables. After matching, binary variables were compared using logistical regressions and continuous variables using linear regressions. Data are presented as mean ± SD or percentages. A p-value < 0.05 was considered statistically significant.
Results and Discussion: The database included 837 males (30,2 months ± 42,7 ; 11,3 kg ± 13) and 651 females (31,8 months ± 42,5 ; 10,9 kg ± 10,38).

	Males (n=837)	**Females (n=651)**	**p-value (Adjusted)**
Primary Outcome			
Morbi-mortality (%)	27,1	27,0	0,94
Secondary Outcomes			
In-Hospital Mortality (%)	2,9	3,7	0,27
Cardiac failure (%)	41,9	43,0	0,57
Respiratory failure (%)	40,3	38,5	0,44
Renal failure (%)	6,0	5,72	0,88
Neurologic deficit (%)	5,1	5,6	0,65

Conclusion: In the conditions of our study (monocentric, propensity matching and composite outcome), patient's gender does not influence early post-operative morbi-mortality.
References:
1. Marelli A et al. Circulation, 2010; 122:S234-240.
2. DiBardino et al. Ann Thorac Surg 2012;94:2054-60.
3. Willems A et al. Eur J Cardio-Thorac Surg 2014;45:1050-7.

5321

Hypophosphatemia following staged surgical palliation of Hypoplastic Left Heart Syndrome

Krycinska R.[1], Jarosz J.[2], Mroczek T.[2], Skalski J.[2]
[1]University Hospital Krakow - Krakow (Poland), [2]University Children's Hospital of Cracow - Krakow (Poland)

Background and Goal of Study: Hypophosphatemia is commonly seen in critically ill children and has been shown to hamper clinical recovery. Patients after surgical palliation of HLHS are prone to develop this disturbance as they require large doses of medications known to decrease serum phosphorus levels. Moreover, deleterious effects of hypophosphatemia on the cardiopulmonary system can be especially harmful to those patients.
Materials and Methods: We conducted a retrospective review of the medical records of children consecutively admitted to our PICU between March 2014 to September 2018, immediately after Norwood, Glenn or Fontan procedure. The following data were recorded: age, weight, presence of malnutrition, type of procedure with assigned Aristotle Basic Complexity Score, duration of cardiopulmonary bypass, serum phosphorus and magnesium levels monitored during the first 3 days of PICU admission, hemodynamic parameters, medications, use of blood products, duration of mechanical ventilation and PICU length of stay.
Results and Discussion: 89 children were included in the study, with a median age of 6,4 months (range: 2d - 75.7m). Throughout the study period decreased serum phosphorus levels occurred in 39 patients (44%), and we observed 6 cases of refractory hypoophosphatemia, which did not respond to single potassium phosphate infusion. The mean age and weight at the time of the procedure was significantly lower for the hypophosphatemic group and the mean Aristotle Basic Complexity Score (perioperative morbidity, mortality, and technical difficulty of the procedure) was significantly higher. What's more, epinephrine and dopamine use showed independent association with hypophosphatemia.
Conclusion: Hypophosphatemia is highly prevalent in children after staged surgical palliation of HLHS. Given the greater susceptibility and potential complications, serum phosphorus levels should be routinely measured after the surgery, so that appropriate replacement therapy may be started.

5592

Management of physiopathology in congenital complex cardiopathy in adults to keep pulmonary/ systemic blood flow ratio (Qp/Qs) balance as a main goal. A case report

Aznar de Legarra M.[1], Martín Orejas M.[1], Ribas Ball M.[1], Gonzàlez Tallada A.[2], Gómez Felices A.[1], Manrique Muñoz S.[1]
[1]Hospital Universitari Vall Hebron - Barcelona (Spain), [2]Vall Hebrón University Hospital - Barcelona (Spain)

Background and Goal of Study: Maintaining Qp/Qs balance in complex cardiopathy is a challenge. Despite congenital cardiac defects classifications, every case has its peculiarities, anatomical variations and physiopathological hemodynamic (HD) adaptations.
Materials and Methods: We present a 23 year old woman with a single ventricle physiology, systemic circulation depending of stenotic ductus, tricuspid atresia with great vessels transposition, rudimentary right ventricle with a restrictive atrioventricular channel, hypoplasic aortic valve, filiform ascendant aorta and right pulmonary artery (RPA) stenosis and associated left lung hyperflux lesion. No reconstructive or palliative surgery were performed before. In March 2019 she showed a pulmonary endocarditis with moderate insufficiency sequelae. Returns in August for acute coronary syndrome secondary to increased telediastolic pressures, no coronary lesions, ductus gradient of 45-50mmHg and basal SatO2 80-85% despite dobutamine 12mcg/kg/h. To optimise right ventricle function she was proposed to go through a palliative ductus and RPA dilatation + stenting under general anesthesia.
Results and Discussion: The main concern was the disbalance of Qp/Qs secondary to hyperaflux alterations after opening the RPA with the risk of shunting due to theft from the healthy lung and systemic, also shunting due to systemic theft after opening the ductus, associated with a resulting risk of coronary perfusion fall which depends on the pressure in the filiform aorta(1). General anesthesia was induced with midazolam 2.5mg, fentanyl 50mcg, propofol 55mg, calcium chloride 550mg, atropine 0,2mg, atracurium 25mg. Ventilatory parameters, pulmonary vasodilators, peripheral vasodilators, vasoactive agents and fluidotherapy were adjusted to V/Q optimization during the procedure with invasive blood pressure and central pressures registered by the hemodynamists. The patient went without severe desaturation or HD instability, dobutamine was retired at the end of the procedure.
Conclusion: As far as we know this is the first case reported of anesthetic management in such a complex cardiac congenital defect. We conclude that forseeing the problems and their solutions creating a well defined plan of action including anesthetics, management of ventilator parameters and different drugs, is crucial to ensure an optimal outcome
References:
1. Leyvi, G. and Wasnick, J. (2010). Single-Ventricle Patient: Pathophysiology and Anesthetic Management. Journal of Cardiothoracic and Vascular Anesthesia, 24(1), pp.121-130.

5787

Role of the ratio between venous-arterial carbon dioxide difference and arterial-venous oxygen content difference in predicting low cardiac output syndrome after surgery for congenital heart disease

Bresadola E.[1], Cattin L.[1], Mingon C.[1], Russo A.[1], Corubolo L.[1], Gottin L.[1]
[1]Azienda Ospedaliera Universitaria Integrata Verona - Verona (Italy)

Background and Goal of Study: Low cardiac output syndrome (LCOS) is the most common complication after surgery for congenital heart disease (CHD). Classic markers to detect LCOS (blood lactate and ScVO2) have several pitfalls and may are not completely reliable indicators of global tissue hypoxia. Aim of the present study is to establish whether the ratio between the veno-arterial carbon dioxide and the arterial-venous oxygen differences [P(v-a)CO2/C(a-v)O2] could predict developing of LCOS after surgery for CHD.
Materials and Methods: This retrospective study involves 61 patients treated for CHD from June 2018 to September 2019 admitted at the Cardiothoracic Intensive Care Unit (ICU). According to our clinical practice, coupled arterial and central venous blood samples were drawn at admission in ICU after surgery, at the occurence of haemodynamic instability or after any variation in fluid or drug therapy, and after extubation. LCOS was established according to echocardiographic criteria associated to a high inotropes requirement and end organ dysfunction (i.e increasing in blood lactate levels, development of acute kidney injury or cerebral rSO2 desaturation). For data analysis, ROC curve were used to asses diagnostic performance of the following indices: lactate, ScVO2, P(v-a)CO2/C(a-v)O2, Oxygen Extraction Ratio (ERO2).
Results and Discussion: High inotropic support was needed in 26.2% of cases and 14.8% of patients developed AKI. The overall incidence of LCOS was 47.5%. Comparing patients that developed LCOS to those with an uneventful postoperative course, there was no statistical significant difference in lactate (p=0,7) and ScVO2 levels (p=0,07). Patients developing LCOS showed an increased value of P(v-a) CO2/C(a-v)O2 (1,974 vs 1,505 p=0,001) and ERO2 (0,34 vs 0,26 p=0,005). The best diagnostic performance in predicting LCOS was reached by P(v-a)CO2/C(a-v) O2 (best cut-off 1,669 mmHg/mL, NPV 83,3%, PPV 67,5%) and ERO2 (best cut-off 0,27%, NPV 72,3, PPV 60,5).
Conclusion: Both P(v-a)CO2/C(a-v)O2 and ERO2 seem to be a more reliable markers of global anaerobic metabolism and useful tools in predicting LCOS even in pediatric cardiac surgery patients.

5878

Anesthetic management of a infant with cor triatriatum sinister anomally and atrioventricular canal defects undergoing closure of the ostium primum atrial septal defect and inlet ventricular septal defect

Korkmaz Toker M.[1], Altıparmak B.[2], Uysal A. I.[1], Gumus Demirbilek S.[2]
[1]Mugla Sıtkı Kocman University - Mugla (Turkey), [2]Mugla Sıtkı Kocman University - Mugla (Turkey)

Background: Cor-triatriatum is seen about 0.1% of patients with congenital heart disease, consisting of a membrane in the left atrium (1). Some challenges for anesthesiologists in patients with cor triatriatum should be managed. We report the anesthetic management of a 7-month old infant with cor triatriatum undergoing closure of atrioventricular (AV) canal defects.
Case report: The patient was 7-month-old with 3000 gr body weight. She underwent an echocardiography and a complete AV canal defect, cor triatriatum were demonstrated. There was 20 mmHg systolic gradient distal to the pulmonary valve diagnosed as pulmonary hypertension. On the operation day, blood pressure was 88/50 mmHg and peripheral O2 saturation 88%. Peripheral venous access was obtained using 24-gauge cannula before induction and the child received 1.5 mg/kg

ketamine and 0.1 mg/kg midazolam, 25 mcg/kg fentanyl and 0.6 mg/kg rocuronium bromide. A 24-G 19-mm single-lumen catheter was inserted in the right radial artery before intubation. Arterial pressure was 75/45 mmHg, arterial pressure did not drop by more than 20%. Anaesthesia was maintained with 1mcg/kg/h fentanyl and 0.05 mg/kg/h midazolam. A 4-F triple-lumen catheter was advanced into the right internal jugular vein. Patient was cooled to 28°C during cardiopulmonary bypass. The total CPB time was 95/min. After complete excision of membrane, ASD was closed and the VSD was repaired. After the completion of repair, the patient was rewarmed to 37°C and weaned from CPB. Dopamine, dobutamine and inhaled ilioprost were administered. The patient was transferred to ICU and discharged from the ICU on the 10th postoperative day.
Discussion: The anesthetic goal for such cases is to prevent exacerbation of pulmonary artery hypertension (PAH). We used the beneficial effects of fentanyl, midazolam based anaesthesia maintenance and inhaled nitric oxide in the perioperative management of pulmonary hypertensive infant associated with cor triatriatum.
References:
1. Alphonso N, Nørgaard MA, Newcomb A, et al. (2005) Cor triatriatum: presentation, diagnosis and long-term surgical results. Ann Thorac Surg 80: 1666–7.
Learning Points: Patients with a reactive pulmonary vasculature, high doses of fentanyl will be useful in blunting increases in PVR associated with surgical stimulation. High doses of fentanyl will also blunt stimulation-induced increases in the SVR, which will increase the mitral regurgitant fraction.

6037

ADHD symptomatology of children with congenital heart disease 7 years after cardiac surgery

Czobor N. R.[1], Ocsovszky Z.[2], Roth G.[3], Szekely A.[1], Konkoly-Thege B.[4]
[1]Semmelweis University - Budapest (Hungary), [2]University of Szeged - Szeged (Hungary), [3]Gottsegen György Hungarian Institute of Cardiology - Budapest (Hungary), [4]University of Toronto - Toronto (Canada)

Background and Goal of Study: The aim of the present study was to investigate the differences in ADHD symptomatology between healthy controls and children who underwent cardiac surgery at different ages.
Materials and Methods: Altogether, 132 children (53 patients with congenital heart disease undergoing cardiac surgery under 3 years of age, 27 operated thereafter, and 52 healthy controls) were examined. ADHD symptoms were assessed on average 6.8 years after first surgery. Both patients and parents were asked to complete the Child Behaviour Checklist, while the ADHD Rating Scale-IV was completed by parents only.
Results and Discussion: Results of the general linear models indicated that surgery status was a significant predictor of most indicators of ADHD symptomatology even after controlling for sex and age at survey completion, with effect sizes in the medium range. Post hoc tests indicated that the ADHD symptoms of those treated surgically above 3 years of age were more severe not just than that of the control group but also those who were treated surgically at a younger age. The control group and those treated surgically below the age of three did not differ significantly across any of the five ADHD severity indicators.
Conclusion: Our findings indicate that the age at the time of cardiac surgery is predictive of later ADHD symptomatology – with younger children having better outcomes.

6310

Anesthetic Strategy for very young children undergoing coronary artery bypass due to Kawasaki disease: Utopia or reality?

Melo W.[1], Roesberg M.[2], Lucas Passos R.[3], Bernardes De Oliveira R.[2], De Paula Tofani G.[2], Abrao J.[3]
[1]Centro Universitario UNINORTE - Rio Branco (Brazil), [2]Hospital Vila da Serra - Belo Horizonte (Brazil), [3]Hospital das Clínicas da Faculdade de Medicina da USP - Ribeirao Preto (Brazil)

Background: Kawasaki disease is one of the most common vasculitis in childhood. Of unknown etiology, it can cause a variety of cardiovascular complications, such as aneurysm and coronary artery stenosis, which may later lead to acute myocardial infarction, arrhythmias, heart failure and sudden death.
Case Report: 2 years old child, 11,470kg, Kawasaki Disease diagnosed in the previous year, in follow-up for residual pericardial effusion. IN a new control echocardiogram, an important left aneurysm measuring about 8mm in diameter was detected. Ventricular ejection fraction of 45%. The patient was then submitted to myocardial revascularization surgery under balanced general anesthesia using sevoflurane, fentanyl and rocuronium. Cephalothin for antibiotic prophylaxis and prevention of bleeding with transamin (bolus + maintenance). During surgery bolus of phenylephrine for blood pressure maintenance. Later on, dobutamine and milrinone at moderate doses, considering ventricular dysfunction were added. Long ICU stay, after surgery developed a severe cardiac dysfunction (EF 36%) and altered walking pattern.
Discussion: Treatment with aspirin-associated intravenous immunoglobulin is effective and should be started early within the first 10 days of illness to prevent cardiac sequelae. The persistence of fever after 24 hours of initiation of treatment should be assumed as refractory disease and it is associated with the development of coronary artery abnormalities. Myocardial revascularization surgery is often indicated in an attempt to relief the symptoms of angina, reduce the risk of acute myocardial failure and aneurysmal rupture. Anesthesia should always keep an hemodynamic stability, as well as maintain an average blood pressure level in order to avoid neurological complications due to hypoxia.
References:
1. Urriola-Martínez M, Molina-Méndez F. Manejo anestésico del paciente con enfermedad de Kawasaki durante la cirugía de revascularización coronaria: informe de un caso Arch Cardiol Mex. 2013;83(4):267-272.
Learning points: Induction in very young patients at risk of aneurysm rupture should be slow and always avoid hemodynamic changes. Hypoxic-ischemic lesions with consequent neurocognitive disorders due to brain immaturity is the risk factor to be considered during anesthesia.

4875

Severe tracheal stenosis: a challenging clinical case with a multidisciplinary approach

Moura Cabral S.[1], Barbosa R.[1], Cunha S.[1], Cunha I.[1], Ferreira A. J.[1], Bernardo J.[1]
[1]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Tracheal stenosis is a rare but a life-threatening condition. The most common indications for tracheal resection and reconstruction are symptomatic concentric stenosis either idiopathic or related to prolonged intubation. First-line tracheal resection is a safe option and obviates the need for repeated endoscopic dilations1.
Case Report: A 46-year-old male, ASA III, with a severe tracheal stenosis due to prolonged intubation by rupture of esophageal varices, was scheduled for tracheal resection and reconstruction. He was a current smoker and medical history included cirrhosis of alcoholic etiology and diabetes mellitus. He presented with stridor and shortness of breath. The exams showed a concentric 5 mm stenosis distancing 3 cm from the vocal cords. Intubation through the stenosis was successful using a microlaryngoscopy tube number 5 and a bronchofiberscope under sedation and maintaining the spontaneous breathing. Sevoflurane, fentanyl and rocuronium were used for maintenance of general anesthesia. The surgical approach with resection of the stenosis around the endotracheal tube allowed no further mobilization of the tube throughout the procedure. Extubation, with forced flexion of the neck, was after complete recovery of consciousness, adequate spontaneous breathing, preventive reflex and muscle strength.
Discussion: Despite the relatively low occurrence, anaesthesia for tracheal resection is one of the most challenging aspects of our practice. The anaesthesiologist must provide adequate ventilation and oxygenation to a patient with a pre-operative critical airway, an intraoperative transected airway and a precarious post-operative airway that may be edematous due to multiple manipulations and cervical flexion positioning2. Our approach avoided a tracheotomy that is itself more invasive and carries an increased risk of restenosis.
References:
1. Elsayed H, Mostafa AM, Soliman S, Shoukry T, El-Nori AA, El-Bawab HY; First-line tracheal resection and primary anastomosis for postintubation tracheal stenosis. Ann R Coll Surg Engl. 2016;98:425-30.
2. Pinsonneault C, Fortier J, Donati F; Tracheal resection and reconstruction, Can J Anesth, 1999, vol. 46(pg.46439-55).
Learning points: This case reports the management of a tracheal stenosis and demonstrates the importance of a detailed clinical history, the approach in severe cases, the surgical technique and mostly the importance of programming solutions by a multidisciplinary team.

5029

Effect of Thoracic Epidural Anesthesia on Cardiac Rhythm in Patients with Paroxysmal Atrial Fibrillation During the Perioperative Period in Thoracic Surgery

Gritsan A.[1], Mitsukov D.[2], Ishutin V.[2], Novokreshchennykh V.[2], Smirnova V.2, Koh N.[2]
[1]Krasnoyarsk Regional Clinical Hospital, Krasnoyarsk State Medical University - Krasnoyarsk (Russia), [2]Krasnoyarsk Regional Clinical Hospital - Krasnoyarsk (Russia)

Background: The occurrence of paroxysmal atrial fibrillation (PAF) in patients in thoracic surgery significantly worsens treatment outcomes. According to the literature review, thoracic epidural anesthesia (TEA) has a protective effect on the cardiac rhythm stabilization.
Goal of study: The research is aimed at assessing the effect of TEA on the incidence of PAF and the features of their course in patients with paroxysmal form of atrial fibrillation (PFAF) after thoracotomy.
Materials and Methods: The study included 2 groups of 20 patients who underwent a lobectomy. Patients of both groups were diagnosed with PFAF. Patients of the control group (CG) got general anesthesia with sevoflurane and fentanyl whereas in the studied group (SG) it was supplemented by TEA with ropivacaine (2 mg/ml) with fentanyl (2 mkg/ml) for 3 days. The study assesses the incidence of PAF during the surgery and in the postoperative period, as well as the duration of paroxysms and the dose of amiodarone for their relief.
Results and Discussion: Initially, all patients had a sinus rhythm. During the intraoperative period the incidence of PAF in patients of the CG was significantly higher than that in the SG (50% (10/20) vs 15% (3/20); p=0.043). Moreover, the duration of PAF in the CG turned out to be longer than in the SG (20.1±5.7 min and 16.3±4.5 min respectively; p<0.05), and the dose of amiodarone is higher (245±53 mg vs 210±38 mg; p<0.05). The short duration of intraoperative PAF can be explained by the reflex character, which is confirmed by their occurrence during traction of the heart, as well as during electrocoagulation. In the postoperative period, the incidence of PAF in the CG also exceeded that in the SG (65% (13/20) vs 25% (5/20); p=0.026). The duration of PAF (158.5±48.3 min), as well as the dose of amiodarone (515±135 mg) in patients of the CG, significantly exceeded the similar parameters in the SG (115.2±36.5 min and 405±118 mg respectively; in both cases p<0.05). In this situation positive effects of TEA can be associated with sympatholysis, improved gas exchange, correction of the pain syndrome, as well as the antiarrhythmic effect of the local anesthetic.
Conclusion: The addition of TEA to the anesthetic protocol and the postoperative analgesia in patients with PFAF in thoracic surgery improves the perioperative period by reducing the incidence of PAF, as well as their modification in the form of the decreased duration and less resistance to antiarrhythmic therapy.

5155

Atypical ACTH-producing carcinoid tumor of thymic origin. Anesthetic management. Postoperative complications

Martinez Plumed R. M.[1], Granell Gil M.[1], Biosca Perez E.[1], Petrini G.[2], De Andres Ibañez J.[1], Guijarro Jorge R.[1]
[1]Consorcio Hospital General Universitario Valencia - Valencia (Spain), [2]Città Della Salute E Della Scienza - Torino (Italy)

Case report: Patient, 48-year-old male, in charge of Thoracic Surgery of General Hospital of Valencia for surgery of atypical ACTH-producing carcinoid tumor of thymic origin. The patient has secondary Cushing syndrome, with alkalosis and hypokalemia, IDDM, hypertension and pulmonary aspergillosis, in treatment with voriconazole. In pulmonary CT the anterior mediastinal mass is visualized, in contact with large vessels. In preoperative analysis, thrombocytopenia secondary to chronic treatment with ketoconazole. Surgery is scheduled, along with Cardiac Surgery. Transfusion of 1 pool of platelets and administration of 200 mg hydrocortisone. Airway management was performed using 37 Fr Vivasight DL and a videolaryngoscope. Thymic tumor excision through sternotomy, without incidents. In the immediate postoperative period in ICU, massive bleeding, requiring urgent intervention, where diffuse bleeding is noted. After that, coagulopathy with polytransfusion and severe ARDS requiring deep sedation, relaxation, pulmonary protection ventilation and inhaled nitric oxide. Unfavorable evolution, the patient dies after 5 weeks of admission.
Discussion: Cushing syndrome by ectopic ACTH secretion is caused by excess ACTH secretion by a non-pituitary tumor. Hypokalemia, psychiatric disorders and fractures are most frequently observed. There is a high risk of opportunistic fungal infections. In preoperative assessment is necessary to stabilize coexisting diseases before surgery. The lung is the main site in 50% of cases. Other origins include thymic endocrine tumors. The treatment is curative surgery. The anesthetic management of the mediastinal masses is complicate, especially to prevent airway complications. There is no correlation between the clinic and the degree of tracheal compression seen in imaging test. Minimizing invasive procedures allows limiting the use of general anesthesia and neuromuscular relaxants, thus avoiding ventilatory collapse. The intensity of the perioperative immunoinflammatory response is related to postoperative prognosis, recommending the use of anesthetic techniques to attenuate it (locoregional anesthesia, halogenated agents). Perioperative hypervolemia increases morbidity, stay in ICU and postoperative mortality, due to respiratory complications. In conclusion, the perioperative treatment must be adapted to the patient and the surgical procedure, in order to limit the harmful consequences of surgical, anesthetic and ventilatory aggressions.

5440

Perioperative inflammation related to chronic arterial hypertension may be associated with a greater rate of cancer recurrence after lung resection surgery

Aznar P. T.[1], Higuero F.[1], De Miguel J. P.[1], Martínez-Gazcueña D.[1], Sánchez Pérez E.[1], Hortal J.[1]
[1]Hospital General Universitario Gregorio Marañon - Madrid (Spain)

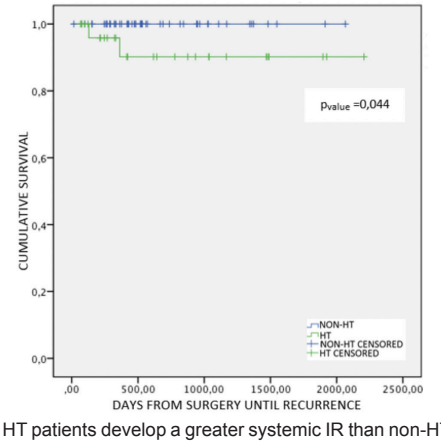
Background and Goal of Study: Chronic hypertension (HT) is one of the most common chronic medical conditions. Inflammation is a cause and consequence of chronic HT. Inflammatory response (IR) plays a major role in tumor progression. The goal of this study was to evaluate the relationship between chronic HT and inflammatory biomarkers (IB) during the perioperative period of lung resection surgery (LRS) and to evaluate its influence in cancer recurrence.
Materials and Methods: 174 patients who underwent LRS were classified as non-HT (n=95); HT grade I (n=38), patients preoperatively well controlled with 1 hypotensive drug, or HT grade II (n=41), patients who need 2 or more hypotensive drug to control preoperative arterial blood pressure or patients who have had an hypertensive emergency during the previous 12 months. Blood was drawn at baseline (before one lung ventilation [OLV]), at 30 min after the start and at the end of the OLV and 6 and 24 hours after the end of the surgery. IB were measured using Western blot. Kruskal Wallis, Mann-Whitney U and $\chi 2$ tests were used to analyse and compare all data and Kaplan Meier estimator was used to analyse recurrence. Results and Discussion: Table 1 and Graph 1 shows the results from this study. IR was higher at 6 hours postoperative in HT patients. Preoperative HT was associated with a bigger rate of oncological recurrence. HT is associated to a broader inflammatory state, which can worsen tumor progression. Thus, there could be a causal relationship between the highest perioperative inflammatory response in HT patients and the greatest tumor recurrence in these patients.

TABLE 1: PERIOPERATIVE INFLAMMATORY BIOMARKERS IN NON-HYPERTENSIVE AND HYPERTENSIVE PATIENTS UNDERGOING LUNG RESECTION SURGERY

		BAS Mean (SD)	OLV30 Mean (SD)	OLV END Mean (SD)	PO 6h Mean (SD)	PO 24h Mean (SD)
IL1	Non-HT	27.8 (6.2)	30.9 (9)	31.6 (5)	34.8* (12)	33.4 (9)
	HT Grade I	27.9 (6.1)	31.7 (6)	31.6 (5)	32.7* (10)	34.1 (12)
	HT Grade II	27.7 (5.5)	30.6 (7)	34.2 (9)	39.7 (13)	36.7 (9)
	ANOVA	NS	NS	NS	**0.038**	NS
IL6	Non-HT	3.03 (0.3)	3.64 (0.7)	4.18 (1.1)	3.88* (1.1)	3.69 (0.8)
	HT Grade I	2.93 (0.3)	3.71 (1.0)	4.31 (1.0)	3.89 (1.1)	3.72 (0.7)
	HT Grade II	3.18 (1.2)	3.63 (0.5)	4.50 (1.0)	4.45 (1.3)	3.86 (0.8)
	ANOVA	NS	NS	NS	**0.029**	NS
IL2	Non-HT	0.85 (0.1)	1.33 (0.3)	1.19 (0.4)	1.14* (0.3)	1.14 (0.3)
	HT Grade I	0.85 (0.1)	1.37 (0.3)	1.19 (0.4)	1.13 (0.3)	1.13 (0.3)
	HT Grade II	0.85 (0.1)	1.35 (0.4)	1.24 (0.3)	1.30 (0.4)	1.27 (0.4)
	ANOVA	NS	NS	NS	**0.029**	**0.049**
IL7	Non-HT	2.74 (1.0)	3.04 (0.6)	5.3*& (1.4)	5.45* (2.1)	3.85 (0.8)
	HT Grade I	2.80 (0.7)	2.84 (0.6)	5.8 (2.2)	5.39 (1.9)	3.96 (0.9)
	HT Grade II	2.71 (0.9)	3.20 (0.9)	6.5 (2.5)	6.65 (2.5)	4.08 (0.7)
	ANOVA	NS	NS	**0.047**	**0.012**	NS

Bonferroni post hoc: (*) p <0.05 vs Grade II
(&) p<0.05 HT (grade I and grade III vs No-HT patients

GRAPH 1: KAPLAN MEIER PLOT OF DAYS UNTIL RECURRENCE IN NON-HT AND HT PATIENTS AFTER LUNG RESECTION SURGERY



Conclusions: HT patients develop a greater systemic IR than non-HT patients after LRS. IR is more pronounced in HT grade II. Postoperative outcome is related with the presence of preoperative HT and the severity of HT.

5673

The Effects of Thoracoscopic Intercostal Nerve Blocks in Patients Receiving Non-intubated VATS and Endotracheal Intubated VATS

Han S. C.[1], Wu L. L.[2], Chen J. S.[1], Cheng Y. J.[2]
[1]National Taiwan University Hospital - Taipei (Taiwan), [2]National Taiwan University Cancer Canter - Taipei (Taiwan)

Background and Goal of Study: Regional anesthesia may have anesthetic-sparing effects. However, the effects of regional anesthesia were rarely investigated. In this study, we analyzed the effects of intraoperative thoracoscopic intercostal nerve blocks (ICBs) from T3 to T8 on the effect-site concentration (Ce) of propofol and remifentanil infusions for non-intubated VATS (NIVATS) and intubated VATS (IVATS).
Materials and Methods: Sixty ASA I to II patients suitable for NIVATS were randomly divided into NIVATS and IVATS groups. Anesthesia was induced and maintained with intravenous propofol and remifentanil with TCI. ICBs were performed after artificial pneumothorax. The data of BIS, Ce for remifentanil and propofol were recorded and retrospectively analyzed.
Results and Discussion: The effects on ICBs, the changes of Ce were demonstrated in figure 1. The results of two-way ANOVA were shown in table 1.
Conclusion: More analgesics but not hypnotics were needed on IVATS than on NIVATS. The effects of ICBs onset almost immediately after blocks by a significantly reduced BIS. The anesthetic-sparing effects are shown by significantly decreased Ce for both drugs 10 minutes after ICBs.

5964

Postoperative quality of recovery after nonintubated thoracoscopic lung resection surgery: a randomized controlled trial

Hung M. H.[1], Wang M. L.[2], Cheng Y. J.[2], Chen J. S.[2]
[1]National Taiwan University Hospital Hsinchu Branch - Hsinchu City (Taiwan), [2]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Nonintubated anesthesia has been reported as a feasible alternative of intubated general anesthesia for patients undergoing thoracoscopic pulmonary resection. Retrospective studies showed that a nonintubated thoracoscopic approach provides faster recovery after surgery. However, the quality of recovery after nonintubated thoracoscopic surgery is rarely evaluated in a prospectively randomized study design.
Materials and Methods: We evaluated the postoperative quality of recovery and safety of nonintubated thoracoscopic approach for management of lung tumors. Patients were randomly assigned to undergo thoracic surgery using either nonintubated or intubated approaches. A modified Postoperative Quality of Recovery Scale (PQRS) was used to assess physiological, emotive, nociceptive, functional, and cognitive recovery at 50 minutes (T50) and 1 day (D1) after surgery. Each domain recovery as primary endpoints was defined as PQRS scores returning to baseline values or better. Postoperative hospital stay, chest drainage, and complications were also evaluated as secondary endpoints.
Results and Discussion: A total of 151 patients were assigned to receive nonintubated anesthesia and 149 to receive intubated anesthesia for thoracoscopic pulmonary resection. There were no differences between groups in overall recovery (odds ratios for nonintubated group in T50 and D1 were 8.67 (CI: 0.46 – 162.57) and 1.25 (CI: 0.54 – 2.89), respectively. Individual domains were only significantly favored nonintubated group in T50 nociceptive recovery (odds ratio: 2.21, CI: 1.28 – 3.81) but less favor nonintubated group in D1 cognitive recovery (odds ratio: 0.39, CI: 0.20 – 0.74). Clinically, there were no differences between groups in length of hospital stay, chest drainage, and postoperative complications.
Conclusion: Nonintubated anesthesia management for thoracoscopic surgery did not provide a better overall quality of recovery after surgery. Even so, it may be associated with faster immediate nociceptive recovery but with less favored early cognitive recovery. Tracheal intubation or not seems to be equally safe in selective patients undergoing thoracoscopic surgery.

6025

An approach to a new minimal invasive surgical procedure for chest wall repair in patients with pectus excavatum: “PECTUS UP”

Arespacochaga Ramos G.[1], Carmona Prieto M.[1], Palamidessi Domínguez J.[1], Martínez Caridad J.[1], Albajar Bobes A.[1], García Fernández J.[1]
[1]Hospital Universitario Puerta de Hierro Majadahonda - Majadahonda (Spain)

Background and Goal of Study: Pectus excavatum (PE) is the most common chest wall malformation with an incidence of 1 out of 400 newborn and it is three times more frecuent in males. The cardiorrespiratory morbidity and the psychosocial impact it has are the main clinical issues we found in these patients. In recent years, new surgical procedures regarding pectus excavatum chest wall repair have emerged, one of which is the “Pectus Up”. Due to its minimal invasiveness and the much shorter recovery period associated, this procedure is blazing new trails towards chest wall repair surgery.
Materials and Methods: From June 2017 to August 2019 a total of 18 (n=18) pectus excavatum repair surgeries by the “Pectus Up” method were performed in our hospital. While hospitalized, or at the prospective surgeon visits, patients were asked about their satisfaction with the procedure. The main clinical outcomes were short and long term complications, mean hospitalization time, individual satisfaction with the procedure and the use of analgesia in the postoperative period.
Results and Discussion: No cases of intraoperative complications were found in this study (0%). Short term complications were mild pain (2 patients, 11%) ten days after the surgery and the appearance of a serous exudate at the surgical wound reported by three patients (17%), whereas long terms complications involved problems in relation to subdermal metal plate. A protrusion of the plate was noted in five patients (27%). Nevertheless, two of these patient’s surgical wires were broken, desestabilizing the plate and leading to a recurrence of the pectus excavatum. The mean hospital stay time was 2.55 days. Analgesia used in these patients involved NSAIDs and opioids. The whole sample with no recurrence of the pectus excavatum (88%, sixteen patients) reported high levels of satisfaction with the procedure.
Conclusion: “Pectus Up” is a minimal invasive surgical procedure used for chest wall reparation in pectus excavatum. It has shown a short convalescence period and satisfactory short and medium term results with low incidence of complications, although long term efectiveness is still needed to be validated.

6085

Routine practice of Erector Spinae Plane Block for Video Assisted Thoracoscopic Surgery: Experience in our centre

Marín Moya M.[1], Benito Gómez A.[1], Cebrian Moreno A.[1], Mestres González G.[1], Martínez Pérez J. A.[1], Asbert Sagasti R.[1]
[1]Hospital Universitari Mutua Terrassa - Barcelona (Spain)

Background and Goal of Study: The erector spinae plane (ESP) block was described in 2016 as a novel regional anesthetic technique for thoracic analgesia. [1] This block is easier to perform than Paravertebral Block and Thoracic Epidural, therefore, it represents an attractive alternative to the existing techniques. In this descriptive report we describe our experience with ESP Block as part of a multimodal anaesthetic approach in several patients who underwent different video-assisted thoracoscopic (VATS) surgeries.
Materials and Methods: After general anaesthesia induction, the ESP block was performed in lateral decubitus between T5 and T7 level with ultrasound guidance. There were administered a volume of 30 mL of local anaesthetic. In some cases, those involving a pulmonary resection surgery, a catheter was placed in the same plane after the initial administration of local anaesthetic. Pain was evaluated with the Visual Analogue Scale (VAS) from 0 to 10 in the postoperative, as well as the need for rescue intravenous analgesia if VAS was greater than 3. In the cases where a catheter was placed, it was removed the third postoperative day.
Results and Discussion: We collected data of all the ESP Blocks implemented in patients who underwent VATS surgery during years 2018-2019. In this series of cases we performed a total amount of 78 ESP Block; 60 were a single puncture, 5 were 2 level puncture and 13 were with a catheter placement. Pending of the final results, most of the patients reported a good level of analgesia with high satisfaction during their admission. Although some of them required rescue analgesia with opioids, all patients were able to complete their postoperative pulmonary rehabilitation with adequate pain management. Neither complications related to the blocks nor the use of opioids were seen.
Conclusions: ESP block seems to be a safe, easy and effective technique for thoracic surgery; consequently it has become a regular practice in our center and in some procedures it is now our first regional analgesia choice. Adding a catheter and

a continuous infusion of local anaesthetic could be a good alternative for longer and more painful surgeries. Further studies are needed to compare the effectiveness towards thoracic epidural and paravertebral block.

References:
1. Forero M, Adhikary SD, Lopez H, et al. The erector spinae plane block: a novel analgesic technique in thoracic neuropathic pain. Reg Anesth Pain Med. 2016;41(5):621–627.

6124

Erector Spinae Plane Block as an Effective Analgesia Method After Thoracotomy in a 4 Year Old Boy

Dilik B.[1], Safak B.[1], Solak S.[1], Buyuk S.[1], Yildirim Guclu C.[1]
[1]Ankara University Faculty of Medicine - Ankara (Turkey)

Background: In pediatric patients, pain control after open thoracotomy is a challenging problem. Erector spinae plane block is a new and promising block for many analgesia treatments.
Case Report: A 4-year-old,16kg boy, was admitted to the hospital with metastatic nodule adjacent to the pleural area in the right lung and surgical resection was planned. The patient was evaluated the day before the surgey and examination was normal. After obtaining consent from parents,he was taken into the operating room. The operation took 90 minutes in right lateral decubitis position and the tumour was removed through a posterolateral incision. The patient was administered 15mg/kg paracetamol for analgesia. ESPB was planned for postoperative analgesia. IV fentanyl PCA (10mcg bolus, 30min lockout) was programmed as a rescue analgesic. At the end of surgery while the patient is still in the lateral position, transvers proces of T5 vertebra visualized with a lineer USG probe. A 22G block needle was inserted in-plane in a craniocaudal direction to contact the tip of the T5 transvers process. After the correction of the needle tip location with 2ml %0.9 NaCl, 8ml %0.025 bupivacaine was injected that was seen to spread from T3 to T8.There were no additional problems during the operation period. Postoperative pain was utilized with Wong-Baker FACES Pain Rating Scale at 2,6,24 and 48 hours. The scores at rest were 4-2-2-2 respectively. The scores didn't change with movement and coughing. He needed analgesic only at eighth hour after operation. He mobilized at postop 22 hour. The chest tube was removed at third day after the operation. He was discharged from the hospital 6 days after the operation.
Discussion: ESPB is a recently described interfacial plan block for the treatment of thoracic neuropathic pain, trauma, and acute pain after surgery. With easy recognition of sonoanatomy, ESPB is a simple and reliable block, provides multisegmental analgesia with a single injection, besides doesn't have the adverse effects and complications of paravertebral block and thoracic epidural analgesia.
References:
1. Felipe M., Javier C., Antonio JB., Ki JC. Erector spinae plane block for postoperative analgesia in pediatric oncological thoracic surgery. Can J Anesth/J Can Anesth (2017)64:880–882.
Learning points: ESPB is an effective regional analgesia techique that can be easily performed with ultrasound guidance in pediatric patients.

6235

The effect of US guided serratus anterior plane block (SAPB) in addition to intrathecal morphine for early postoperative period after Video-Assisted Thoracoscopic Surgery (VATS): a randomised controlled study

Azizoglu M.[1], Yapıcı D.[1], Bayülgen A.[1], Sagün A.[1], Özdemir L.[1], Atıcı S.[1]
[1]Mersin University, Faculty of Medicine - Mersin (Turkey)

Background and Goal of Study: Intratechal morphine(ITM) provides prolonged postoperative analgesia lasting approximately 24h, but the peak analgesic effect occurs up to six hours after administration.Therefore, an additional analgesia is needed for about 6h.The aim of this study was to evaluate the effect of serratus anterior plane block (SAPB) in addition to intrathecal morphine for early postoperative period after VATS on the amount of morphine consumption and the Visual Analogue Scale(VAS) scores.
Materials and Methods: By obtaining ethics committee approval, we conducted a prospective study in 64 patients, undergoing VATS. SAPB Group(n=32) received 0.4 ml/kg bupivacaine 0.250% at the level of fifth rib with US guidance in addition to intrathecal morphine 0.6 mg, ITM Group(n=32) received only intrathecal morphine 0.6 mg after an induction of anesthesia. Primary outcomes were the amount of morphine consumption, VAS-S and VAS-D. Mann Whitney U test used for comparison.
Results and Discussion: A total of 64 patients included in the study. Mean morphine consumption was significantly lower in the SAPB group at all hours. Compared with the control group, VAS scores at rest and coughing were significantly lower at 0,6 and 12. hours after surgery (Figure 1-2). Pain scores were significantly higher in the SAPB group in patients where trochar was inserted at upper than lower intercostal space (3-4 vs 5-7) at 0. and 6. hours during postoperative period.

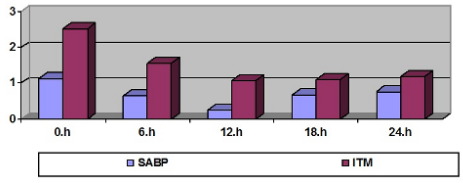


Figure 1

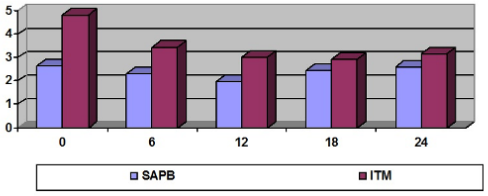


Figure 2

Conclusion: SAPB added intrathecal morphine are safe and effective way to improve pain control for early postoperative period after VATS. SAPB ensures better analgesia until the peak effect of spinal morphine occurs. More studies needed to investigate proper technique in patients who operated with upper intercostal space.

4544

Perioperative Stanford type A aortic dissection in a renal transplantation donor: a case report

Nakagomi S.[1], Satomoto M.[1], Sumner R.[1], Baba H.[1], Yamamoto Y.[1], Ochiai R.[1]
[1]Toho University Omori Hospital - 大田区 (Japan)

Background: Mortality of iatrogenic aortic dissection is reportedly 43% (1). Most instances of perioperative aortic dissection onset occur during cardiovascular surgery. We found reports of 24 cases of iliac artery dissection in renal transplant recipients (2), but there have been no reports of Stanford type A dissection in renal transplant donors.
Case report: A 63-year-old man was scheduled for laparoscopic nephrectomy as a renal transplantation donor under epidural and general anesthesia. The patient had medical history of hypertension and hyperlipidemia and was taking an angiotensin II receptor blocker and a statin. The operation proceeded normally, but the patient required emergency hemostasis 3 hours postoperatively because of hypotension that involved bleeding from the drainage tube. Although there was no obvious bleeding from artery, bleeding from vein was observed. The patient had decreased platelets (6,7000/μL), prolonged prothrombin time (international normalized ratio: 1.5), and hypofibrinogenemia (75mg/dL). Transfusion of 6 units of packed red blood cells, 20 units of fresh-frozen plasma, 20 units of platelets, and 2 grams of fibrinogen concentrate required to stop bleeding at last. A clinical diagnosis of disseminated intravascular coagulation (DIC) was made; however, it was difficult to determine the cause of the DIC because of postoperative hemorrhage (the total amount of blood lost during primary operation was approximately 1,800mL). Therefore, plain computed tomography (CT) scan which had taken after the nephrectomy was reviewed to search cause of the DIC, and it was suspected that the patient had a diagnosis with Stanford type A aortic dissection. Finally, the diagnosis was confirmed by contrast CT scan and the patient underwent an emergency third surgery immediately.
Discussion: Acute aortic dissection developed during or after initial surgery, but symptoms such as chest pain and back pain were masked by continuous epidural analgia. Meanwhile platelets and coagulation factors were exhausted, and the patient fell into DIC. As a result, bleeding persisted.
References:
1. Interactive Cardiovascular and Thoracic Surgery. 2006.
2. Transplantation Proceedings. 2019.
Learning points: An aortic dissection might be considered when a patient shows a coagulation disorder that does not correspond with clinical symptoms.

4424

Blowout syndrome of femoral artery after radical vulvectomy

Videnovic N.[1], Mladenovic J.[2], Filipovic M.[1], Tokic B.[3], Zdravkovic R.[4], Kostic A.[5]
[1]University of Pristina, Faculty of Medicine - Kosovska Mitrovica (Serbia), [2]University of Pristina, Faculty of Medicine, - Kosovska Mitrovica (Serbia), [3]Department of Anesthesiology, Clinical Center - Gracanica (Serbia), [4] Institute for Cardiovascular Diseases of Vojvodina - Sremska Kamenica (Serbia), [5]Department of Surgery, Clinical Center - Gracanica (Serbia)

Background: Carcinoma of the vulva represents 4-5% of all genital tract carcinoma. The occurrence of metastatic changes in the inguinal lymph nodes, often associated with the present infection and radiation therapy may involve femoral blood vessels, lead to bleeding, severe hemorrhagic shock and death.
Case Report: A 60-year-old woman, received due to occasional bleeding from the inguinal region. Six months ago a radical operation was performed with bilateral dissection of the inguinal lymph nodes due to the vulvar carcinoma. During hospitalization, there is spontaneous, massive bleeding from the left femoral artery, the development of severe haemorrhagic shock, respiratory failure, and disturbances of consciousness with a predisposing heart failure. Immediately she was introduced into the operating room with reanimation measures and compression of left invinal region. Introduced in general anesthesia and surgery was performed on femoral artery. Postoperatively she was on mechanical ventilation and analgosedation to hemodynamic stabilization and correction of biochemical disorders. She was discharged from the hospital 12 days after surgery.
Discussion: Respecting the reanimation recommendations made it possible to get time to perform surgical intervention and to prevent further loss of blood from the femoral artery. Although numerous surgical vascular techniques have been described in order to resolve disturbed circulation in the femoral vessels due to metastatic changes in the lymph nodes of the inguinal region, our surgical team has done the femoral artery wall suture. Such a procedure is dictated by the difficult general condition of the patient, by the lack of a vascular surgeon in the operative team (intervention performed by abdominal surgeons), by insufficient team experience to deal with such urgent vascular situations, but also by the need to quickly and effectively stop further bleeding from the femoral artery.
Learning points: Aggressive reanimation treatment, taken on time and with respect to the resuscitation guide and intensive care, can save the life of these patients. Minimally invasive surgical approach is a highly desirable, safe and effective palliative management option in such cases.

4837

Considerations in performing anesthesia for the patient with an aortoesophageal fistula secondary to the aortic lesion; a rare and fatal complication

Kataoka K.[1], Kakemizu M.[1]
[1]Juntendo University Hospital - Bunkyoku (Japan)

Background: Aortoesophageal fistula secondary to the aortic lesion (AEF) is a rare lethal complication1)2)3) . For us anesthesiologists, however, its severity is not widely known. Through this case, considerations for AEF are discussed.
Case Report: 45-year-old man presented melena four months after the total arch replacement due to acute aortic dissection. The gastrointestinal fiberscope revealed an AEF and he received stent grafting (TEVAR) in the descending aorta. As the infection and melena did not improve in spite of fasting and antibiotics, he was scheduled for esophagectomy and descending aorta replacement, which was 6 months after the diagnosis of AEF. His cardiopulmonary function was normal and the laboratory exam showed WBC7.1*109/L, Hb8.3g/dL, Hct23.8%, Plt194*109/L, PT(INR)1.42, Alb2.6g/dL, CRP4.74mg/dL. He came to the OR on foot. In the operation, he got deteriorated after esophagectomy with refractory hypotension, deteriorated ventilation and oxygenation, and massive bleeding. Due to the uncontrollable status, the surgeons decided to pack gauzes to close the chest. He died in the ICU 19 hours after the operation.
Discussion: There is no consensus concerning the optimal treatment for AEF. Recently, however, a few studies reported that conservative treatments result in no late survival1)3) and that esophagectomy and descending aorta replacement should be done as soon as the diagnosis of AEF1)2). The deterioration of the patient is attributed to intravascular hypovolemia due to malnutrition, surgical stress, cardiopulmonary bypass (CPB) and massive bleeding, which was far complicated by focal infection becoming systemic through CPB and also by massive bleeding. Administration of albumin and fresh frozen plasma from the early stage, and using a suction system other than the CPB might have brought another result.
References:
1. Yamazato, et al. Surgical strategy for the treatment of aortoesophageal fistula. The J of Thoracic and Cardiovascular Surg. Jan. 2018: 32-40.
2. Czerny M, et al. New insights regarding the incidence, presentation and treatment options of aorto-oesophageal fistulation after thoracic endovascular aortic repair. Eur J Cardiothorac Surg. 2014;45:452-7.
3. Ito T, et al. Total surgical repair for secondary aortoesophageal fistula: two case reports. General Thoracic and Cardiovascular Surgery. Jan 2019.
Learning points: AEF is a rare but fatal condition. We have to be prepared for sudden deterioration.

5194

Pre-operative cardiac evaluation of patients undergoing peripheral vascular surgery using coronary CT-derived fractional flow reserve (FFRCT) may reduce post-operative cardiac complications

Zellans E.[1], Krievins D.[1], Latkovskis G.[1], Kaufmanis K.[1], Bruvere M.[1], Zarins C. K.[2]
[1]Pauls Stradins Clinical University hospital - Riga (Latvia), [2]HeartFlow Inc - Redwood City (United States)

Background and Goal of Study: Patients undergoing peripheral vascular surgery (PVS) have high risk of cardiac complications with 3% hospital mortality and >5% 30-day MACE (death/MI). Current guidelines recommend no pre-op cardiac testing of patients with no CAD symptoms. A new non-invasive cardiac test, coronary CT-derived fractional flow reserve (FFRCT) reliably identifies patients with coronary ischemia. We sought to determine whether pre-op diagnosis of coronary ischemia using FFRCT can facilitate multidisciplinary care of PVS patients to reduce post-op death/MI.
Materials and Methods: Patients with no cardiac symptoms admitted for elective PVS had pre-op coronary CT angiography (CTA) and FFRCT in a prospective Study and were compared to matched Control patients undergoing surgery with standard pre-op cardiac evaluation. FFRCT results were available to treating physicians in Study with guidance by multidisciplinary Vascular Team. Coronary ischemia was defined as FFRCT ≤0.80 distal to stenosis in a major coronary artery with ≤0.75 indicating severe ischemia. Primary endpoint was MACE (death/MI) at 30 days and 6 months.
Results and Discussion: Study patients (n=126) were similar to Controls (n=130) with regard to age (66±8 v. 66±8 years), gender (80% v. 82% male), cardiac risk factors, and surgery performed. Coronary CTA in Study revealed left main disease in 7% and ≥50% stenosis in 70%. FFRCT analysis revealed significant silent coronary ischemia in 86 patients (68%) with severe ischemia in 53%. Indicated vascular surgery was performed in Study with knowledge of silent ischemia using cardiac anesthesia and intensive care with no post-op deaths or MI. In Control there were 7 MIs and 5 post-op deaths. MACE at 30 days, in Study was 0% vs 5.4% in Control (p=0.060). On the basis of FFRCT findings, elective coronary revascularization was performed in 50 patients with severe coronary ischemia (45 stents; 5 CABG), 1-3 months after recovery from surgery. MACE at 6 months was reduced in Study (2/126, 1.6%) compared to Control (9/130, 6.9%, P=0.034).
Conclusion: Patients undergoing PVS have high prevalence (68%) of silent coronary ischemia. Pre-op diagnosis with FFRCT can identify high risk patients and facilitate multidisciplinary care to improve outcome. Favorable results with staged peripheral and coronary revascularization suggest the need for prospective, controlled trials to further define the role of FFRCT in assessment of PVD patients.

5401

Neutrophil-lymphocyte ratio and platelet-lymphocyte ratio as predictors for adverse events in endovascular aneurysm repair for abdominal aortic aneurysm

Ntalouka M.[1], Nana P.[1], Kouvelos G.[1], Kolonia K.[1], Matsagkas M.[1], Arnaoutoglou E.[1]
[1]University of Thessaly, Faculty of Medicine, Univeristy Hospital of Larissa - Larissa (Greece)

Background and Goal of Study: This study investigated the association of chronic inflammatory markers with the clinical outcome after endovascular aneurysm repair (EVAR) for abdominal aortic aneurysm.
Materials and Methods: The study included 230 consecutive AAA patients, treated

electively by EVAR from March 2016 to February 2019. The values of simple inflammatory markers, neutrophil-lymphocyte ratio (NLR) and platelet-lymphocyte ratio (PLR), were measured pre- and postoperatively. Adverse events included any major adverse cardiovascular events (MACE), acute kidney injury and death from any cause.
Results and Discussion: Adverse events occurred in 12 patients (6%). Seven patients suffered from cardiovascular event and five patients from acute kidney injury. The values of NLR and PLR were significantly increased after the procedure (NRL: from 3.34 to 8.64, p<0.001 and PLR: from 11.37 to 17.21, p<0.001). None of the markers were predictive for the occurrence of a cardiovascular event. Receiver operating characteristic curve analysis showed that postoperative NLR and PLR were strong predictors of acute kidney injury after the EVAR procedure (area under the curve, NLR: 0.843; P=0.009 and PLR: 0.754, p=0.05). Areas under the curve for preoperative values of NLR and PLR were 0.595 (p=0.46) and 0.604 (p= 0.426). A threshold postoperative NLR value of 9.9 was highly associated with the occurrence of acute kidney injury, with a sensitivity of 80% and specificity of 81%. A threshold postoperative PLR value of 22.8 was highly associated with the occurrence of acute kidney injury, with a sensitivity of 80% and specificity of 83%.
Conclusion: Postoperative NLR and PLR are useful prognostic factors for the occurrence of acute kidney injury after EVAR for AAA.

5565

Postoperative complications after Type b aortic dissection endovascular treatment

Williams A.[1], Pérez C.[1], Coto C.[1], Baeza L.[1], Vega M.[1], Arenas E.[1]
[1]Hospital Universitario Central de Asturias - Oviedo (Spain)

Background and Goal of Study: Aortic dissection is a life-threatening condition associated with high morbidity and mortality. Type B aortic dissection, according to the Stanford classification, involves only the descending aorta. Endovascular treatment is one of the most innovative approaches of this disease. The aim of this study is to evaluate the postoperative complications after endovascular surgical treatment of type B aortic dissection.
Materials and Methods: In this descriptive, retrospective and unicentric observational study, we collected data from the electronic medical records of 25 patients undergoing endovascular surgery over a period of 5 years (January 2015 – September 2019). We analyzed different variables, such as sex, age, hospital admission, ASA-classification, mortality during hospital admission, general postoperative complications and specific postoperative complications. We performed the statistical analysis using SPSS Statistics. Data are presented in absolute values and percentages or mean ± SD.
Results and Discussion: After studying 25 patients in our hospital, we observed these overall results: 72% were men, average age was 66 (±11) years old, and ASA II and III was obtained in most patients (95%). The average hospital admission was 14 (± 11) days. Thoracic endovascular aortic repair was performed in 23 patients (95%), 16 of which were emergent surgeries (64%). Mortality during hospital admission was 16%. We observed an incidence of general postoperative complications in 80% of the patients and specific postoperative complications in 72%. The most frequent complications were arterial hypertension (72%), delirium (32%), acute kidney injury (28%), refractory pain (24%), cardiorespiratory arrest (16%) and infection (16%).
Conclusion: Our results suggest that thoracic endovascular aortic repair in Stanford type b aortic dissections lead to an increased incidence of arterial hypertension, delirium, acute kidney injury and refractory pain in postoperative care units. Nevertheless, further investigation is needed to determine this association in larger prospective studies.

5628

Open abdominal aortic aneurysm repair: how to determine the Maximum Surgical Blood Ordering Schedule?

Coelho M.[1], Carp M.[1], Costa F.[1], Alves Â.[1], Conde P.[1]
[1]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background and Goal of Study: Despite advances in surgery, endovascular aneurysm repair is not always an option. Patients undergoing elective open abdominal aortic aneurysm (AAA) repair are at greater risk of requiring red blood cells (RBC) transfusion1, with multiple studies showing association between RBC transfusion and increased mortality and morbidity2. Avoiding over crossmatching is important in order to best manage RBC stock and avoid unnecessary allocation of resources. However, there is a lack of guidelines advising the number of crossmatch units RBC needed. The C/T index is the ratio of blood cross-match blood units to the number of transfused blood units. Researchers have rated C/T index from 2.1 to 3.1 as the result of the optimal use of blood.4 We determine the Maximum Surgical Blood Ordering Schedule (MSBOS) for open AAA repair at our hospital.
Materials and Methods: A retrospective observational study took place in our hospital between January 2016 and April 2017, for all patients who underwent open AAA elective repair and analyzed, among others, the hemoglobin values, blood loss and RBC units transfused.
Results and Discussion: For a population of 35 patients, an average of 3,49 RBC units per person were pre-operatively cross-matched. In total only an average of 0,91 units were transfused per patient. Because only 37.1% of the patients were transfused, this subgroup received an average of 2.46 RBC units.The mean value of preoperatory hemoglobin was 13,4 g/dL and blood loss was around 1575 ml per surgery with a delta hemoglobin mean value of 5g/dL. With the aim of avoiding unnecessary cross-matching and maintaining patient safety we opted for a C/T index of 3,1 to determine our MSBOS4.
Conclusion: For patients submitted to open AAA repair at our hospital, we established an MSBOS of 3.
References:
1. Stoneham, M, et al; Effects of a targeted blood management programme on allogeneic blood transfusion in abdominal aortic aneurysm surgery Transfusion Medicine Dec 17.
2. Wedel, C, et all;Red blood cell transfusion associated with increased morbidity and mortality in patients undergoing elective open abdominal aortic aneurysm repair;PLOS ONE: uly 11,2019.
3. Lowe E, et all; Are we cross-matching too much blood for elective open abdominal aortic aneurysm repair?;SAGE Open MedicineVol5:1–4.
4. Hashemi, S., et all;Determining Model for Maximum Blood Request (MSBOS) for Surgery: An Elective Surgery in Imam Ali Hospital, Zahedan, Iran; IJHOSCR 13(2) April 19.

5910

Spinal cord injury (sci) after a successful hybrid repair combining endovascular thoracic stent placement (tevar) with an open bypass from the descending aorta to the femoral artery

Barrio Perez I. M.[1], Establés M.[1], Canal M. I.[1], Jimeno C.[1], Fernandez-Riveira C.[1], Quintana-Villamandos B.[1]
[1]HGU Gregorio Marañon - Madrid (Spain)

Background: We present a patient with a failed attempt at emergency endovascular repair of a ruptured abdominal aortic aneurysm that required in the same surgery the explant of the prosthesis and closure of the aorta below the superior mesenteric artery, ligation of both renal arteries and a bypass axilobifemoral. Two years later, he goes to the operating room for a TEVAR and a bypass from the descending aorta to the femoral artery because of thrombosis of the axillobifemoral bypass.
Case Report: 69 year-old man with history of hypertension, and late-stage renal failure (RF) who is programmed for a TEVAR because of an aortic ulcer (aortic coverage of 10 cm) and revascularization of the legs with an opened aorto-femoral bypass. The stent is placed from the left humeral artery. On the day before surgery, the CSF drainage is placed uneventfully, obtaining pressures around 20 mmHg. On the day of the intervention, surgery occurs without complications, requiring low doses of norepinephrine during legs reperfusion, no blood products were required. During the immediate postoperative period, urgent reintervention for mediastinal bleeding is required, observing a right ventricular lesion resolved with primary suture. After 48 hours, when sedation is withdrawal, motor paralysis is observed which does not improve despite CSF drainage and hemodynamic optimization, corroborating with imaging tests the ischemic cord injury in T4.
Discussion: Extent aortic repair, regardless of operative strategy, is associated with a significant morbidity and mortality risks. Risk factors1 for the development of SCI after TEVAR have been identified. Patient-related factors include advanced age, perioperative hypotension, kidney disease, COPD and HTA. RI has been postulated as a marker of widespread peripheral atherosclerotic disease, which suggests that such patients have a compromised collateral network of blood supply to the spinal cord. Surgical risk factors include the emergency, the extent of the coverage and occlusion of the left subclavian artery (LSA).
References:
1. Spinal cord injury after thoracic endovascular aortic aneurysm repair. Awad H et al. Can J Anaesth 2017.
Learning points: Despite of the use of the two-staged repair approach to develop collateral network in the spinal cord, the short extent of the coverage, optimized spinal cord perfusion, early detection of neurological deficits we couldn´t avoid paraplegia. Probably, LSA occlusion was the last cause of SCI.

6032

Is cerebrospinal fluid drainage indicated in endovascular repair of low-risk thoracic aneurysm?

Canal Alonso M. I.[1], Arnalich A.[2], Barrio I. M.[2], Jimeno C.[2], Fernandez-Riveira C.[2], Quintana B.[2]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [2]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background: Medullary ischaemia (SCI) is a serious complication of thoracic endovascular aortic surgery (TEVAR) that increases short and long-term mortality. The incidence depends on the location and protection measures, but the length of the excluded segment seems to be the only independent predictor factor. Clinical guidelines recommend placement of cerebrospinal fluid drainage (CSFD) only in high-risk patients. Our patient developed a delayed paralysis in the postoperative requiring CSFD insertion to improve SCI.
Case Report: An 86 year old man with an asyntomatic thoracic aorta aneurysm 20 cm long had its preoperative CSFD rejected due to the length of the segment to be occluded without any other risk factors. Two stent-graft were placed with an occluded segment of 22.8cm. The intervention had no incidences neither need of vasoactive drugs. He was extubated without neurological focal point and transferred to the UCI. Five hours later he showed reduced mobility in left leg without any hemodynamic changes. After coagulation check, CSFD for delayed paraplegia management was placed. The pressure was 25 mmHg and fluid was extracted to 15 mmHg with clinical improvement. It was then monitored with 8-10 mmHg pressure without need of drainage, with slight improvement but without complete resolution of the paresis. MRI confirmed ischemic dorsal myelopathy T6 to T9 and proved on CT that the prosthesis didn't show complications. The drainage was whitdrawn and discharged the third day without neurological changes. The paresis was not modified and continued with rehabilitation until being transferred to an specialized center.
Discussion: This is an SCI case in a low risk TEVAR, so no prophylactic CSFD was placed(1). Length of aortic coverage was the only independent predictor of SCI with 205 mm of aortic coverage as the threshold for increased risk, doubling the probability every 10%. However, Maier y cols. conclude that the use of CSFD is associated with a significant lower incidence of SCI after low-risk TEVAR than nonuse. The importance of the spinal cord's collateral blood supply network and its imbalance after TEVAR could be a contributing factor in this case.
References:
1. Maier et al. Benefits and Risks of Prophylactic CSF Catheter and EP Monitoring. Thorac Cardiovasc Surg.2019 Aug;67(5):379-384.
Learning point: Highlight of CSFD utility in low risk TEVAR.

6087

Preoperative Anaemia Prevalence in Elective Vascular Surgery: A Portuguese Unicentric Retrospective Study

Nogueira Z.[1], Miguel da Cunha A. S.[2], Ribeiro M.[1], Conde P.[1], Alves Â.[1]
[1]Centro Hospitalar Universitário Lisboa Norte - Lisbon (Portugal), [2]Portuguese Institute of Oncology Lisbon - Lisbon (Portugal)

Background and Goal of Study: Preoperative anaemia prevalence on vascular surgery is reported to be more than 30%. Anaemia is an independent predictor of adverse outcomes (hospital length of stay, morbidity and mortality) and the strongest predictor of intra and postoperative RBC transfusions, another independent risk factor for poorer outcome. Our goal was to identify the prevalence of preoperative anaemia in elective vascular surgery on a tertiary hospital.
Materials and Methods: We conducted a retrospective descriptive analysis of adult patients submitted to elective vascular surgery between 1st january 2018 and 31st march 2018. Anemia definition was based on WHO Hb thresholds (non-pregnant women < 12.0 g/dL, men < 13.0 g/dL). Data collected were: age, gender, weight, ASA-PS, comorbilities, type of surgery, preoperative blood tests (hemoglobin, fibrinogen, coagulation, creatinine) and preop renal replacement therapy. The statistical analysis of epidemiological and clinical data was performed with SPSS®.
Results and Discussion: The study involved 128 patients with 69.5% male and 70.3% ASA-PS III. The prevalence of preoperative anemia was 51.6%. The anaemia group was in average older (67.98 vs 66.19 years), female patients (69.69% vs 31.81%), with systemic disease (90.9% ASA III or IV vs 64.51%) and under renal replacement therapy (24% vs 3.22%). A higher incidence of preop anemia was found in patients submitted to limb amputation (90.91%), followed by arteriovenous fistulae (80%). Carotid endarterectomy and endovascular aortic repair had the lowest preop anaemia (21% and 24% respectively). Vascular preoperative anaemia is multifactorial but predominantly an iron-deficiency state. Vascular patients are frequently anemic due to signicant comorbidities including cardiac disease, diabetes, and malnutrition. RBC transfusion is commom, exarcebated by antiplatelet agent use, prolonged operationg times and intraoperative anticoagulation.
Conclusion: This vascular surgery population revealed a high prevalence of preoperative anaemia (51.6%) in concordance with literature. The correction and optimization of preoperative anaemia represents the "First Pillar of PBM - Optimize red cell mass". Nonemergency procedures should be postponed until appropriate anaemia treatment, especially if the antecipated blood loss is more than 500 to 1,000 mL. Preoperative anaemia in surgical care is an issue of patient safety demanding scientific societies recommendations.

6277

Paraparesis following endovascular aneurysm repair (EVAR) in absence of anticipated risk factors. How important is teamwork?

Rauer Alcover F.[1], Martín Jaramago J.[1], Baldó Gosálvez J.[1], Álvarez Herreros C.[1], Cuenca Tello S.[1], Llau J. V.[1]
[1]University Hospital Doctor Peset from Va - Valencia (Spain)

Background: Despite advances in endovascular technique and measures aimed at spinal protection, paraparesis and paraplegia continue to be devastating complications of aortic aneurysm repair surgery. Patients with planned extensive thoracic aorta coverage (>200 mm) or previous aortic aneurysm surgery have a high risk for developing spinal cord ischaemia (SCI)1. Long procedure time is another known major risk factor for SCI2. Cerebrospinal fluid drainage (CSFD) is an effective measure in the treatment of SCI and its prophylactic use is recommended in patients with a high risk of SCI1.
Case Report: A 75-year-old male with a juxtarenal aortic aneurysm underwent first stage fenestrated endovascular aneurysm repair (FEVAR). Prophylactic CSFD was not put in place given that the planned aortic draft coverage was <200mm and the patient's record showed no previous aortic surgery. Procedure time was longer than expected (7.5 hours). Nevertheless, hypotension, hyperthermia and anaemia were successfully avoided throughout the whole procedure. Following extubation a few hours later, the patient complained of paresis and anaesthesia of the lower limbs. Shortly after, the MRI showed signs of SCI at T11-T12. Although CSFD was initiated 6 hours later in an attempt to optimise spinal cord perfusion, paraparesia as well as sphincter incontinence remained.
Discussion: Despite being a known risk factor for SCI, procedure time is often difficult to predict. Interdisciplinary cooperation between surgeons and aneasthesiologists is crucial to assess whether the possible benefits of prophylactic CSFD outweigh its risks. If procedure time turns out to be longer than anticipated, a collaborative effort is also needed to maximise vigilance for early symptoms of SCI and, if necessary, initiate therapeutic measures, such as CSFD, as soon as possible.
References:
1. Eur J Vasc Endovasc Surg 2017;53:4-52.
2. J Vasc Surg 2015;62:1450-6.
Learning points: Teamwork between surgeons and anaesthesiologists is of paramount importance to decide on a case-by-case basis which patients could benefit from prophylactic CSFD placement. This decision should be based on the patient's risk factors and the predicted procedure time. If CSFD is not put in place prophylactically but procedure time is longer than predicted, cooperation between surgeons, anaesthesiologsts and ICU staff is equally important to guarantee early extubation, tight neurological surveillance and, should SCI arise, timely CSFD.

4479

Airway and anesthetic management of a patient undergoing tracheoplasty for tracheobronchial malacia

Mayer D.[1], Belo J.[1]
[1]St.Elizabeth's Medical Center - Boston (United States)

Background: Airway management of tracheoplasty surgery represents one the greater challenges for the anesthesiologist. The surgery requires access to the posterior aspect of the tracheobronchial tree via right thoracotomy (1). While various techniques for lung isolation in the setting on tracheoplasty were previously utilized (2) here we describe the use of reinforced single lumen tube for left endobronchial intubation as a safe alternative.
Case Report: 55-year-old female presented for tracheobronchoplasty with polyproplylene mesh for symptomatic trachobronchomalacia. Thoracic epidural, large bore i.v. and left radial a-line were placed pre-operatively. After induction of anesthesia flexible bronchoscopy via LMA confirmed the diagnosis and patient was intubated with 8.0 reinforced endotracheal tube that was advanced into the left main

bronchus and used as an endobronchial tube. TIVA with propofol and remifentanil provided adequate depth of anesthesia during subsequent multiple episodes of ETT repositioning and apnea during surgery. At the resolution of surgery; reconfirmation of the trachea was confirmed with flexible bronchoscopy and patient was extubated.
Discussion: Airway management for tracheoplasty requires easy repositioning of ETT in the setting of one lung isolation. Previously described techniques require either modification of existing double lumen tubes by the surgeon (2) or specialized long reinforced ETTs (3) that may not be readily available. Here we describe a simple technique using reinforced endotracheal for left main stem intubation.
References:
1. Tracheoplasty for expiratory collapse of central airways. Wright CD, Grillo HC, Hammoud ZT, Wain JC, Gaissert HA, Zaydfudim V, Mathisen DJ. Ann Thorac Surg. 2005 Jul;80(1):259-66.
2. Master Techniques in Upper and Lower Airway Management. Rosenblatt WH, Popescu WM, 2015 Wolters Kluwer Health: 236-237.
3. The optimal breathing tube for tracheal resection and reconstruction. Hannallah MS. Anesthesiology. 1995 Aug;83(2):419-21.
Learning points: A safe anesthetic technique for tracheoplasty requires detailed understanding of the surgical procedure and close communication between the anesthesiologist and the thoracic surgeon. Here we present a simple alternative to the previously described airway management for tracheoplasty.

4903

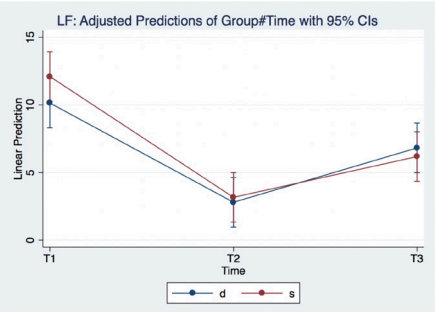
Autonomic stimulation is not different between single-lumen and double-lumen endotracheal intubation

Wang M. L.[1], Huang H. H.[1], Chi R. C.[1], Pu H. H.[1]
[1]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Tracheal intubation is associated with autonomic stimulation and adverse effects in susceptible patients. Traditionally double-lumen endobronchial intubation is considered mandatory during thoracoscopic surgery. Whether endotracheal intubation with a larger lumen of the endotracheal tube may exaggerate sympathetic stimulation is less investigated. The aim of this study was to determine if different intubation techniques may have an impact on the sympathovagal balance, which was evaluated using heart rate variability (HRV).
Materials and Methods: A total of 60 ASA class I-II patients 20-65 year of age were recruited. Thirty of them were scheduled for otorhinolaryngology surgery under general anesthesia with tracheal intubation of single lumen tube (group S), and the other 30 were scheduled for thoracoscopic surgery requiring double-lumen endotracheal intubation (group D). Heart rate variability was derived by continuous recording of electrocardiography. Power spectrum was generated by time-frequency analysis and the HRV parameters of different groups were compared between three periods: (1) pre-induction baseline (2) pre-intubation and (3) immediately post-intubation. Two-way ANOVA with repeated measures was used for statistical analysis.
Results and Discussion: There were a significant increase in the HRV spectral power in low-frequency (LF) power bands for both single-lumen and double-lumen endotracheal intubation groups after intubation. Moreover, there was no significant difference between the single-lumen and double-lumen endotracheal intubation groups.

	Baseline (T1)	Pre-intubation (T2)	Post-intubation (T3)
Group S	12.10 ± 6.42	3.17 ± 2.81	6.18 ± 5.30
Group D	10.14 ± 6.51	2.80 ± 2.84	6.82 ± 5.20

Table 1. LF power bands during induction in patients undergoing general anesthesia



Conclusion: Tracheal intubation is associated with higher HRV spectral power in LF power bands, but there is no difference between single-lumen and double-lumen endotracheal intubation.

5506

Acute bleeding endobronchial tumour: a different airway approach

Clave J. L.[1], Cebrián A.[1], Benito A.[1], Mestres G.[1], Asbert R.[1]
[1]Hospital Universitari Mutua Terrassa - Terrassa (Spain)

Background: Surgical treatment of endobronchial tumours are always a challenge for the anesthesiologist due to differences when ventilating the patient, especially when an emergency occurs and this tumour starts bleeding. We present a case report of a patient with an acute bleeding endobronchial tumour in which an emergency thoracotomy was performed.
Materials and Methods: A 47-years-old woman with no significant past medical history, was hospitalized in the intensive care unit (ICU) because of respiratory insufficiency after repeated episodes of pneumonia. During a fibrobronchoscopy, an endobronchial mass that occluded the right main bronchus was detected and started bleeding after the procedure handling. The patient was intubated with a single lumen tube at the ICU and was transferred to the operating room for an emergent thoracotomy; an attempt of right selective intubation was performed without success, due to the blood in the endobronchial lumen the ventilation was impossible. When placed in left lateral decubitus, a severe hypoxaemia led to cardiorespiratory arrest. After 1 min of cardiac arrest and unachievable ventilation, we agreed with the surgeon to perform an emergent thoracotomy and a bronchotomy to place the tube in the left main bronchus. A right pneumonectomy was carried out. The patient remained in the ICU for five days, and was discharged after 7 days.
Discussion: Airway management in important bleeding endobronchial tumours is a critical situation that can overstep the traditional algorithms. A selective intubation must be considered preferably, with the setback that it would probably be a difficult fibrobronchoscopy because of the occupation of the lumen and must be performed blindly [1]. In extreme situations, a thoracotomy and placement of a tube through a bronchotomy can be considered.
Conclusion: Few cases of endobronchial intubation through a bronchotomy are reported. We could consider this approach in big endobronchial tumours, tracheal tumours or in blunt thoracic trauma when a double lumen tube is not possible to place. The relevance of this case report lies in the rarity of the technique performed to control the airway and to give an option for dealing with this uncommon and not necessarily catastrophic situation.
References:
1. Torrance R, Dawson A, Wohlgemut J, Buchan K. Sudden loss of ventilation through a double lumen endotracheal tube requiring a surgical bronchotomy. Ann Thorac Surg 2013;96:687-8.

5573

Protocol: Utility of capnography and gas analysis in checking the correct placement and function of the double-lumen tube for one-lung ventilation

Pardines Rico S.[1], Navarro Martínez J. A.[1], Marín Jiménez D.[1], Rivera Cogollos M. J.[1], Galiana Ivars M.[1], Vera Sabater P.[1]
[1]Hospital General Universitario de Alicante (HGUA) - Alicante (Spain)

Background and Goal of Study: During general anesthesia in thoracic surgery it is common to employ one lung ventilation (OLV) so immobility of the non-ventilated lung (NVL) facilitates surgical manipulation. On one hand this is achieved with a double-lumen endobronchial tube (DLT) which must be correct positioned and sealing properly. For its placement, current gold standard is flexible bronchofibroscope. On the other hand, capnograph and gas analyzer measures the gas mixture inhaled and exhaled by the patient and it is mandatory in interventions under general anesthesia. However, new utilities of this device are currently being studied. Goal of study: Evaluate the analysis of the gases from the NVL as a predictor of malposition or sealing failure of DLT during OLV compared to bronchofibroscope.
Materials and Methods: 21 patients scheduled for thoracic surgery with OLV using DLT in the HGUA from September until December 2nd, 2019. The method used was: After initiation of OLV, a diagnostic algorithm was followed that included: auscultation, data collected from NVL through a capnography accessory line connected to the clamped lumen of DLT (expiratory oxygen fraction and morphology of CO2 curve) and pressures and volumes recorded by the anesthesia station, to evaluate the position and sealing of the DLT. Findings were immediately compared to bronchofibroscope views. At the end of this study, results of both techniques were collected in 2x2 tables to estimate sensitivity, specificity, and positive and negative predictive values (PPV and NPV) of the new method compared to fibroscope
Results and Discussion: This algorithm showed for all diagnosis a sensitivity and specificity of 50% and 86% respectively, with a 60% PPV and 81% NPV. Specifically, it detected distally displacement of DLT with 40% sensitivity and 100% specificity, showing 100% PPV. It also diagnosticated proximally displacement with 100% sensitivity and specificity. Even more, the algorithm allowed to detect sealing

problems of the tube before surgeon or anesthesia station notice it.
Conclusion: The gas analysis and morphology of CO2 curve of the clamped lumen is a good alternative to bronchofibroscope being simpler, cheaper and less invasive method. Moreover, it allows to notice sealing problems not been detected by fibroscope and providing complementary and valuable information. Besides, we believe than with a larger sample of patients its effectiveness would be even more evident.

5846

Mediastinal mass, superior vena cava syndrome and respiratory failure: a case report

Pineschi G.[1], Galvão M.[1], Milanez P.[1], Rivoli A. L.[1], V. Lemos Neto S.[1]
[1]NCI (INCA) - Ministry of Health, Brazil - Rio de Janeiro (Brazil)

Background: Anaesthesia for patients with mediastinal masses imply on imminent risk of airway collapse after induction1. Superior vena cava syndrome is also a challenge because of it's hemodynamic features1. In this case we discuss a patient with both of the pathologies that presents for an emergency tracheostomy.
Case Report: 58 year old male patient, former smoker, treating hypertension and new onset hypothyroidism with a past of squamous cell carcinoma of the tonsil treated with chemoradiotherapy in remission for 3 years. He was brought to the surgical ward by the head and neck surgery team with breathing effort and laryngeal stridor to undergo emergency tracheostomy. The procedure was performed under sedation with dexmedetomidine and local lidocaine and it was noticeable that the blood flow through the IVs was dependable on the respiratory pattern. After the tracheostomy the patient maintained the breathing pattern and the differential diagnoses were addressed. He received treatment for bronchospasm with no improvement and only after the chest radiography, echocardiography and blood tests we could understand that he had severe haemodynamic and respiratory impairment due to a mediastinal mass occupying ¾ of the diameter of the chest, severe right atrium dysfunction with superior vena cava syndrome, hypoxaemia and sodium level of 100 mEq/L.
Discussion: These pathologies are often described as anaesthesiology challenges due to the ventilatory and haemodynamic components1. The point-of-care evaluation of these patients can be decisive and the after-effects life changing. In this case we decided to proceed with a form of sedation that would maintain the respiratory drive2 and offer positive pressure (PSV), the only way we could ensure airway patency.
References:
1. Hartigan, PM, Ng JM,Gill RR. Anesthesia in a Patient with a Large Mediastinal Mass. New England Journal of Medicine, 379(6), 587–588.
2. Williams A, Singh G, George SP. Procedural sedation for a child with a mediastinal mass and superior vena caval syndrome. J Anaesthesiol Clin Pharmacol. 2015 Jul-Sep;31(3):421-4.
Learning points: The use of point of care evaluation can be life changing for the choice of the anesthetic technique. Patients with respiratory failure can have multiple differential diagnosis and knowing about a mediastinal mass can completely change the choice of drugs and technique and directly impact on the perioperative morbidity.

5907

Insertion depth of double-lumen endotracheal tube (DLT) changes in repeat lung surgery

Myoga Y.[1]
[1]Kitakyushu Municipal Medical Center - Kitakyusyu Kokurakita-Ku (Japan)

Background and Goal of Study: Insertion depth of double-lumen endotracheal tube (DLT) changes with various factors such as body position and post-lung resection, and pleurodesis. Our purpose were to evaluate to change of the insertion depth from 1st lung surgery to 2nd lung surgery.
Materials and Methods: We retrospectively reviewed 1744 patients who underwent thoracic operations requiring intubation of DLT at our institution, using electronic chart, collected from August in 2010 to September in 2019. We extracted data on poly-surgery patients and calculated change of insertion depth from 1st lung surgery to 2nd lung surgery. Mann-Whitney U test was performed to analyze the effect of lung resection volume on change of insertion depth.
Results and Discussion: We identified 133 poly-surgery patients. 75 patients' data sets of 1st and 2nd lung surgery's insertion depth were missing. The median age of the 58 patients at the time of 1st lung surgery was 68 years (16 - 85). Operation included 55 lung resection and the others (empyema curettage). At 2nd surgery, there were three cases of intubation failure as follows: DLTs were misplaced to the right main bronchus in two cases, one was unable to be placed to the left main bronchus. The change of insertion depth from 1st surgery to 2nd surgery were - 3 - 3 cm (Lobectomy at 1st surgery: 31 cases) and - 2 - 1 cm (Segmentectomy or partial resection at 1st surgery: 24 cases). The absolute value of change in Lobectomy group (0 – 3 cm) was significantly larger compared to Segmentectomy or partial resection group (0 – 2 cm) (p = 0.03). In one empyema curettage case, the insertion depth became minus 4 cm due to abscess cavity.
Conclusion: These findings suggested that DLT insertion depth at 2nd surgery changes greatly in proportion to lung resection volume at 1st surgery. We recommend that the depth of DLT insertion should be reliably confirmed using a bronchoscope rather than referring to the record at the 1st surgery.
References:
1. Khanbhai M. et al. Dissection of the pulmonary ligament during upper lobectomy: is it necessary?
2. Ueda K. et al. Clinical Ramifications of Bronchial Kink After Upper Lobectomy. 2012.
3. Seok Y. et al. The effect of postoperative change in bronchial angle on postoperative pulmonary function after upper lobectomy in lung cancer patients. 2014.

6002

Impact of one-lung ventilation duration on the prognosis of patients undergoing lung resection surgery

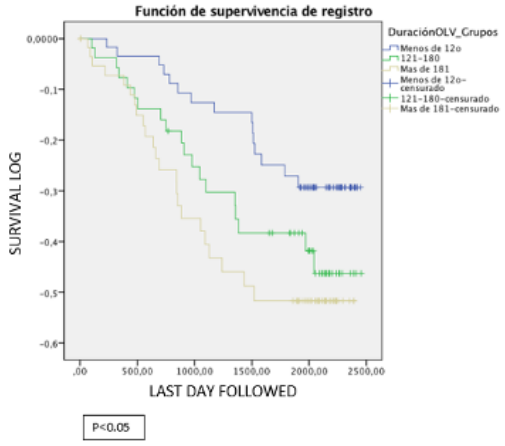
Martinez Gascueña D.[1], Perez A.[1], Aznar P. T.[1], Higuero F.[1], Piñeiro P.[1], Garutti I.[1]
[1]Hospital General Universitario Gregorio Marañon - Madrid (Spain)

Background and Goal of Study: During thoracic surgery, periods of one-lung ventilation (OLV) are required in order to make easier the surgical technique. However, OLV could imply a negative impact on patients due to pathophysiology associated with it. The aim of our study was to assess the association between OLV duration and prognosis of patients undergoing lung resection surgery (LRS).
Materials and Methods: This is a sub-study of the randomized controlled trial NCT 02168751, performed in patients who underwent LRS and approved by the local Ethics Committee in Madrid, Spain in 2011. 174 patients scheduled for LRS were recruited and divided into 3 groups based on OLV time. Group 1 had OLV for less than 120 minutes, group 2 between 121 and 180 minutes, and group 3 more than 181 minutes. All patients were managed with the same anesthetic protocol and ventilatory settings. BAL was performed in both lungs before and after OLV period in order to determine inflammatory local biomarkers. They were measured using Western Blot. We recorded postoperative complications, survival and IL6/IL10 ratio. Anova test was used to compare between three groups, and Kaplan Meyer curves were obtained to assess long term survival. Statistical significance was defined as p-value <0.05.
Results and Discussion: Our results are shown in Table 1 and Figure 1. Postoperative pulmonary Complications (PPC), Acute Kidney Injury (AKI), hospital stay, IL6/IL10 ratio and mortality were higher in patients who had longer OLV (p<0.05). Limiting OLV time could decrease incidence of PPC observed in our study and long term mortality, although it should be balanced against a more difficult surgical technique.

Table 1. Postoperative complications related to OLV duration

	<120min	121-180	>181min	p-value
	60	54	60	
PPC	9 (15)	9 (16.7)	19 (31.7)	0.041
Respiratory failure	8 (13.3)	4 (7.4)	14 (23.3)	0.053
Respiratory infection	3 (5)	6 (11.1)	13 (21.7)	0.021
Atelectasis	2 (3.3)	1 (1.9)	4 (6.7)	0.403
SDRA/ALI	0 (0)	0 (0)	3 (5)	0.045
Pneumonia	3 (5)	3 (5.6)	7 (11.7)	0.31
AKI	2 (3.3)	1 (1.9)	9(15)	0,009
Infection	10 (16.7)	12 (22.2)	17 (28.3)	0.309
Hospital Stay	17 (28.3)	31 (57.4)	37 (60.1)	<0.001
IL6/IL10 dependent lung - End	0.169	0.176	0.181	0.036

Figure 1. Long term survival



Conclusion: Thoracic surgery is related to an important morbidity and mortality burden. Our study showed the association between PPC and long term mortality with duration of OLV.

6029

Analysis of respiratory sound monitoring on the non-ventilated side during one-lung ventilation

Miyoshi H.[1], Nakamura R.[2], Haraki T.[2], Saeki N.[2], Tsutsumi Y. M.[3], Shime N.[3]
[1]Hiroshima University Hospital - Hiroshima (Japan),
[2]Hospital - Hiroshima (Japan), [3]University - Hiroshima (Japan)

Background and Goal of Study: Detection sensitivity of bronchial intubation by auscultation is less than 50%. One hypothesis for this is due to transmitted respiratory sounds from the ventilated lung. To better understanding this phenomenon, we investigated how the respiratory sounds change during one-lung ventilation from the non-ventilated side using a novel respiratory sound monitoring system.
Materials and Methods: Following approval from our institutional review board, 5 elective thoracic surgery patients were recruited. Tracheal intubation was performed with a double lumen endotracheal tube, and mechanical ventilation was continued throughout the measurement. Probes for the continuous respiratory monitoring were attached to the body surface. It was affixed to a total of 5 points at the nipple level: the midline, left and right anterior axillary lines, and at the midpoint between them. One-lung ventilation was performed interchangeably on the right and left lungs, and respiratory sounds were recorded on the ventilated and non-ventilated side. The sound pressure for 30 seconds was analyzed for two frequency bands of 150-800Hz and 400-1200Hz and compared between the ventilated and non-ventilated lung areas. Statistical analysis was performed by paired t-test, and a $P < 0.05$ was considered significant.
Results and Discussion: At all measurement points, respiratory sounds were auscultated on the non-ventilated side. The sound pressure on the non-ventilated side averaged 33.3% (range 9.4-93.0%) of the sound pressure of the ventilated side. However, the difference between the two groups was small in decibel (average 11.0 dB). The respiratory sound ratio auscultated on the left side during right lung ventilation had higher than the those on the right side during left lung ventilation (400-1200 Hz: 67.5±17.1% vs 37.0±18.8%, P=0.04, 150-800 Hz: 29.5±14.6% vs 11.0±4.5%, P=0.02). The sound pressure on the non-ventilated side was significantly higher in the 400-1200 Hz than in the 150-800 Hz (P=0.02)
Conclusion: By using a novel continuous respiratory sound monitor, we were able to quantitatively observe significant decrease lung sound on the non-ventilated side by about one third of the ventilated side during one-lung ventilation. However, even with this reduction respiratory sounds were able to auscultated on the non-ventilated side, which is likely the cause for the reduced diagnostic sensitivity seen in bronchial intubation from auscultation.

6040

Endobronchial blocker and tracheal bronchus: case of misdiagnosed congenital anatomic variant

Cappellini I.[1], Montinaro F.[1], Zamidei L.[1], Consales G.[1]
[1]Ospedale di Prato - Prato (Italy)

Background: In case of difficult airway management or predicted post operative mechanical ventilation, bronchial blocker (BB) are more often used compared to double lumen tube (DLT) to achieve selective one lung ventilation (OLV) during thoracic surgery. We describe a case of an incomplete OLV due to an aberrant tracheal bronchus (TB) arising from the right side of supracarinal trachea successfully managed with dependent lung apneic oxygen insufflation (AOI) interspersed to bilateral ventilation (BLV).
Case Report: A 77 yo, BMI 32, El Ganzouri 11, ASA 3 man was submitted to elective video assisted thoracoscopy surgery (VATS) due to upper lobe lung cancer. An awake fiberoptic (FB) intubation was performed and a right Arndt 7 french BB was inserted (Cook Medical, Bloomington, IN, USA), as we predicted a difficult airway management. Nevertheless, a complete collapse of right upper lobe, where cancer was located, could not be obtained. A right TB was suspected and confirmed by a carefully FB examination. Therefore, in order to not interrupt the procedure, BB was displaced on left bronchus; 5 minutes of 4 mL/kg of ideal body weight (IBW) BLV was alternated to 3 minutes of AOI on the dependent lung for a total time of 15 minutes. This procedure allowed to maintain an oxygen saturation of 93%, an end tidal carbon dioxide below 50 mmHg and surgery was completed as scheduled. At the end of surgical resection, BLV was re-established, BB was removed and the patient transferred in ICU for protected extubation. After 24 hours of monitoring, the patient was extubated without any complications.
Discussion: In the clinical scenario of incomplete lung collapse in patient submitted to OLV with BB, a TB should be considered. In these circumstances, is recommended the use of a DLT to achieve OLV completely. Nevertheless, DLT position could be challenging in case both predicted difficult airway management and post operative ventilation. In our case report, the displacement of BB in the left bronchus allowed AOI on the dependent lung and surgery was completed without any complications.
Learning Points: TB should be suspected in the scenario of incomplete OLV; displacement of BB on depend lung could allow AOI.

4317

Hypothermia is an independent risk factor for prolonged ICU stay in coronary artery bypass patients

Wang Y. C.[1], Huang C. H.[1]
[1]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Perioperative management could influence outcomes in coronary artery bypass (CABG) patient, but its importance is less well documented. Maintain normothermia was an important perioperative issue, and we would like to explore whether hypothermia on intensive care unit (ICU) admission was an independent risk factor for increased morbidity and mortality.
Materials and Methods: We collected medical and perioperative records for isolated elective CABG patients from Jan. 2018 to Jun. 2019. The outcome of interest was mortality, surgical site infection rate, ventilator dependent time, intensive care unit stay, and hospitalization duration. We did multivariate regression to adjust for age, sex and EuroSCORE II, and analyze the relationship of hypothermia during ICU admission and clinical outcomes.
Results and Discussion: A total of 206 patients were enrolled for analysis. 71 patients had off-pump CABG surgeries, and 135 patients had on-pump CABG surgeries. Hypothermia patients were taller (p=0.012), had lower LVEF (p=0.016), and more frequently had off-pump CABG (p=0.04). No 30-day mortality was noted in our analysis. Hypothermia was not associated with higher surgical site infection site or longer intubation time. After adjustment for sex, age, CPB duration, left ventricular ejection fraction, and EuroSCORE II, higher EuroScore II (p<0.001) and hypothermia on the admission to ICU (p<0.001) were independent risk factors for longer ICU stay.
Conclusion: In addition to EuroSCORE II, hypothermia on admission to ICU was an independent risk factor for prolonged ICU stay in elective coronary artery bypass patients.

4686

Predictive value of STOP-BANG Score in patients undergoing Coronary Artery Bypass (CABG)

Ke Y.[1], Sim E. Y.[1], Yek J. J. L.[1], Lin I.[1], Gui C.[1], Abdullah H. R. B.[1]
[1]*Singapore General Hospital - Singapore (Singapore)*

Background: Obstructive Sleep Apnea (OSA) increases post operative cardiac complications and morbidity in the general population. The STOP-Bang questionnaire was specifically developed to be a easy-to-use screening tool to predict risk patient having OSA. The association between STOP-Bang score and mortality and morbidity undergoing cardiac surgery is not well established. The study aims to determine the the association between STOP-Bang score and composite cardiac outcome and 30-day and 1-year mortality in patients undergoing Coronary Artery Bypass (CABG). Secondary outcomes were pulmonary, neurological, infection, renal complications, re-operation and readmissions and length of stays.
Methods: This was a prospective cohort study of patients undergoing cardiac surgery. STOP-Bang questionnaire was administered prior to surgery. Ethics approval was obtained from Institutional Review Board. Patients are excluded if they had valvular replacement surgery. Peri-operative data and post operative outcomes including morbidity, mortality and length of stay was collected for a follow-up period of 1 year. COX proportional hazard was used for analysis of mortality, while multivariable linear or logistical regression models were used where appropriate for analysis.
Results and Discussion: Among 1349 patients recruited for the study, 919 patients met inclusion criteria and was categorized into Low (N=197), Intermediate (N=626) and High (N=626) risk groups based on STOP-Bang Score of 1-2, 3-4 and 5-8. The rates of composite cardiac complications were 53/197(26.9%) in low risk, 186/626(29.7%) in intermediate risk and 27/96(28.1%) in high risk group (p=0.737). STOP-Bang risk groups did not predict 30 day mortality (Ref group: Low risk. Intermediate risk p=0.576 and high risk p=0.448) and 1 year mortality (Ref group: Low risk. Intermediate risk p=0.998 and high risk p=0.345). In exploratory analysis, increasing STOP-Bang risk group is associated with increased acute kidney injury (AKI) (Adjusted HR 1.39, [95% CI 0.021-0.63, p=0.036]) but reduction in re-admissions to ICU (Adjusted HR 0.49, [95% CI -0.024 - -1.40, p=0.49]). Subgroup analysis shows female and thinner patients has more re-admissions to ICU (p<0.05). There was no significant differences in other secondary outcomes.
Conclusion: STOP-Bang Score is not useful in predicting cardiac outcomes and mortality in patients undergoing CABG surgery, but may predict post-operative AKI.

4709

The effect of high thoracic epidural anesthesia on response to fluid therapy and myocardial function after off-pump coronary artery bypass grafting

Volkov D.[1], Paromov K.[1], Nizovtsev N.[1], Kirov M.[2]
[1]*City Clinical Hospital №1 amed after Volosevich - Arkhangelsk (Russia),* [2]*Northern State Medical University, Arkhangelsk, Russian Federation - Arkhangelsk (Russia)*

Background and Goal of Study: In off-pump coronary artery bypass grafting (OPCAB), high thoracic epidural anesthesia (HTEA) with local anesthetics and opioids can provide effective analgesia and reduce the number of perioperative complications. However, the hemodynamic effects of HTEA in coronary surgery are controversial and require further evaluation. The aim of our study was to estimate the effects of HTEA on response to fluid therapy and myocardial function after OPCAB.
Materials and Methods: Twenty-nine patients scheduled for elective OPCAB were enrolled into a single center prospective randomized study. All patients received sevoflurane anesthesia (1 MAC) and fentanyl 2-4 μg/kg/h. The control group (n=15) had no epidural catheter and received postoperative IV infusion of fentanyl 20 μg/ml at a rate of 2-4 mL/h. In the HTEA group (n=14), an epidural catheter was inserted at Th2-5 level with administration of 0,5% ropivacaine 1 mg/kg before surgery and continuous infusion of ropivacaine 0.2% and fentanyl 2 μg/mL at a rate of 3-8 mL/h postoperatively. We measured cardiac index (CI) using Swan-Ganz catheter and assessed blood gases. To estimate response to fluid therapy after OPCAB, we used passive legs rising (PLR) test and fluid challenge test (FCT) (7 ml/kg of crystalloids during 15 min). Patients with CI increase after tests by >10% were estimated as responders. To assess diastolic myocardial function, we measured E/e' ratio before operation (E/e'start) and at 24 hours after surgery (E/e'24h) by echocardiography.
Results and Discussion: Euroscore and demographic data did not differ significantly between the groups. After PLR test and FCT, CI was not different between the control and the HTEA groups. Also, we did not find difference between the groups in distribution of responders after PLR (p=0.83) and FCT (p=0.2) and in E/e'start, E/e'24h, lactate, SvO2, Pv-aCO2 gap and PaO2/FiO2 at the end of surgery and at 24 hours postoperatively (p > 0.05).
Conclusion: The perioperative HTEA during OPCAB does not influence response to fluid therapy, myocardial function and oxygen transport.

5019

The effect of low-opioid anesthesia on the level of endocrine-metabolic response and cardiospecific enzymes during coronary artery bypass grafting (CABG) under artificial blood circulation (ABC)

Loskutov O.[1], Danchyna T.[1], Kolesnykov V.[1], Druzhina O.[1], Loskutova M.[1], Korotchcuk N.[1]
[1]*Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine)*

Background and Goal of Study: The effectiveness of multimodal low-opioid anesthesia as an anesthetic assurance technique during CABG surgery under ABC. Materials and Methods: The study included 96 patients aged 61,9±1,1 year who underwent CABG under ABC. Patients were divided into 2 groups. The induction in both groups was performed with propofol (1.34±0.3 mg/kg), fentanyl (1,3±0.2 mcg/kg), myorelaxation - pipecuronium bromide (0.08 mg/kg). The maintenance in Group I(n=46): sevoflurane (1-1.5MAK), lidocaine (bolus 1 mg/kg followed by continuous infusion 1.5-2 mg/kg/h), dexmethomidine 0.8 mg/kg/min., magnesium sulfate iv (20 mg/kg). The Group II (n=50) at this stage received: sevoflurane (1.5-2MAK), fentanyl (12.3±2.1 mg/kg for the entire operation).During the main stage we used artificial electric fibrillation. The level of endocrine-metabolic response was determined by measuring blood lactate and cortisol level dynamics in blood samples.
Results and Discussion: The average duration of anesthesia in the groups was 221.04±4.7 min. The total dose of fentanyl in Group I - 1.29±0.03 mcg/kg/h, in Group II - 4.66 mcg/kg/h. The average value of cortisol in Group I was 479.3±26.4 nmol/L, lactate-1.61±0.2 mmol/L, glucose–7.9±0.2mmol/l. The dynamics of mean values of cardiospecific enzymes in both groups corresponded to uncomplicated course for cardiac surgery, (in Group I: TnI = 1.86±0.74 mg/ml, CPK-MB = 7.26±1.2 U/L; in Group II: TnI = 1,93±0,35 mg/ml, CPK-MB = 7.46±1.4 U/L (p> 0.5)). On day 2 p/o, a decrease in these indicators was observed in Group I by 25.2±1.7% (TnI), by 20.1±1.1% (CPK-MB) and in Group II by 26.9±1.4% (TnI), by 19.6±1.08% (CPK-MB) (p> 0.5)). The percentage of IL-6 p/o increase was 467.7% (25%-199.0:75%-970.7) [min49.6;max13461.2] in GroupI, and in GroupII-1106.0%(25%-605.2;75%-2479.5) [min248.5;max6308,9](p=0.016).By determining the Spearman's rho was found that the increase in IL-6 was statistically significantly influenced by the anesthesia technique (p=0.016), and the age, the duration of fibrillation, the number of aortic displacements, the duration of ABC in Group I with the growth of IL-6 were not correlated (p>0,05).
Conclusion: The multimodal low-opioid anesthesia technique did not have negative effects on the coronary blood flow, which can ensure adequate analgesia, indicated by the absence of endocrine-metabolic changes and has no pathological effect on the dynamics of cardiospecific enzymes.

5365

Bilateral vocal cord palsy following minimally invasive coronary artery bypass graft surgery

Chee Y. R.[1], Narasimhan U.[1]
[1]*National University Hospital - Singapore (Singapore)*

Background: Postoperative vocal cord palsy (VCP) is a rare but known complication of cardiothoracic surgery. However bilateral VCP following minimally invasive coronary artery bypass graft (MIS CABG) surgery through a mini thoracotomy has not been reported.
Case Report: A 64-year old male with history of hyperlipidaemia and coronary artery disease underwent MIS CABG under general anaesthesia. Size 39 double lumen tube (DLT) was placed under direct laryngoscopy. Proper tube placement was confirmed by fibre-optic bronchoscope and optimal cuff pressures were ensured. Transesophageal Echo (TEE) probe was inserted and patient was positioned for left anterior mini thoracotomy. Surgery was technically challenging and lasted for 6 hours. Before transferring to intensive care unit, DLT was changed to a standard endotracheal tube. Patient was extubated 6 hours later and noted to have aphonia and dysphagia without respiratory compromise. Nasoendoscope revealed bilateral VCP with both cords at paramedian position allowing a narrow 3-4mm glottic gap. Subsequently he was managed with steroids, nasogastric tube feeds and speech therapy. The right cord was mobile after 1 week while the left cord remained paretic at 6 weeks review.
Discussion: VCP after cardiac surgery is mainly due to recurrent laryngeal nerve (RCN) palsy secondary to direct or indirect injury. Surgical causes include direct thermal injury caused by ice slush or electrocautery, indirect injury due to excessive sternal and rib retraction, internal mammary artery graft harvest and aortic surgery. Non-surgical causes include direct injury to vocal cords or arytenoid dislocation by traumatic intubation and indirect injury to RCN from DLT cuff, TEE probe and hyperextension of the neck. Our patient had an unexpected bilateral VCP in

the absence of median sternotomy, ice slush or a traumatic intubation; possibly due to additive effects of various other factors. One of the main advantages of MIS CABG is lower postoperative morbidity and reduced length of hospital stay compared to traditional surgery. However, bilateral VCP after MIS CABG resulted in higher morbidity due to aspiration risk, prolonged hospital stay and distress due to nasogastric feeding and loss of voice.
Learning points: Postoperative VCP may result from multiple surgical and non-surgical factors. It is important to recognise various contributing factors and take necessary precautions to avoid long term morbidity.

5390

Intraoperative use of clonidine and dexmedetomidine for the prevention of postoperative delirium after coronary artery bypass grafting

Volchkov V.[1], Balandina E.[2], Boyarkin A.[1], Pushkin A.[3], Volchkova E.[4]
[1]St. Petersburg State University - St. Petersburg (Russia), [2]Saint Petersburg State University - St. Petersburg (Russia), [3]First Pavlov State Medical University of St. Petersburg - St. Petersburg (Russia), [4]Saint Petersburg State Pediatric Medical University - St. Petersburg (Russia)

Background and Goal of Study: Delirium is a common complication after heart surgery. That is why, a large number of drugs, including clonidine and dexmedetomidine, have been proposed for the prevention of postoperative delirium. However, there is still no convincing evidence of their ability to reduce the mentioned complication significantly. The goal of our study was to evaluate the effectiveness of the intraoperative use of clonidine and dexmedetomidine for the prevention of postoperative delirium.
Materials and Methods: Within the study 200 patients who underwent surgical treatment for ischemic heart disease were randomized into three groups. The control group included 100 people, the clonidine group - 50 and the dexmedetomidine group - 50. Patients in all groups were comparable by gender, age, Charlson's comorbidity index, ASA and EuroScore II scores. All patients underwent general anesthesia (sevoflurane inhalation with intravenous infusion of fentanyl and propofol). Intraoperatively, dexmedetomidine or clonidine were used in a dose of 0.5 μg /kg/hour in clonidine and dexmedetomidine groups. The infusion started after anesthesia induction and lasted 2 hours after surgery. The existence of postoperative delirium was assessed by the Nursing delirium screening scale (NuDESC) during the patient's stay in the intensive care unit. Mean arterial pressure (MAP), heart rate (HR), need of inotropic support, delirium and postoperative mechanical ventilation duration were analyzed.
Results and Discussion: The frequency of delirium was significantly higher in the control group. Postoperative delirium was detected in 19 patients from the control group, in 3 patients from the clonidine group and in 2 patients from dexmedetomidine group. The NuDESC scores also differed significantly among groups and they were lower in clonidine and dexmedetomidine groups. No significant difference in MAP, HR, need of inotropic support and delirium duration between groups was revealed. In control and clonidine groups the duration of postoperative mechanical ventilation was higher in comparison to the dexmedetomidine group.
Conclusion: Intraoperative use of clonidine and dexmedetomidine in the studied doses reduces the incidence of postoperative delirium after coronary artery bypass grafting and does not affect the hemodynamics significantly. However, the use of clonidine increases the duration of postoperative ventilation.

5972

Ultra-fast-track anesthetic technique promotes extubation in the operating room in patients undergoing off-pump coronary artery bypass graft surgery

Diasamidze K.[1], Mishin G.[1], Turenok A.[1], Vorozhka I.[1], Rybka M.[1]
[1]A.N. Bakulev National Medical Research Center of Cardiovascular Surgery - Москва (Russia)

Background and Goal of Study: To determine if implementation of ultra-fast-track anesthetic technique (UFTAT) promotes extubation in the operating room (OR) in patients undergoing off-pump coronary artery bypass graft (CABG) surgery.
Materials and Methods: Two groups represented UFTAT (n = 42) and standard anesthetic (controls, n = 22) techniques. Anesthesia was conducted with propofol, fentanil, rocuronium, isoflurane, dexmedetomidine and high thoracic epidural analgesia in the UFTAT group and propofol, fentanil, rocuronium, isoflurane in the control group. Active temperature control was an integral part of UFTA technology. The fluid was preheated. Warming of the head and skin, moistened inhaled gases, a mattress with heating of circulating water and maintaining the operating room temperature of 24°C were used. The control group used heating of the head and skin, moistened inhaled gases, a mattress with heating of circulating water. The temperature in the operating room remained constant (20°C). The quality of sewn shunts in each patient was checked by means of intraoperative shuntography. In case of adequate myocardial revascularization and the absence of bleeding through safety drains, activation of patients was used. Patients who did not satisfy extubation criteria within 20 minutes from the end of skin suturing transferred to the intensive care unit (ICU).
Results and Discussion: All patients in the UFTAT group were extubated in the operating room within 20 minutes after a skin suturing. None of the patients required reintubation. Postoperative PaO_2 were 88,6 +/- 7,2 and $PaCO_2$39,1 +/- 4,8. Rectal temperature decreased from 36,6 +/- 0,2 degrees to 36.2 +/- 0.3 degrees in the UFTAT group. ICU length of stay differed statistically significantly between the groups ($p < 0.0001$). Patients who were extubated in the operating room required lower nurse-to-patient acuity ratio (1:2) in the ICU. No difference was found in hospital length of stay. There were no perioperative deaths.
Conclusion: Implementation of UFTAT technique provided adequate hemodynamic control and facilitated extubation in the operating room in all patients. The impact of UFTAT on earlier patient discharge and actual cost savings requires further evaluation.

6236

The impact of anesthesiologist and surgeon performance on outcomes after coronary artery bypass surgery

Leite-Moreira A.[1], Saraiva F.[2], Lourenço A.[2]
[1]Centro Hospitalar São João E.P.E. - Porto (Portugal), [2]Faculty of Medicine of the University of Porto - Porto (Portugal)

Background and Goal of Study: Coronary artery bypass grafting (CABG) is one the most common procedures in cardiac surgery and disparities exist in clinical practice, especially in anesthesiology. This is further exacerbated when off-pump surgery is performed. We aimed to characterize the contribution of operators to outcomes after CABG.
Materials and Methods: We designed a retrospective cohort study including patients that had undergone CABG at our hospital from 2004 to 2014. We collected sociodemographical data, as well as variables relating to patient and surgery characteristics, postoperative complications including stroke, acute myocardial infarction or ischemia demanding reintervention, acute renal sepsis, and atrial fibrillation episodes, 30-day mortality after surgery and all-cause mortality up to the end of 2016. We used mixed effects multilevel models to ascertain the influence of anesthesiologists and surgeons on these outcomes as random effects, as well as the effect of patient and surgical risk in the form of EUROSCORE II and off-pump surgery. We compared models with and without random effects using the likelihood ratio test.
Results and Discussion: We included 3,303 patients with a median follow-up time of 5.8 years. The prevalence of off-pump surgery was 44.7%. We found a significant contribution of anesthesiologists to the incidence of postoperative ischemia ($p=0.01$). This outcome was also influenced by surgeons and off-pump surgery. This was the only outcome not significantly impacted by EUROSCORE II ($p<0.001$). Surgeons also significantly influenced the incidence of post-operative atrial fibrillation ($p<0.001$).
Conclusion: We report on the contributions of surgeon and anesthesiologist to outcomes after CABG. Studies with greater statistical power may perform subgroup analyses to bring out other intriguing associations and effect modifications reported in the literature.

4368

The relationship between transfusion and outcomes in patients undergoing isolate off-pump coronary artery bypass grafting

Liangyuan L.[1], Ji C.[2], Weiping C.[2], Zhanmin Y.[1], Jiakai L.[2]
[1]Aerospace Center Hospital - Beijing (China),
[2]Beijing An Zhen Hospital - Beijing (China)

Background and Goal of Study: The relationship between transfusion and clinic outcomes in patients undergoing off-pump coronary bypass grafting (OPCABG) was not clear. The aim of this study was to retrospectively study the relationship between perioperative transfusion and clinical outcomes in patients undergoing OPCABG after excluding time factor in a high-volume cardiac hospital.
Materials and Methods: Perioperative data of 2,178 patients who underwent isolate OPCABG in An Zhen hospital were collected from 2018 to 2019. All of patients were divided into transfusion group and control group. A 1:1 propensity score matching (PSM) was performed to control for potential biases. The post-operation complications (cerebral infarction, atrial fibrillation, myocardial infarction, heart failure, liver and kidney injury, wound infection, pulmonary infection, etc.) and the survival of patients in the two groups at 30 days after surgery were collected and analyzed. Kaplan-Meier survival curve was drawn and log-rank test was used for survival analysis.
Results and Discussion: The total transfusion rate of all patients was 29%, including 27.6% in red blood cell transfusion, 7.3% in plasma transfusion and 1.9% in platelet transfusion. 440 patients in each group were compared after PSM. Transfusion was only associated with postoperative pulmonary infection in patients undergoing OPCABG, but was not related to other complications, after adjusting preoperative and intraoperative confounders ($p<0.05$). There was no association between cardiac surgery complicated by acute kidney injury and transfusion. It also showed that it was possible to help alleviate the risk of AKI through an experienced multidisciplinary approach including intensivists, nephrologists, surgeons and anesthesiologists. Increased pulmonary complications significantly prolonged the duration of postoperative mechanical ventilation, ICU stay, and in-hospital after surgery, and reduced short-term survival. ($p<0.05$). Kaplan-Meier survival curve analysis showed that the 30-day cumulative survival rate of the transfusion group was lower than that of the control group ($p<0.05$). These factors may increase the consumption of patients during hospitalization.
Conclusion: Perioperative transfusion in patients undergoing OPCABG increases the risk of postoperative pulmonary infection, reduces short-term postoperative survival, and may increases in-hospital costs.

5274

Multi-model analgesia with wound infiltration after median sternotomy

Lin W. C.[1], Lu C. W.[1], Lin T. Y.[1]
[1]Far Eastern Memorial Hospital - New Taipei City (Taiwan)

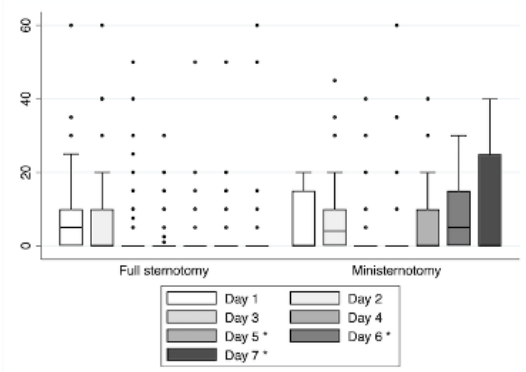
Background and Goal of Study: Opiate analgesics have been routinely used after cardiac surgery for postoperative pain control but have some unsavory side-effects which could delay patient recovery and prolong discharge after surgery. Infiltration of local analgesics at wound site could play as a part of opioid-minimizing multimodal pain regimen by blocking peripheral nerve. The aim of this study was to find out the efficacy of continuous local analgesics wound infiltration on decreasing post-cardiac surgery pain, opioid consumption, and effect on incidence of postoperative nausea and vomiting (PONV).
Materials and Methods: 97 patients including coronary artery bypass graft(CABG), isolated valve, or combined CABG and valve surgery were retrospectively analyzed from Jan to Aug 2018. In treatment group (N=50), presternal soft tissues were inserted with a soft catheter at the end of surgery, infiltrated with continuous infusion of 0.2% ropivacaine at a rate of 2ml/hour for 48 postoperative hours. In control group (N=47), no intervention was performed. Both groups had intravenous patient-controlled analgesia (PCA) for postoperative pain control. The total amount of PCA dosage, numeric pain rating scales at rest and during movement and events of PONV were recorded from post-operative day (POD)1 to POD4 and compared between two groups.
Results and Discussion: On POD1, mean value of pain score during movement was lower in infiltration group (3.2 vs 4.1, $p=0.02$). PCA requirement amount were also remarkably reduced on POD1(21.7 ± 9.65 mg vs. 33.8 ± 13.59 mg, respectively, $p=0.01$). No notable difference was found in pain score or PCA dose since POD2. Overall PONV rate were lower in infiltration group (8.5%) than in control group (30.7%), with marginal significant trend($p=0.1$).
Conclusion: Continuous ropivacaine infiltration at sternal wound site after cardiac surgery considerably contributes to lower subjective experience of pain and reduction of postoperative opiate usage on POD1. Overall PONV episodes were also less frequent under ropivacaine infiltration, with a borderline significant trend.

4738

Ministernotomy versus full sternotomy: a retrospective study of opioid consumption in the first postoperative period after cardiac surgery

Crescioli E.[1], Skallerup Andersen A.[1], Bisgaard Stæhr J.[1]
[1]Aalborg University Hospital - Aalborg (Denmark)

Background and Goal of Study: Most cardiac operations are conducted via full median sternotomy. In the past decades, various minimally invasive techniques have been flourishing, with ministernotomy being promising in reducing long term postoperative complications and enhancing recovery. It has also been thought that a smaller surgical incision would imply less postoperative pain. The aim of this study was to evaluate the consumption of opioids after ministernotomy in comparison with full sternotomy.
Materials and Methods: This was a retrospective observational study, including all patients for aortic valve replacement (AVR) (n=78) and combined AVR and coronary artery bypass grafting procedures (n=58) at Aalborg University Hospital during 2017. Data were collected by reviewing medical charts and compared using Student's t-test, Mann-Whitney test, Chi-squared test, or Fisher's exact test as appropriate. Regression analysis, adjusted for repeated measures and potential confounders, was used for comparison of equipotent opioid administration.
Results and Discussion: No differences were seen in baseline and demographics. In postoperative ICU, we observed less administrations of fentanyl in the full sternotomy group (27% vs. 44% of patients, $p<0.05$). In the thoracic ward, a larger consumption of opioids was seen in postoperative day 5, 6 and 7 (figure 1, *$p<0.05$) in the ministernotomy group. The regression model revealed that the equipotent dose of opioids tended to be higher in the ministernotomy group (2.63 mg/day, 95%CI (-0.07 to 5.34), $p=0.06$). Moreover, the use of gabapentin was correlated with lower opioid administration (-18.55 mg/day, 95%CI (-31.2 to -5.8), $p<0.01$). In conclusion, these results point towards a larger administration of opioids in the ministernotomy group compared with full sternotomy in the first week after cardiac surgery.



Conclusion: Ministernotomy may not provide advantages in terms of analgesic administration in the immediate postoperative period. A multimodal analgesia strategy may be recommended in this category and its potential advantages could be the object of a next prospective study.

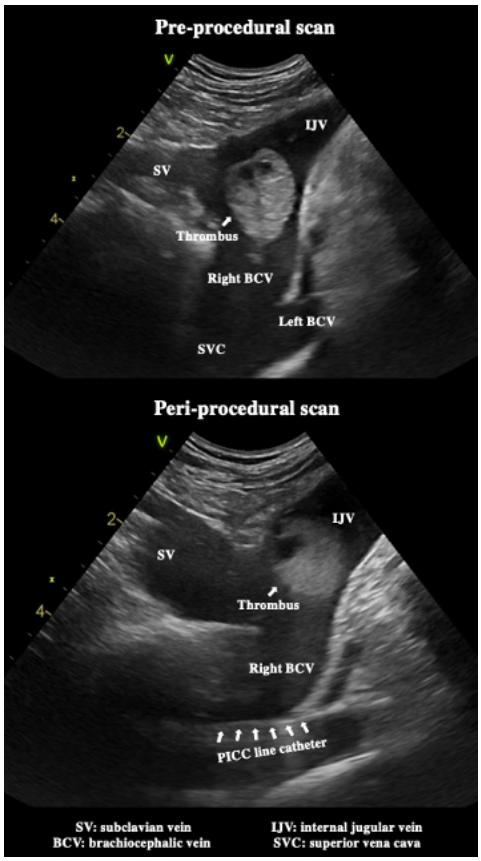
4768

Ultrasonography of the central veins through the supraclavicular view reveals pathology and provides solutions for optimal PICC line insertion

Lind P.[1], Kirkegaard E.[1], Dolmer H.[1], Juhl-Olsen P.[1]
[1]Aarhus University Hospital - Aarhus (Denmark)

Background: Novel supraclavicular ultrasonographic techniques allow for the visualisation of central veins including the right subclavian vein and both the right and left brachiocephalic veins. This facilitates an anatomical survey prior to catheter insertion and helps identify pathology. This case report presents a patient in whom a large, right-sided venous thrombus was observed allowing for an alternative approach with successful validation of catheter tip position.
Case report: A 38-year-old male with a history of acute lymphoblastic leukaemia was referred for PICC line insertion. Pre-procedural ultrasonography with a microconvex probe placed in the right supraclavicular fossa revealed a large, mobile thrombus at the junction between the right subclavian vein and the internal jugular vein without concomitant limb swelling. Hence, a left-sided approach was chosen. During catheter insertion, the confluence of the brachiocephalic veins was

visualised in real-time using the same supraclavicular view. The catheter tip was seen as it entered the superior vena cava ensuring optimal tip positioning (see figure). Upon insertion appropriate anticoagulant therapy was administered.
Discussion: The case presents a patient with asymptomatic deep vein thrombosis which would not have been discovered without a pre-procedural ultrasound examination. It is not recommended to insert a catheter in close proximity to a pre-existing thrombus, as there is a risk of thrombus dislodgement and, in addition, the catheter may act as a substrate for further thrombus formation. In the present case, supraclavicular ultrasonography facilitated a change in strategy, and despite left-sided insertion correct catheter tip position was ensured in real-time.
Learning points: Supraclavicular ultrasonography allows for an anatomical survey of the right-sided central veins prior to PICC line insertion. When pathology is found, ultrasonography helps reveal feasible alternative strategies. The right-sided supraclavicular fossa view facilitates real-time confirmation of correct catheter tip positioning even in PICC lines placed on the left side.



4849

Assessment of fluid unresponsiveness state guided by lung ultrasound in abdominal surgery: an observational and prospective study

Bar S.[1], Yee C.[1], De Broca B.[1], Marc J.[2], Miclo M.[1], Lorne E.[1]
[1]CHU Amiens Picardie - Amiens (France),
[2]Centre Hospitalier De Lens - Lens (France)

Background and Goal of Study: Fluid challenge could generate an infraclinical interstitial syndrome that could be detected by the passage from A profile (normal) to B profile (with "comet tail" B lines) in lung ultrasound 1. The main objective was to evaluate the appearance of new B lines as a predictive marker of preload unresponsiveness state.
Materials and Methods: We conducted a prospective and observational study. The agreement of the Institutional Review Board and signed consent of the patients have been obtained. Major patients undergoing abdominal surgery were included. Patients with chronic or acute pulmonary diseases were excluded. Fluid challenge was performed according to the french guidelines 2: titration with 250 ml of crystalloids. Stroke volume assessed by oesophageal Doppler was collected before and after fluid challenge of 250 mL of crystalloids (ΔSV). Responders were defined by a >10% increase of ΔSV after fluid challenge. B lines were count before and after the fluid challenge of 250 mL at 4 predefined zones (right and left supero-anterior and supero-lateral). Delta B-lines was defined as the number of new appeared B lines after fluid challenge. A receiver-operating characteristic curve (ROC) was established for ΔSV to predict fluid unresponsiveness after fluid challenge.
Results and Discussion: 200 patients were included. Median age was 62 [47-71] years and median ASA-PS was 2 [2-3]. Initial median total number of B lines was 0 [0-2]. After fluid challenge of 250 ml, 67% patients were responders and 33% were nonresponders. Delta B-lines was significantly higher in non-responders patients compared to responders (4 [2-7] vs 1 [0-3], $p < 0.0001$). Delta B-lines could predict fluid nonresponders with an area under the ROC curve of 0.74 (IC95% [0.67-0.80] ; $p< 0.0001$). The best threshold was 2 B-lines with a sensibility of 80% and a specificity of 57%. When considering all fluid challenge administered, Delta B lines was significantly correlated with ΔSV(%) after fluid challenge (rho= -0.25 ; $p< 0.0001$).
Conclusion: The appearance of 2 B-lines 2 on 4 lung ultrasound zones could be considered as a predictive marker of preload unresponsiveness after fluid challenge in abdominal surgery.
References:
1. Lichtenstein D. FALLS-protocol: lung ultrasound. Heart Lung Vessels. 2013; 5(3):142 7.
2. Vallet B, Blanloeil Y, Cholley B et al. Guidelines for perioperative haemodynamic optimization. Ann Fr Anesth Réanimation. 2013; 32(10):e151 8.

5054

Lung ultrasound versus auscultation techniques in confirming endobronchial intubation in patients for thoracic surgeries

Kim S. H.[1], So K. Y.[2]
[1]Chosun University Hospital - Gwangju (South Korea),
[2]Chosun University - Gwangju (South Korea)

Background and Goal of Study: The lung condition during one lung ventilation (OLV) may be similar with the pneumothorax, which the lung ultrasound can detect with high specificity and sensitivity. We hypothesized that lung ultrasound may be effective as much as bronchoscopy for confirmation of double lumen tube (DLT) position. Therefore, for this purpose, we investigated the sensitivity, specificity, positive prediction value, negative prediction value, and overall accuracy of auscultation and lung ultrasound techniques.
Materials and Methods: We enrolled 30 patients who were aged above 18 years requiring endobronchial intubation for OLV. We excluded patients without lung sliding by lung ultrasound before anesthetic induction, and refusing to attend this study. For blinding, 4 researchers were involved in the measurement of one person responsible for auscultation (AR), lung ultrasound (UR), bronchoscopy (FR), and principal researcher (PR). After OLV, the AR first determined the success if the breathing sound was not heard in unventilated lung, and was clearly heard in the ventilated lung. And then, the UR determined the success if there was no lung sliding and was lung pulse. And then, the FR determined the success if the proximal part of the bronchial cuff was located directly below the carina. Finally, The PR recorded all inspection results and the time to complete each assessment in supine and lateral position. Examination result of FR was treated as that of standard test.
Results and Discussion: The sensitivity (100%), specificity (100%), positive predictive value (63.3%), negative predictive value (0%), and accuracy (63.3%) of ultrasound was as same as that of auscultation in the supine position. The sensitivity (100%), specificity (57.1%), positive predictive value (85.2%), negative predictive value (100%), and accuracy (86.7%) of ultrasound was as same as that of auscultation in the lateral position. The total time for bronchoscopy was significantly longer than that for auscultation ($P = 0.002$ in supine position, $P = 0.001$ in lateral position), and slightly longer than that for lung ultrasound ($P = 0.435$ in supine position, $P = 0.234$ in lateral position).
Conclusion: Lung ultrasound as well as auscultation techniques are effective as much as bronchoscopy for confirmation of DLT position, even though the total time for estimation by auscultation was significantly shorter than that by lung ultrasound.

6315

The association between preoperative hepatic venous flow and the outcome after cardiac surgery

Eke C.[1], Szekely A.[1], Szabo A.[1], Nagy A.[1]
[1]*Semmelweis University - Budapest (Hungary)*

Background and Goal of Study: The hepatic venous flow reflects to the pressure changes of the right ventricle. Therefore, it starts to appear as a part of the echocardiographic examinations. Moreover, the back and forth link between the cardiovascular state and the liver is well-known for several years. Our objective was to evaluate the association between preoperative hepatic venous flow and the outcome of patients underwent cardiac surgery.
Materials and Methods: Our prospective, observational study included 79 patients who underwent cardiac surgery between January 2018 and October 2019 at our Heart and Vascular Centre. Beside the routine echocardiographic examination we also measured the venous blood flow in the common hepatic vein before the influx into the Inferior Vena Cava with Doppler ultrasound. We recorded the standard four waves' (V, D, S, A) maximal speed and velocity time integral (VTI). In our database we recorded the patients' demographic data, preoperative and postoperative hemodynamic and hepatobiliar markers and the EuroSCORE. We collected the length of stay (LOS), the intensive care unit stay, the vasopressor and inotrope need, and the occurrence of acute kidney injury (AKI). Our primary outcome was AKI, it were defined by the Kidney Disease Improving Global Outcomes (KDIGO) guidelines, which is one of the first signs of circulation problems. We used SPSS 22 program to analyse our data, with descriptive parameters and Cox-regression analyses.
Results and Discussion: Median age was 67.9 (IQR 25-75: 60.6-73.6), none of them had any liver or renal disease in their medical history. Most common surgical procedure was aortic valve surgery (27, 34.1%). During the first postoperative week 14 patients developed AKI (17,8%). Multivariate Cox-regression analysis revealed, that the ratio of the retrograde and anterograde waves' VTI had independent association with AKI (OR: 1.35; 95% CI: 1.03-1.75; p=0.027), the model was adjusted for the EuroSCORE.
Summary: The increment in the hepatic venous retrograde waves, which are related to hepatic stasis, can predict worse outcome among cardiac patients. Therefore, we might include this potentially useful tool in routine echocardiographic examinations.

4613

Echocardiographic outcomes of intraoperative transprosthetic cuff leakage of biological aortic valve replacement in a single centre

Ito H.[1]
[1]*Shinmatsudo Central General Hospital - Matsudo (Japan)*

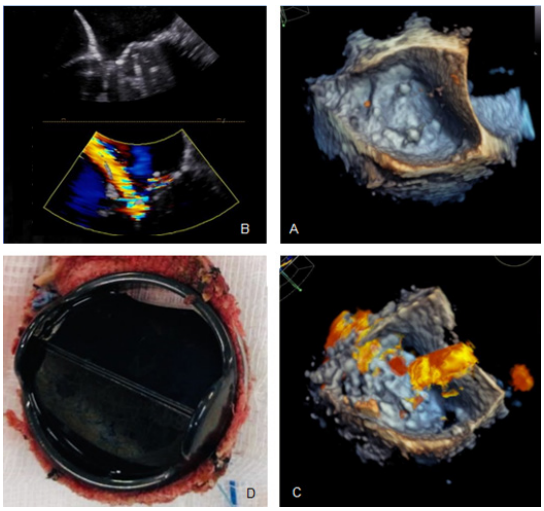
Background and Goal of Study: Intraoperative transprosthetic cuff leakage (TCL) which is neither paravalvular (PVL) nor transvalvular leakage (TVL) after biological aortic valve replacement (AVR) has been recently reported. Although some studies have described the incidence of aortic TCL, there is a paucity of evidence regarding their time course of TCL. The aim of this study is to compare the short and long-term echocardiographic outcomes of TCL.
Materials and Methods: The study comprised adult patients undergoing biological AVR between January and November in 2019. TCL were determine whether trivial or greater TCL quantified using intraoperative transesophageal echocardiography (TEE) and postoperative TTE. TEE performed prior to weaning from the cardiopulmonary bypass, immediately after aortic declamping and follow-up with protamine administration. For each of the patients we recorded the pre-operative echocardiographic data as well as the post-AVR echocardiographic outcomes at day 7 and 1 month.
Results and Discussion: Twenty five patients using four types of aortic bioprosthetic valves (Inspiris, Magna Ease [Edwards Lifesciences, Irvine, CA USA], Trifecta [Abbott, St Paul, MN, USA], Crown PRT [LivaNova PLC, London, United Kingdom]) were enrolled in this retrospective study. Intraoperative TCL was present in 8 patients (32.0%); the majority (87.5%) were trivial. No TCL resolved after protamine administration. Follow-up TTE at each 7 days and 1 month was available for 25 patients (100%) and 23 patients (92%), respectively. At 7 days after AVR, most TCL remained unchanged (62.5%) or disappeared (12.5%). Only 1 patient (12.5%) had a progression of the TCL. One patient had trivial neo-TVL and the other patient had mild neo-PVL. Follow-up TTE at 1 month revealed all aortic TCL (including neo-leakage) remained unchanged except two patients who died during the follow-up period. Additionally, intraoperative mild TCL remained unchanged at 3 months in one case.
Conclusion: This single center evaluation of the intraoperative TCL of biological AVR demonstrated aortic TCL is not uncommon. These leaks are usually trivial and generally have a benign course. However, most of trivial-to-mild remained unchanged and the presence of residual TCL may influence neo-leakage.

6230

A rare case of a severe mitral regurgitation due to a small fracture of a prosthetic valve

Park S. H.[1], Otero Gómez P.[1], Bolón Villaverde A.[1], Eiras Mariño M.[1], Martínez Salgado A.[1], Taboada Munñiz M.[1]
[1]*University Hospital of Santiago de Compostela - Santiago de Compostela (Spain)*

Background: We present a rare case of a severe mitral regurgitation due to a small fracture of a prosthetic valve thirteen years after surgery.
Case Report: A 67-year-old women was admitted to our hospital with dyspnea and edema in the lower limbs. She had a past history of mitral and aortic mechanical valve replacement and tricuspid annuloplasty tricuspid 13 years ago. Transesophageal echocardiography showed a correct excursion of the veils of the mitral prosthesis (Fig 1. A), intraprosthetic mitral leak with a severe mitral regurgitation (Fig 1B, C), severe tricuspid regurgitation and severe pulmonary hypertension. The patient was scheduled for mitral and tricuspid replacement surgery. During operation macroscopic examination revealed a fracture in the medial part of one leaflet of the mitral valve prosthesis with a missing fragment on its edge (Fig 1. D), and that is reponsible for its insufficiency. The valve was replaced surgically. The patient had a torpid postoperative period and died twenty days after the operation.



Discussion: Mitral valve dysfunction due to a fracture and escape of a mitral leaflet prothesis is a complication described with mitral mechanical prothesis1-2. However, severe mitral regurgitation with normal movement of the two leaflets of the mechanical valve prothesis is an unusual complication. Clinicans should be aware of the possibility of a fracture of a prosthetic valve in patients with prosthetic heart valves presenting sudden acute decompensated heart failure or cardiogenic shock.
References:
1. Kobayashi et al. Unilateral Pulmonary edema due to leaflet fracture of a duromedics Edwards bileaflet mitral valve.
2. J Cardiothorac Vasc Anesth. 2017; 31: 16-17. Spontaneous leaflet fracture resulting in embolization from mechanica valve prostheses. J Card Surg. 2019;34: 124-130.

6160

Pericardial Effusions in Cancer Patients: Anesthetic Management and Survival Outcomes

Afonso A.[1], Seier K.[1], Tan K. S.[1], Isbell J.[1], Fischer G.[1]
[1]*Memorial Sloan Kettering Cancer Center - New York (United States)*

Background and Goal of Study: Malignancy is a common cause of pericardial effusion. Previous reports have studied survival and effusion recurrence rates after different surgical interventions for pericardial effusion in cancer populations but no study to date examines effect of intraoperative anesthetic management on long-term survival outcomes in cancer patients. Primary outcome is overall survival. Secondary outcomes are 30-day survival, 90-day survival and in-hospital survival.
Materials and Methods: After IRB waiver, restrospective review of 150 cancer patients between 2011-2015 in a single quaternary cancer center. All patients with malignancy and pericardial effusions requiring drainage were included. Data from electronic health record included preoperative and intraoperative data. Overall survival was measured from date of surgery to date of death in June 2019.
Results and Discussion: Median survival was 5.84 months, with an in-hospital

mortality of 13.3%. 30-day mortality of 19.3%, and a 90-day mortality of 36.7%. Univaroable analysis showed metastatic disease (HR, 1.772; p=0.026), malignant pericardial effusion cells (HR, 1.499; p=0.032) were associated with decreased overall survival. After multivariable analysis, the only statistically significant factors affecting mortality are high initial heart rate (HR, 1.182; p=0.005) and intraoperative sinus tachycardia (HR, 1.862; p=0.012).
Conclusion: Mortality after pericardial wondow in oncologic patients remains high. High starting heart rate and sinus tachycardia are associated with worse survival. Initial high heart rate and intraoperative sinus tachycardia were only significant factors affecting mortality.The malignancy type and preoperative presence of tamponade physiology are not associated with difference in mortality. Intraoperative factors such as choice of induction agents, paralytics, utilization and timing of arterial line, and time of day surgery took place are not associated with a statistically significant difference in mortalityoutcome after multivariable analysis.
References:
1. Warren WH. Malignancies involving the pericardium. Seminars in thoracic and cardiovascular surgery. 2000;12(2):119-129.
2. Horr SE, Mentias A, Houghtaling PL et al. Comparison of ouctomes of pericardiocentesis versus surgical pericardial window in patients requiring drainage of pericardial effusions. The American Journal of Cardiology. 2017;120(5):883-890.

4930

BioGlue manifesting as a subaortic floating structure in ventricular septal rupture surgery

Nakata S.[1], Sugimoto K.[1], Kadosaki M.[1], Aizawa K.[1], Kawahito K.[1], Takeuchi M.[1]
[1]Jichi Medical University Hospital - Shimotsuke (Japan)

Background: In surgical patch repair for ventricular septal rupture (VSR), it has never been described that BioGlue, an adjunct to seal the suture line of patch-repaired septum, was detected as a subaortic floating structure, which could potentially contribute to devastating embolism.
Case Report: Written informed consent was obtained from the patient. The 72-year-old male developed myocardial infarction and percutaneous intervention was administered, thereafter intra-aortic balloon pump (IABP) was placed. The following day, he exhibited VSR and underwent a patch closure. The incision was undertaken from right ventricular wall, then BioGlue was applied to the suture line of patch-repaired septal endocardium toward left ventricle. Before the weaning from cardiopulmonary bypass, transesophageal echocardiography (TEE) demonstrated a subaortic floating structure, which was not found preoperatively. TEE also revealed an exacerbated mitral regurgitation, which urged the surgeons to perform valve repair. While the additional operation, the subaortic structure was removed and diagnosed as BioGlue clot due to its appearance. Although he was extubated on postoperative day (POD) 8 and weaned from IABP the following day, right ventricular failure developed on POD 19, and he died on POD 29.
Discussion: We experienced a case of subaortic floating BioGlue clot leaked from suture line between the patch and septal endocardium. The glue responsible for embolism has been previously reported that it is applied to the suture lines outside of the heart, such as aortic or coronary grafts. Cryolife Inc. warns that the glue should not be applied to the intracardiac cavity, which is more likely to cause embolism than its application outside of the heart. However, surgeons occasionally use the glue during VSR surgery to provide reinforcement to the suture line between infarcted friable septum and the patch. It is recommended that anaesthesiologists ask the surgeons about the use of BioGlue, and if so, careful TEE examination particularly around the patch to find the abnormal structure is needed, thereby avoiding the postoperative embolism.
Learning points: BioGlue applied to intracardiac suture line is more likely to cause embolism than its use of outside of the heart. Anaesthesiologists are recommended to confirm the use of the glue and if so, careful TEE examination is needed to prevent potential embolism.

5708

New NIRS features. An alternative view on the technique

Lomakin M.[1], Rybka M.[1], Dibin D.[1], Loseva A.[1], Yudin G.[1]
[1]A.N. Bakulev National Medical Research Center of Cardiovascular Surgery - Москва (Russia)

Background: The depth of penetration into biological tissues limits the sensor radiation of the most common NIRS monitors using in clinical practice by 15–20 mm. We were interested in the possibility of intraoperative spectroscopy of the lungs, myocardium and gastrointestinal tract organs. The aim of our study was to evaluate the possibility of a modern spectrometer in determining non-cerebral tissue oxygenation in patients of various age groups during operations and congenital heart correction without cardiopulmonary bypass in newborns.
Case Report: We selected patients whose visualization depths of the pleural hyperechoic line were no more than 15 mm for lungs study. In this group we performed an intraoperative study of the oxygen saturation dynamics of lung tissue. To assess visceral blood flow under cardiopulmonary bypass, the sensor was fixed on the anterior abdominal wall in children under one year old. Transgastric spectroscopy was performed in patients over 18 years with anterior abdominal wall thickness greater than 15 mm. Two adult patients underwent myocardial spectroscopy before and after cardioplegia.
Discussion: The method for the lung tissue saturation assessment is a criterion for an adequate systemic-pulmonary anastomosis function. In the case of corrective anastomosis function, asymmetry of lung rSO2 appears in 100% of cases. With PEEP increasing from 5 to 10 cmH2O all patients showed a decrease in rSO2 over the lungs of 9.5-14.7% ($p < 0.05$). The analysis of the oximetry dynamics of the lungs during cardiopulmonary bypass operations, accompanied by cardioplegia: lung rSO2 increased to 95% with aortic clamping time of more than 20 minutes, followed by a decrease within 72 hours to 70 ± 5% ($p < 0.05$). When performing transgastric spectroscopy of the abdominal organs, the influence of certain factors on the dynamics of rSO2 of the visceral tissues was examined, for example, the beginning of the infusion of vasoactive drugs (a 5.7% decrease in visceral rSO2), the transition to extracorporeal circulation (lack of dynamics of visceral rSO2). Myocardial rSO2 was evaluated before and after cardioplegia: rSO2 decreased by 8.4%.
Learning points: The physical NIRS basis allows dynamic monitoring of the blood flow state and oxygen metabolism not only in the brain, but also in other organs and tissues.

5499

Cerebral oximetry changes and postoperative delirium in adult cardiac surgery patients

Belkaid M.[1], Ródenas F.[1], Rodríguez M.[1], Moret E.[1], Martí I.[1], Jimenez Y.[1]
[1]Hospital Germans Trias i Pujol - Badalona (Spain)

Background and Goal of Study: Postoperative delirium is associated with increased morbidity and mortality. We hypothesized that changes of regional cerebral oxygen saturation would influence the incidence of postoperative delirium after cardiac surgery. The aim of this study was to analyse the relationship between intraoperative cerebral oximetry changes and the postoperative delirium incidence after adult cardiac surgery in our setting.
Materials and Methods: This was a prospective observational study. After obtaining institutional Ethics Committee approval and written informed consent, all consecutive adult patients scheduled for elective cardiac surgery with cardiopulmonary bypass (CPB) were enrolled during 3 months (from February to April 2019). Recorded variables were: demographics, preoperative medication, preoperative cognitive function using Mini-Mental-State-Examination (MMSE), baseline educational level, comorbidities, EuroScore, intraoperative data (type of surgery, CPB time, regional cerebral oximetry (rScO2) and desaturations >20% from baseline values (1 minute or longer) at different times, ICU and in-hospital length of stay) and postoperative data (intubation time, transfusion, presence of shock, need of vasoactive drugs, etc.). Postoperative delirium was assessed by using the confusion-assessment-method for the intensive care unit (CAM-ICU) during 10 postoperative days. Student's t-test and Chi-square test were used for analysis.
Results and Discussion: A total of 90 consecutive patients were included (25% women; 100% ASA IV, mean age 67.7±11.3 years, mean body mass index 28.63±4.4 kg.m-2). 6.7% of them developed delirium postoperatively according to the CAM-ICU criteria; none of these patients presented a decrease of baseline rScO2 value > 20% intraoperatively (p=0.48). Postoperative noradrenaline requirements in ICU were higher in patients with postoperative delirium (p=0.012). 66% of the patients that presented delirium had a low daily physical activity preoperatively. No other differences were found between patients with or without delirium.
Conclusion: In our setting the delirium incidence was low and no relationship between intraoperative cerebral oximetry changes and postoperative delirium incidence after adult cardiac surgery with CPB was found. The use of noradrenaline in the ICU was associated with a higher incidence of postoperative delirium in our patients. More studies are needed to explore this hypothesis.

4525

Preoperative arterial and venous cannulation in RE-DO cardiac surgery: from the points of safety and cost-effectiveness

Yildiz Y.[1]
[1]Medipol Universty Hospital, - Istanbul (Turkey)

Background and Goal of Study: Re-do cardiac surgery carries certain risks of myocardial injury especially during exploration. Damages to the mycardium may be life threatening and consequences may increase the hospital costs. The aim of the current research is to investigate the safety and cost effectivity of preoperative cannulation and conventional approach techniues.
Materials and Methods: In total of 63 patients whom underwent re-do open cardiac procedures between September 2015 and September 2017 are grouped into two groups as; Group A (n:31): conventional cannulation after sternotomy and Group B (n:32), cannulation before sternotomy group. Patients were evaluated retrospectively for general complication rates and total hospital costs.
Results and Discussion: Mortality occured in 4 patients in Group A and in 1 patient in Group B. Four patients required ECMO in Group A where as 2 in Group B. Duration of total operation, cardiopulmonary bypass and cross clamp time were longer in the conventional surgery group than pre-sternotomy cannulation group (420.29±188.84 vs 314.77±187.38, p: 0.036; 171.87±85.59 vs 141.7±82.47, p: 0.089; 102.94±70.67 vs 60.97±52.81, p: 0.009; respectively). Total blood and blood product use were higher in Group A when compared with Group B. Postoperative intensive care unit stay was 62.77±145.3 hours vs. 25.13±73.11; ventilation time 5.16±5.09 hours vs. 3.03±2.78 hours; duration of ward stay was 5.23±2.52 days vs. 5.57±2.16 days andhospital stay was 9.58±5.85 vs 9.8±5.31 days in conventional sternotomy and pre-sternotomy cannulation groups. Total hospital costs were calculated 35863.52±20803.99 Turkish Lira in Group A and 25744.74±16472.03 Turkish Lira in Group B (p=0,042).
Conclusion: Arterial and venous cannulations before sternotomy decreased myocardial injury and complication rates, blood and blood product use, hospital stay and in the end hospital costs in our modest cohort.

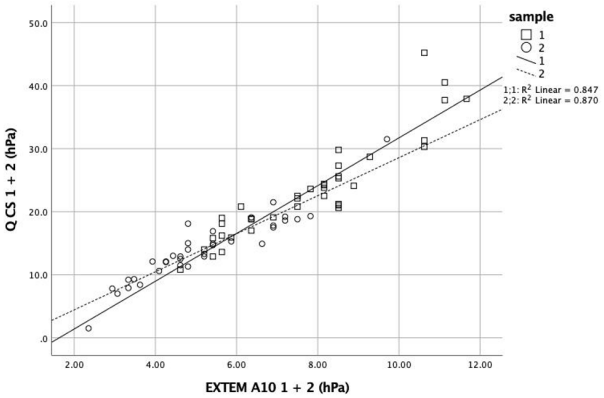


Fig 1 Scatter Plot of clot stiffness values of Quantra (Q CS) and ROTEM (EXTEM A10), squares and solid line: sample 1, circels and dashed line: sample 2

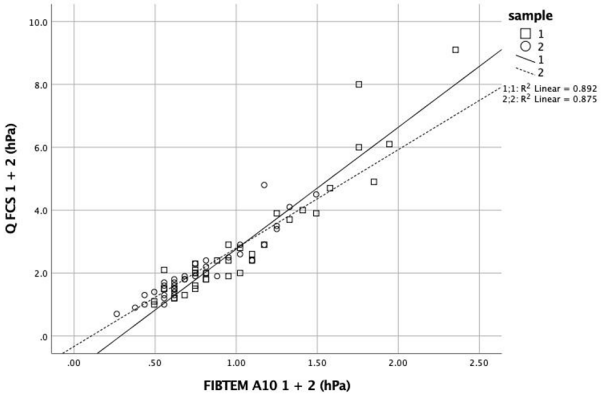


Fig 2 Scatter Plot of fibrinogen contribution to clot stiffness of Quantra (Q FCS) and ROTEM (FIBTEN A10), squares and solid line: sample 1; circels and dashed line: sample 2

4567

Comparison of the ultrasound sonorheometry based Quantra® System with rotational thromboelastometry ROTEM ® Sigma in cardiac surgery

Baulig W.[1], Akbas S.[2], Schütt P.[3], Berdat P.[3], Theusinger O. M.[4]
[1]Klinik Im Park - Zürich (Switzerland), [2]Kantonsspital Winterthur - Winterthur (Switzerland), [3]Klinik Im Park - Zurich (Switzerland), [4]Blood Donation Service - Zurich (Switzerland)

Background and Goal of Study: In cardiac surgery point of care coagulation monitoring is commonly used for detection of severe coagulopathy enabling goal-directed and timely treatment. Measures of the novel sonorheometry based Quantra Viscoelastic Hemostatic Analyzer (HemoSonics, Charlotteville, VA, USA) were compared with corresponding results of the ROTEM sigma device (Instrumentation Laboratory, Bedford, MA, USA)
Materials and Methods: In elective cardiac surgery patients, blood samples were taken after induction of anesthesia (sample 1) and after termination of cardiopulmonary bypass and heparin neutralization (sample 2). Samples were measured on Quantra (QPlus cartridge) and ROTEM sigma device with recording of time-to-results (first available and complete), clot times and clot stiffness values. For comparison of clot stiffness values, ROTEM amplitudes (A in mm) were converted to shear modulus (G) in hectoPascal (hPa): G (hPa) = (500xA) / (100-A). Correlation was evaluated by Spearman rank test. Bland Altman analysis was performed to determine agreement of methods. P-value <0.05 indicated statistical significance.
Results and Discussion: Thirty-seven patients (29 male and 8 female) were enrolled, with 72 data pairs analyzed. The time to delivery of first and complete results was significantly (p<0.0001) shorter for Quantra (6.9 abd 14.0 minutes) compared to ROTEM sigma (11.0 and 21.5min). In both samples, Quantra clot stiffness (CS) and fibrinogen contribution to clot stiffness (FCS) exhibited a strong correlation with ROTEM EXTEM A10 (r = 0.93 and r = 0.94) and FIBTEM A10 (r = 0.92 and r = 0.96) (Fig 1). Bland Altman analysis showed only a moderate agreement. Quantra clot times (CT) correlated strongly with ROTEM INTEM CT (r = 0.71 abd r = 0.75) in samples 1 and 2
Conclusion: Result delivery of the Quantra is much faster than ROTEM sigma. Quantra demonstrates strong correlation with the ROTEM sigma for determining clot times and clot stiffness. However, measures of clot stiffness of both devices are not interchangeable.

4694

Better to be Underweight or Obese going for Cardiac Surgery? - A study in Asian population

Ke Y.[1], Sim E. Y.[1], Yek J. J. L.[1], Thin T. N.[1], Tan B. P. Y.[1], Abdullah H. R. B.[1]
[1]Singapore General Hospital - Singapore (Singapore)

Background: There is an apparent paradox that increased body mass index (BMI) is associated with reduced mortality after cardiac surgery. It has been attributed to reverse epidemiology (causation) bias whereby the underweight patients who are more frail and cachexic has worse outcomes. We examine the association of BMI (Underweight vs Obese) with mortality in cardiac surgery in an Asian population.
Methods: A retrospective review of patients undergoing cardiac surgery in a tertiary hospital between 2016 and 2018 was done. Ethics approval was obtained from Institutional Review Board. A follow up of one-year was done. Perioperative data and post operative complications was collected. Patients were divided into 4 groups based on BMI for Asians: Underweight (BMI <18, N=45), Normal (BMI 18-23.5, N=449), Overweight (BMI 23.5-27.5, N=501), and Obese (BMI>27.5, N=342). Multivariable logistical regression models were used where appropriate for the statistical analysis.
Results and Discussion: A total of 1337 patients were included in the study. 45 (3.4%) were underweight while 342(25.6%) are obese. Although there were less 30-day mortality in obese group vs normal weight group (Adjusted HR (95% CI): 0.50 (-0.14- -1.23), p=0.014), there was no difference in Underweight vs Obese (Adjusted HR(95% CI):0.96 (0.74- -0.83), p=0.92). The 1-year mortality is significantly more in underweight (Underweight vs Normal, Adjusted HR (95% CI): 0.66(-0.02- 0.80), p=0.039), but there was no difference between underweight and obese groups (Adjusted HR(95% CI):0.76 (0.26- -0.81), p=0.32). Exploratory analysis shows obese patients and more protected from pulmonary complications, re-operations, re-admissions to Intensive care unit (ICU), length of stay in both ICU and hospital, and there was difference in risk of acute kidney injury and cardiac complications (figure 1).
Conclusion: There was no difference in 30-day and 1 year mortality between the underweight and obese patients, but the obese patients have less postoperative complications. Rather than the obesity paradox, one might call it the Lean paradox as patients who are underweight has worse reserves after cardiac surgery.

5250

Incident and outcomes of cerebrovascular events in patients with prolonged left ventricular assist device support: experience from a single university center

Hara N.[1], Shibata S. C.[1], Fujino Y.[1]
[1]Osaka University Graduate School of Medicine - Osaka (Japan)

Background and Goal of Study: More than 90% of heart transplantation (HT) candidates are bridged with a ventricular assist device (VAD) in Japan. In these patients, anticoagulant therapy is administered to prevent thromboembolic complications. Cerebrovascular events (CVEs) such as intracranial hemorrhage (ICH) and cerebral infarction may be life-threatening. Patients surviving such complications may require strict control of blood pressure and intracranial pressure during anesthetic management during HT surgery. We conducted a retrospective review and investigated the incident rate and the outcome of cerebrovascular event in patients with VAD.
Methods: After review board approval, we conducted a retrospective review of all VAD implantation cases at our center from 2005 to November 2019. Collected data included age, sex, type of CVE, severity, and survival. Our primary outcome was the rate of CVE. Secondary outcomes included severity of event, survival rate, and type of implanted VAD. Student t-test and chi-square tests were used for statistical analysis.
Results and Discussion: A total of 209 patients were included for this study. The average age at the time of initial VAD implantation was 43.4±14.6 years and 67.5%(n=114) were male. We found 38.7% (n=67) of patients experienced CVEs within an average of 142.5±273.0days post implantation. Intracranial hemorrhage, cerebral infarction, and subarachnoid hemorrhage occurred in 46.5% (n=34), 36.9%(n=27), and 10.9%(n=8), respectively. The severity for cerebral infarction was moderate (mean National Institute of Health Stroke Scale 9.0±8.0). Subarachnoid hemorrhage was occurred with moderate severity (mean Hunt and Hess scale 2.39±1.33). There were 16 mortality cases which directly due to CVEs in which 15 cases due to cerebral infarction. Of the patients which survived the CVE, 29.6% continued VAD support and 23.5% were able to undergo HT. The majority of implanted VAD were HeartMate II (35.8%) We did not find any association between the type of VAD and rate of CVEs.
Conclusion: Patients requiring prolonged periods of VAD support are vulnerable to CVEs. Cerebral infarction was a major cause of death. Our results should be taken in to account during anaesthtic management of HT surgery.

5540

Survival after heart retransplantation in late cardiac allograft failure

Stang M. V.[1], Bianco J. C.[1], Marenchino R. G.[1], Teijido C. A.[1]
[1]Hospital Italiano de Buenos Aires - CABA (Argentina)

Background and Goal of Study: Heart transplantation continues to be the gold standard treatment of end-stage heart failure. Among patients who survive heart transplant, recurrent end-stage heart failure is a major cause of morbidity and mortality. Heart retransplantation (HRT) offers the potential for long-term survival; however, there is controversy about the appropriateness of retransplantation because of limited organ availability and outcomes that tend to be worse than in primary transplantation.The aim of this study was to determine the mid-term survival after HRT.
Materials and Methods: After obtaining IRB approval, the authors retrospectively studied all consecutive adult patients who underwent orthotopic heart transplantation between January 2009 and December 2018 at a tertiary care university hospital and followed them up until November 2019. Patients included in the analysis had undergone HRT and were 18 years or older.
Results and Discussion: During the study period, 250 patients underwent orthotopic heart transplantation. Among these patients, 2% (n=5) underwent HRT. The end-stage heart failure diagnoses leading to first heart transplant in our study were hypertrophic cardiomyopathy (40%) and idiopathic cardiomyopathy (40%) and myocarditis (20%) and the major indications for HRT were chronic rejection (60%) and cardiac allograft vasculopathy (40%). Grafts failed at a median follow-up of 9 (5) years after first heart transplantation. Median HRT recipient age was 28 (8) years, and all patients were males. The majority of patients (80%) required combined simultaneous second cardiac and first renal transplantation. Heart-kidney combined transplantation were performed with organs coming from the same donor and with no-staged modality. Actuarial survival rate was 60%, after a median follow-up of 17.8 (39.6) months. Heart retransplantation survival has improved over the decades, but is still inferior to primary transplantation.1,2
Conclusions: Heart retransplantation is a viable treatment option for patients with late failing allografts. Judicious patient selection and careful perioperative care are of utmost importance considering limited allograft availability.
References:
1. Transplant International 2018; 31: 1223–1232.
2. Ann Cardiothorac Surg 2018;7(1):12-18.

5534

Burnout syndrome among healthcare professionals of Centre of Cardiac Surgery

Nesyn V.[1], Makarov A.[1], Nesyna S.[2]
[1]Federal Centre of High Medical Technologies - Kaliningrad (Russia), [2]Immanuil Kant Federal Baltic University - Kaliningrad (Russia)

Background and Goal of Study: Healthcare professionals with high occupational load work under a stressfull environment which can lead to burnout syndrome. The purpose of the study was to investigate the degree of burnout experienced by anesthesiologists in compare with surgeons and cardiologists in Cardiac Surgery Centre of Kaliningrad and justify the need for education in stress management.
Materials and Methods: Forty-eight health professionals were surveyed. The sample was divided into three groups: anesthesiologists (n=16), surgeons (n=17) and cardiologists (n=15). There were 18 female and 30 male respondents. The questionnaire of burnout by V. Boyko was used to measure symptoms, phases, and degree of burnout syndrome.
Results and Discussion: We observed symptoms of burnout in all participants of the study. Comparative analysis showed lower degree of burnout among anesthesiologists in comparision with surgeons and cardiologists ($p \leq 0.05$). In the group of anesthesiologists, the burnout symptom - reduction of professional obligations and achievements level - had statistically significant positive correlation with age and occupational experience of participants ($p \leq 0.01$). Besides, our study revealed significant differencies between anesthesiologist, cardiologists, and surgeons in the following symptoms: depersonalization ($p \leq 0.01$), personal accomplishment ($p \leq 0.01$), psychosomatic and psycho-vegetative problems ($p \leq 0.05$), and experience of psychotraumatic events ($p \leq 0.05$).
Conclusion: Specialisation based strategies in stress management education are needed to overcome the difficulties of emotionally charged issues of health professionals.
Acknowledgements: A.Vygovskiy, Yu. Shneyder, Federal Centre of High Medical Technologies, Kaliningrad, supported this research.

5779

Evaluation of the compliance with the ESA Guidelines for fibrinogen concentrates prescription in adult cardiac surgery in France: the prospective observational FibCard study

Longrois D.[1], Albaladéjo P.[2], Cholley B.[3], Colson P.[4], Chardonnal L.[5], Ouattara A.[6]
[1]Bichat-Claude Bernard Hospital - Paris (France), [2]CHU Michallon - Grenoble (France), [3]AP-HP European Hospital Georges Pompidou - Paris (France), [4]CHU - Hôpital Arnaud De Villeneuve - Montpellier (France), [5]CHU Lyon - Lyon (France), [6]CHU Bordeaux - Bordeaux (France)

Background and Goal of Study: Cardiac surgery is associated with bleeding and transfusion of blood products (BP) and blood-derived products including fibrinogen concentrates (FC). The goal of this study was to evaluate compliance with the ESA Guidelines (1) for prescription of FC in adult cardiac surgery in French practice.
Materials and Methods: FibCard was a multicentre, prospective, observational study; 14 centres included adults who underwent cardiac surgery with cardiopulmonary bypass. Indication for FC administration was defined as: documented/suspected plasma fibrinogen <2g/L before FC prescription and 'clinically relevant' perioperative bleeding defined as blood loss from chest tubes within 24h of surgery >720mL (75th percentile of blood loss of all patients). The main criterion was evaluated with its 2-sided 95% Confidence Interval (95%CI). A logistic regression model was used to identify the factors associated with FC prescription after adjustment on the centre.
Results and Discussion: Between March 2017 and April 2018, 2665 patients (72.2% males) were included; 374 (14.0%) patients were administered FC at least once (PFC). FC prescription rates varied among centers from <1.0% to 31.2% ($p<10^{-3}$). Perioperative administration of blood products (BP) was higher in the PFC patients ($p<10^{-3}$). After adjustment on the centre, per- and post-operative administrations of BP were significantly associated with FC prescription (Table).

	P_{FC} n=374	NP_{FC} n=2291	p
Preoperative fibrinogen level (g/L)	3.2 [2.7;4.1]	3.7 [3.1;4.3]	$<10^{-3}$
Complex surgery	245 (65.5%)	806 (35.2%)	$<10^{-3}$
Peroperative administration of BP	240 (64.2%)	577 (25.2%)	$<10^{-3}$
Postoperative administration of BP	314 (84.0%)	850 (37.1%)	$<10^{-3}$

Overall, 250 (9.4%) patients were defined as eligible for FC administration (R+), of whom 133 (53.2%; 95%CI: [47.0%; 59.3%]) patients were prescribed FC (R+/PFC); although eligible, 117 (46.8%) patients were not prescribed FC (R+/NPFC). Among the 2415 (90.6%) patients who were not eligible for FC 241 (10.0%; 95%CI [8.9%; 11.2%]) were prescribed FC.

Conclusion: Most prescriptions complied with ESA guidelines. Detailed analysis of the reasons of non-compliance are necessary.

Reference:

1. Kozek-Langenecker et al. Eur J Anaesthesiol 2017.

5841

Successful anaesthesia management in patients with explantation of two different types of left ventricular assist devices

Selçuk Sert G.[1], Balcı E.[1], Demir Z. A.[1], Karadeniz Ü.[1], Özgök A.[1]
[1]Ankara City Hospital, Department Of Anaesthesiology - Ankara (Turkey)

Background: Left ventricular assist devices (LVAD) are implanted in cases of heart failure refractory to medical therapy. LVADs are used mostly as a bridge to heart transplantation; but, in specific cases, myocardial function recovers and LVADs can be explanted. In kind of LVAD surgeries, anaesthesia management can be challenging. Furthermore, explantation of LVAD is more complicated in terms of that all work is left to the patient's own heart.

Case report: First case:10-year-old male, who underwent LVAD (Heartware®) placement after acute myocarditis.Second case:20-year-old male, who underwent LVAD (Heartmate II®) placement after acute myocarditis. Both cases showed marked recovery of their cardiac functions in 3 years and scheduled for LVAD explantation. After routine cardiac anaesthesia monitoring; bispectral index, near-infrared spectroscopy, transesophageal echocardiography(TEE) probes were placed. Following uneventful induction of anaesthesia with ketamine, midazolam,rocuronium ; anaesthesia maintained with sevoflurane-remifentanil. Surgery was initialized with left anterior thoracotomy. In Heartware device the pump speed(rpm)was gradually reduced to 1800 rpm while in Heartmate II to 6000 rpm. Pump speed is reduced every 10 minutes. Detailed TEE was applied to patients at each stage of reducing rpm. All valve functions and ventricular wall movements were examined in detail. Cardiac output was evaluated simultaneously via PICCO system. It was observed that CO and DO2 were increased at each stage, stable hemodynamics were provided. At the end of the operations, the patients were transferred to the ICU uneventfully.

Discussion: Surgery of LVAD explantation is highly stressed in terms of anaesthesia management after recovery is thought to occur in patients with heart failure.During the anaesthetic management of this susceptible period, it is quite useful to monitor the cardiac output in a continuous and less invasive fashion without introducing a pulmonary artery catheter and to assess the ventricle functions using continuous TEE. We would like to present two successful anesthesia management of two different type of LVAD devices explanation surgery.

Learning points: It is a critical period in which the LVAD device is stopped and the patient's heart has taken over all circulation works again. Carefully anaesthetic drug titrations and close hemodynamic monitoring with PICCO, TEE and NIRS are helpful for LVAD explantation surgeries.

6103

Patient flow and clinical decision making through the vascular MDT

Drayton D. J.[1], Howard S.[2], Hammond C.[2], Bekker H.[1], Russell D. A.[2], Howell S. J.[1]
[1]University of Leeds - Leeds (United Kingdom), [2]Leeds Teaching Hospital Trust - Leeds (United Kingdom)

Background and Goal of Study: The UK National Quality Improvement Programme for the management of Abdominal Aortic Aneurysm (AAA) identified multi-disciplinary team (MDT) meetings including anaesthetic assessment to be key to effective care. Studies in cancer suggest that 15% of MDT decisions are not implemented.(1) This service evaluation reviewed decision implementation following a vascular MDT and the factors affecting the decision-making process.

Materials and Methods: Consecutive AAA patients discussed at the vascular MDT at a large UK teaching hospital between October 2017 and August 2018 were identified. Data on MDT decisions and clinical management were collected from the electronic health record. Actual management was compared to the MDT decision and coded as concordant, discordant or undecided. Cases coded as discordant or undecided were reviewed to identify contributing themes. Data are reported as number[%] and median[range].

Results and Discussion: 106 patients, (age 78[56-96] years, 85[80%]) male, were discussed in 42 meetings. Meetings were attended by 3[1-6] interventional radiologists, 6[4-11] surgeons, and 1[0-1] anaesthetists. Aneurysm size was 6.0[3.0-9.5]cm. 82[77%] patients were discussed at one MDT, 20[19%] at two, and 4[4%] at three MDTs. Following the first MDT 23[22%] patients did not have a settled management plan; this reduced to 12 [11%] by the end of the MDT process. 18 of the 24 repeat discussions were prompted by the absence of key clinical information, including anaesthetic or cardiopulmonary assessment, at a prior MDT. Planned management was not implemented in 11[10%] of the 94 patients who had a settled management plan. Reasons for deviation from the MDT decision were multifactorial. An incomplete assessment of the severity of comorbidity was important in 3 cases. Patient preference was a key factor in 8 cases.

Conclusion: Our data suggest that failure of information from preoperative investigations and anaesthetic preassessment to be transmitted to the MDT played a role in the need for multiple MDT discussions and may have contributed to delays in care. Incomplete assessments of co-morbidity or patient choice were important in the majority of patients who did not receive planned care. These may be addressed by changes to the preassessment process. We are now conducting qualitative work to inform process improvement for our MDT.

References:

1. Blazeby, J.M. et al. Ann Oncol. 2006; 17: 457-460.

6182

Dynamics of neuropsychological testing results as a response of patients with surgical aortic pathology to surgery using cardiopulmonary bypass

Sharlai K.[1], Volkova Y.[1], Khizhnyak K.[2]
[1]Kharkiv National Medical University - Kharkiv (Ukraine), [2]Amosov National Institute Of Cardiovascular Surgery - Kiev (Ukraine)

Background and Goal of Study: The aim of the work was to analyze the dynamics of the results of neuropsychological testing as a reaction of patients with surgical aortic pathology to the surgical intervention using cardiopulmonary bypass (CPB).

Materials and Methods: In 118 patients with surgical pathology of the aorta (SPA) against the background of general anesthesia in the context of CPB, a comprehensive medical and psychological study of cognitive function was performed the day before the operation, on the third, seventh and fourteenth day of hospital stay. Patients were divided into 2 groups: group I included 46 patients who were additionally assigned a solution of meglumine sodium succinate (reamberin), group II included 46 patients who were additionally assigned a solution of D-fructose-1,6-diphosphate sodium hydrate (esophosphine). The cognitive abilities of patients were determined by the MMSE scale, by the 5-word test, by the Doskin well-being scale, and by the correction test using the Anfimov tables.

Results and Discussion: Statistical analysis of changes in cognitive abilities on the MMSE scale in the postoperative period in patients of groups K, I and II with SPA found that surgery itself - operational stress, as well as general anesthesia and the use of the CPB device during surgery adversely affect almost all indicators higher nervous activity (HNA). Important is the fact that in patients of group II, no statistically significant difference was found in any of the control points between the total score on the MMSE scale and their starting level. In group II, no statistically significant difference was found between the starting indicators and the numbers of the test result of 5 words in points in any of the control points. Regarding the Doskin scale, as a test to identify postoperative cognitive dysfunction (PCD), when assessing its component - the expressiveness of patient activity, the K, I and II group did not determine a significantly significant difference between its numbers and the starting level.

Conclusion: It can be noted that the indicator of PCD depends on the severity and mechanisms of the effect of hypoxia on the background of artificial brain perfusion, the most influential factor in assessing the patient's condition in the postoperative period.

Acute and Chronic Pain Management and Palliative Medicine

4574

Prolotherapy for the patients with chronic pain: Systematic review and meta-analysis

Bae G. H.[1], Kim H.[1], Ju J.[1], Lee W. Y.[1], Lim Y.[1], Lee S.1
[1]Sanggye Paik Hospital - Seoul (South Korea)

Background and Goal of Study: Chronic pain (>3 months) involved in musculoskeletal system is usually due to the laxity of ligaments or tendons by strains, tearing of the fibers after trauma. Nonsurgical treatment such as prolotherapy can provide a cost-effective, reduced risk, and rapid healing, which is an injection treatment to stimulate healing process for the loosened ligament and tendon. Dextrose is currently most common being used. Recently many literatures about the effect of prolotherapy with dextrose including randomized controlled trials (RCTs) have been published. However, the real benefits may be affected by differences in injection protocols, comparative regimens, and evaluation scales. The aim of this systematic review and meta-analysis is to determine the effectiveness of prolotherapy for long-term treatment of chronic musculoskeletal pain and osteoarthritic pain.
Materials and Methods: We searched Medline (n=250), Embase (n=64), Cochrane Central (n=168), KoreaMed and KMbase (n=198) databases through March 2019 to identify relevant RCTs. We conducted a systematic review and meta-analysis according to the Cochrane Collaboration guidelines. The primary outcome of interest was pain score change during daily life. Effects were summarized using standardized mean differences (SMD) compared to other therapies such as exercise, saline, platelet-rich plasma and steroid injection.
Results and Discussion: Ten RCTs involving 608 participants were included in qualitative and quantitative synthesis. The prolotherapy with dextrose compared to saline significantly reduced the pain score from 6 months to 1 year [SMD=-0.44 (-0.76,-0.11)] and compared to exercise [SMD=-0.42 (-0.77,-0.07)]. However, dextrose injection did not showed significant difference compared to platelet-rich plasma [SMD=0.19(-0.20,0.59)] and steroid injection [SMD=0.45(-0.57,1.47)].
Conclusion: Overall, prolotherapy using dextrose provide a positive and significant beneficial effect in the treatment of chronic pain followed from 6 months to 1 year. There is an evidence of better therapeutic effect than exercise, and showed a corresponding effect over platelet-rich plasma or steroid injection. Adequately powered, longer-term trials with uniform end points are needed to better elucidate the efficacy of prolotherapy.

4619

Facial neuropathic pain: a successful clinical case with 8% capsaicin patch

Jacob M.[1], Marques Ruivo E. F.[1], Portela I.[1], Gestosa S.[1], Buketov A.[1], Lares A.[1]
[1]Centro Hospitalar Universitario do Algarve - Faro (Portugal)

Background: Neuropathic pain is defined as a direct consequence of an injury or disease that affects the somatosensory system and may affect 7-10% of the world population. It is often described as disabling, chronic, difficult to treat and with a noticeable impact on patients' quality of life.
Case Report: Female patient, 37 years old, is referred to the Chronic Pain consultation after 5 years of medical follow-up with marked unsuccess of the therapy instituted for neuropathic pain. In the early beginning, the patient described a two-week history of left maxillary pain with progressive, constant worsening, with exacerbating factors such as temperature variations or wind. She turned to the doctor when her symptomatology culminated in the sudden onset of paralysis of the left hemifacial mimic muscles. Approximately one month after this clinical scenario, a vesicular rash in the left mandibular zone and upper left cervical platysma appeared, with resolution after the applied therapy. The pain, however, remained to this day. Regardless of the specific underlying etiology, either left peripheral facial paralysis associated with trigeminal neuralgia, with later onset of herpes zoster, or, left peripheral facial paralysis with associated ipsilateral post herpetic neuralgia, the patient underwent extensive classical therapy covering both diagnostics, always showing, however, a markedly ineffective pain control. The therapeutic success was only obtained after the first application of 8% capsaicin facial patch, with an extended pain-free interval and a consequent significant increase in quality of life.
Discussion: Not only for this case report, but also the successful casuistic recorded at our institute, patients with facial neuropathic pain showing poor adherence to therapy or treatment ineffectiveness, might be candidates for the 8% capsaicin patch facial application, which, we believe, will become a valid option in such patients in the near future.
References:
1. Luana C et al. Neuropathic pain. Nat Rev Dis Primers. 2017.
2. Binder A, Baron R. The Pharmacological Therapy of Chronic Neuropathic Pain. Dtsch Arztebl Int. 2016.
3. Armstrong E et al. Cost-effectiveness analysis of a new 8% capsaicin patch compared to existing therapies for postherpetic neuralgia. Curr Med Res Opin. 2011.
Learning points: The 8% capsaicin patches may be a valid option in the near future for neuropathic facial pain in patients showing a therapeutic unsuccess with the classical therapy.

4324

Traction therapy For Post Neck Pain with Disc Herniation traction ® (Pilot study)

Kim K. S.[1], Kim Y. K.[2]
[1]Dong Kang Hospital, Dong Kang Medical Foundation - Ulsan (South Korea), [2]Department of Anesthesiology and Pain Medicine, Gangneung Asan Medical Center, University of Ulsan College of Medicine - Gangneung (South Korea)

Background and Goal of Study: 'Disc Herniation traction' is developed to perform the role of expanding the interspinal space by traction around the cervical spine. Spinal cord traction therapy is widely used because its efficiency and efficacy are widely recognized in clinical practice. The purpose of this pilot study is to apply the developed device (Disc Herniation traction®) to the actual clinical environment and to understand its effects and side effects.
Materials and Methods: Ten patients, American Society of Anesthesiologists physical status I or II, aged 20-65 years, scheduled for orthopedic surgery or pain clinic outpatient follow up, due to post neck pain. Group A - 5 patients who applied Disc Herniation traction®. Group B - 5 patients who not applied any traction therapy. Group A received 3 minute traction therapy of 2 times a day objectively with Disc Herniation traction®. ROM (range of motion), NRS (numeric rating scale), SAT (patient satisfaction), and side effects were checked at 15, 30, 60 minutes after procedure and 7 days after each therapy.
Results and Discussion: The ROM was not different between the two groups. The NRS in Group B were higher than in Group A at 15, 30, 60 minutes and 7 days after each procedure. The traction pain was detected in Group A. The SAT in Group A were higher than in Group B at 15, 30, 60 minutes and 7 days after each procedure. Side effects were not seen.
Conclusion: We conclude that traction therapy can be a good substitutive treatment or adjuvants for post neck pain management of disc or spinal stenosis disease with Disc Herniation traction®. Compared to a long period of pain, traction therapy with Disc Herniation® Immediate treatment was also instantaneous and effective. This allows effective early treatment and prevents the post neck pain of neuroaxial spine origin.
References:
1. Shin MK, Shim HS, Yang GY, Sing WS. Effect of a target-controlled infusionof remifentanil in conbinationi with desflurance during the maintenance phase of general anesthesia. Korean J Anesthesiol 2012; 63: 25-9.
2. Aldrete JA, Kroulik D. A postanesthetic recovery score. Anesth Analg 1970; 49: 923-4.

4766

Different patterns of opioid interactions on oxidative-antioxidative balance in chronic non-cancer pain

Kosciuczuk U.[1], Jakubow P.[1], Lotowska-Cwiklewska A. M.[1], Czyzewska J.[1]
[1]Medical University in Bialystok - Bialystok (Poland)

Background and Goal of Study: The oxidative - antioxidative balance is the crucial mechanism of opioid-induced immunomodulation. This phenomenon was clearly described in opioids abuse. This is interesting to evaluate the importance of this subject in chronic pain. The aim of the study was to investigate the oxidative – antioxidative homeostasis using serum total oxidative capacity (TOC) and total antioxidative capacity (TAC) tests in patients with chronic non-cancer pain treated with opioids.
Materials and Methods: The project was approved by Ethical Committee and supported by Medical University in Bialystok (Poland). The serum TOC and TAC measurements were performed in total group of 50 adult patients: Study Group - 36 patients with chronic Low-Back Pain with opioids pharmacotherapy and Control

Group - 14 patients, healthy volunteers. In Study Group anthropometric parameters, duration in opioid therapy, type of opioid, total dose, and form of application were registered.TOC and TAC measurements were performed using ImAnOx and PerOx tests (Immundiagnostik, Germany). Data were analyzed using non-parametric tests. Results and Discussion: The median TOC and TAC values in Study Group were 320 µmol/L, and 260 µmol/L and in Control Group were 160 µmol/L and 310 µmol/L, respectively. In patients with buprenorphine and tramadol therapy TAC was significantly increased compared with oxycodone, ($p<0.005$), while TOC did not differ between these groups. In group of oxycodone pharmacotherapy TOC and TAC values correlated with age,(rho=0.6) and total daily dose (rho=0.7). Opioids modulate the oxidative homeostasis and the effects are exerted through different mechanisms. The gradation of opioids-immunomodulation were described. The phenomenon of opioid-immunomodulation is not described in details in chronic opioid therapy.
Conclusions: Tramadol and buprenorphine have the smallest activity in oxidative-antioxidative balance and this mechanism does not depend on anthropometric parameters. Oxycodone induces changes in oxidative - antioxidative homeostasis in elderly patients with high daily doses.
References:
1. Zahmatkesh M, Kadkhodaee M, Salarian A. et all. Impact of opioids on oxidative status and related signaling pathways: An integrated view. J Opioid Manag. 2017;13: 241-251.
2. Buico A, Cassino C, Ravera M et all. Oxidative stress and total antioxidant capacity in human plasma. Redox Report 2009; 14: 125-130.

4840

Severe atrophy of the ipsilateral psoas muscle associated with hip osteoarthritis

Oh D.[1], Ko M.[1], Moon S.[2]
[1]Inje University Haeundae Paik Hospital - Busan (South Korea), [2]Inje University Busan Paik Hospital - Busan (South Korea)

Background: It is difficult to diagnosis the origin of lower leg pain in patients with both lumbar spinal stenosis and hip joint osteoarthritis. However, hip arthritis is usually an uncomplicated diagnosis by itself that should not be overlooked as this could lead to inappropriate spine surgery.
Case Report: We report a patient with lower leg pain who did not respond to spinal blocks, but in whom hip osteoarthritis was considered since severe atrophy of the ipsilateral psoas m. was identified on MRI. The patient was a 54-year-old female with chronic rt. anterior hip pain with radiation above the knee and mild back pain. Prior to visiting our clinic, she had been diagnosed multilevel lower lumbar degenerative changes, including a disc bulging and foraminal stenosis at L2-3, L3-4 and L4-5 on MRI, and received transforaminal epidural blocks. The blocks were not effective for her anterior hip pain, and so surgery was planned. But she refused to have surgery and visited our clinic. On physical examination, she showed a positive result for Patrick's test. She was unable to extend fully her right hip joint to neutral because of reproducing the hip pain and a sensation of tightness. We had a clinical suspicion that her right hip pain had been caused by other problems, and so rechecked her MRI and were able to identify a severe atrophy of rt. psoas m. (Figure 1). And x-ray showed rt. hip joint osteoarthritis with narrowing of joint space. We performed US guided intra-articular injection of the rt. hip. Her pain was 70~80 % reduction after injection. But the limitation of range of motion of rt. hip joint was remained. After 1 week, the anterior hip pain aggravated gradually, and then the patient was referred to orthopedic surgery for consideration of hip joint arthroplasty.
Discussion: Weakness of the psoas m. related to compression of 2-4 spinal roots has been reported as a clinical feature of lumbar spinal stenosis. Report shows that in as many as 50% of elderly patients, MRI could give a false positive diagnosis of spinal stenosis.
References:
1. Saito J, Ohtori S, Kishida S, et al. Difficulty of diagnosing the origin of lower leg pain in patients with both lumbar spinal stenosis and hip joint osteoarthritis. Spine. 2012;37(25):2089-2093.
Learning points: It is necessary to have attention of excluding the presence of osteoarthritis of the ipsilateral hip because degenerative disease of the hip also can be associated with reduction of strength in the psoas m.

5601

Case report: transcranial magnetic stimulation to control refractory central pain; with evaluation by the Qualitative Sensitive Test (QST)

Villela D.[1], Assunção P.[1], Damasceno M.[1], Moreti N.[1], Santiago B.[1], Villela N.[1], Clínica da Dor HUPE/UERJ
[1]Hospital Universitario Pedro Ernesto - Rio De Janeiro (Brazil)

Background: Classified as a neuropathic pain, the central pain is usually caused by a structural injury of the central nervous system (CNS). It is considered one of the most complex and intriguing painful syndromes; its intensity varies from moderate to disabling. It demonstrates a mood change in 87% of cases and sleeping disorder in 50%. The Qualitative Sensory Testing (QST) evaluates small sensitive nerve fibers, in a controlled way, quantifying the threshold of sensitivity and pain; being a noninvasive method to access the sensory function. With a challenging diagnosis and difficult treatment, full control of the pain is improbable; aiming the balance between the best analgesia and maintenance of a desirable cognitive and functional ability.
Case Report: We report the case of a 59-year-old woman with central pain in left dimid after a stroke in 2016, presenting hypodense, cortical and subcortical region, right parieto-temporal, on CT scan. Accompanied by the neurology service and Pain Management Clinic of Hospital Universitário Pedro Ernesto (RJ). She received optimized pharmacological therapy, psychosocial and physiotherapy support; with no satisfying improvement of the pain and humor. Being proposed then a Repetitive Transcranial Magnetic Stimulation (RTMS); Protocol attack with ten sessions in three weeks and a maintenance monthly session; with evaluation by QST before and after the treatment.
Discussion: The difficulty of diagnosis of symptom quantification interfere in the treatment, presenting poor results in monotherapeutic approaches. The association of techniques with pain description suggests benefits for improving quality of life. Some previous studies demonstrate positive effect of RTMS in motor cortex to control the central pain after ischemic cerebrovascular accident, and the permanence of this effect for approximately 2-4 weeks. Hasan & cols (2014); Saitoh & cols (2013); de Oliveira & cols (2014).
References:
1. Hasan M, et al. Somatosensory change and pain relief induced by repetitive transcranial magnetic stimulation in patients with central poststroke pain. Neuromodulation 2014; 17: 731–736.
2. Saitoh Y, et al. Electrical or repetitive transcranial magnetic stimulation of primary motor cortex for intractable neuropathic pain. 2014.
Learning points: Central pain as a pain syndrome that is difficult to control and often disabling. Difficulty of measuring the pain (subjectivity). Frustrating treatment for both professional and patient.

5952

Long-term individual art therapy sessions in complex treatment of pain in patients with chronic migraine – a randomized controlled trial

Shevtsova G.[1], Medvedeva L.[2], Zagorulko O.[2], Malenkova I.[2]
[1]First msmu - Moscow (Russia), [2]Petrovsky National Russian Research Center of Surgery - Moscow (Russia)

Background and Goal of Study: Art therapy aimed to treat the psychological aspects of chronic pain and reduce accompanying physical symptoms. [1] Chronic headaches are often identified with co-morbid conditions, worsening pain and influencing psychological aspects as well. [2] This study aims to evaluate the art therapy effectiveness in complex chronic migraine treatment.
Materials and Methods: The prospective randomized study included 80 patients with chronic migraine (CM), who attended the Pain clinic in Sept.2018–Aug.2019 and were divided into two groups (40patients each) by the sealed envelope method. Migraine was diagnosed using the International Classification of Headache Disorders criteria. Both groups received topiramate 100 mg/day during 12 weeks. The study group additionally completed art therapy individual sessions, 50 min each, occurring biweekly. Participants were invited to find expression for their pain experience by representing it visually. For all sessions, participants could work outside of any given theme or directive if they wished. They were assured that no previous art-making experience was required. During the session and upon completion of the art, patients were encouraged to discuss their art with the therapist as a means of processing. The treatment effectiveness was evaluated prior to and 12 weeks after the treatment by pain attacks frequency and severity with the Visual Analog Scale (VAS) and Pain Catastrophizing Scale (PCS).
Results and Discussion: The mean age was 30.2±9.1 and 27.5±8.4 in the study and control group, respectively. The majority of participants were women (36 and 32, respectively). At admission the VAS score was 6.3±1.9 and 5.7±1.6 points,

pain attack frequency was 6.7±2.0 and 6.2±1.9 days per month, total PCS score – 22.4±8.1 and 19.8±9.2 points in the study and control groups,respectively. After the 3-months treatment,VAS score was significantly lower in the study group (1.5±0.4) than in control group (2.7±0.7;p<0.05),as well as total PCS score (12.4±8.1; 15.7±10.6 respectively,p<0.05).
Conclusion: Art therapy may be a safe and cost effective intervention as an adjunct to traditional medical management in chronic migraine patintes.
References:
1. Angheluta A. Can J Couns & Psychother 2011;45(2):112-31.
2. Zagorulko O. Rus J Pain 2017;1(52):24.

5940

Prosopalgia As One Of The Syndromes Of Fibromyalgia

Malenkova Y.[1], Zagorulko O.[1], Medvedeva L.[1], Shevtsova G.[2]
[1]Petrovsky National Research Centre of Surgery - Moscow (Russia), [2]I.M. Sechenov First Moscow State Medical University - Moscow (Russia)

Background: Fibromyalgia(FM) is one of the most persistent chronic pain syndromes and is common with a prevalence of 6% in the population. Patients with FM often go to doctors of various specialties and do not always receive proper therapy.
Case Report: Patient E., 43 years old, came to the Pain Clinic in September 2018 complaining of constant aching, pressing, bursting pain in the upper jaw and cheeks, articulation and chewing disorders, symmetrical pain in neck, shoulders and back, intensity of 7-8 points on the Visual Analogue Scale(VAS),night awakenings, tiredness in the mornings. The patient first contacted a neurologist in 2013 with complaints of severe pain in the right shoulder's muscles and back. She received treatment: lidocaine blockades of trigger points, pregabalin 150 mg/day, injections of botulinum toxin type A (BTA)(50units) with a positive effect. In May 2016, after the right molar of the upper jaw extraction there was an aching pain in the right side of the face, and later intense (8- 9 by VAS) throbbing pain in the face. From 2016 to 2018, the patient was consulted by neurologists, dentists, orthodontists, maxillofacial surgeons with the following diagnoses: chronic trigeminal neuralgia, myofascial facial pain syndrome, chronic subluxation of the lower jaw heads,somatoform disorder. She regularly received treatment with a change of methods: orthopedic correction with a relaxing mouth guard, constant wearing of a corrective mouth guard to position the jaw, analgesics, anticonvulsants, tricyclic antidepressants in short courses, BTA, alternative medicine. Nevertheless, pain syndrome persisted and significantly impaired the patient's quality of life.Objectively no data for focal neurological pathology were identified.In the pain clinic patient was diagnosed with fibromyalgia, bilateral myofascial facial pain syndrome. Duloxetine 60 mg/day for 6 months, clonazepam 0.5 mg/night for 2 weeks,a course of reflexology were prescribed. After 2 months of treatment pain decreased to 4 points, and after 6 months to 2 points according to VAS, mood and sleep returned to normal.
Discussion and learning points: The presented clinical case demonstrates a lack of awareness among specialists of various specialties about the possible variants of the course of FM.
References:
1.Malenkova I.Yu., Medvedeva L.A.,European Psychiatry. 2019. T. 56. № S1. S267.
2. Medvedeva L.A. Zhurnal nevrologii i psihiatrii im. C.C. Korsakova. 2014. T. 114. № 11. S. 43-48.

5932

Accupuncture analgesia in chronic pelvic pain treatment

Shevtsova G.[1], Zagorulko O.[2], Medvedeva L.[2], Malenkova I.[2]
[1]First MSMU - Moscow (Russia), [2]Petrovsky National Russian Research Center of Surgery - Moscow (Russia)

Background and Goal of Study: Chronic pain affecting the pelvic and urogenital area is a major clinical problem with heterogeneous etiology, affecting both male and female patients and severely compromising quality of life. [1] Concerning the pharmacological treatment it is associated with adverse events as well as delayed effect due to dose titration. This indicates the need of complex pathogenic treatment plan organization to help patients in short terms. [2] The goal of study is to evaluate the effectiveness of acupuncture analgesia in patients with chronic pelvic pain.
Materials and Methods: A randomized double-blinded placebo-controlled study, approved by local Institution Review Board, involved 58 patients with chronic pelvic pain, who attended the Pain clinic in Sept. 2018 – Sept. 2019 and were randomized into two comparable groups (29 patients each) by the sealed envelope method. The study group completed a classic acupuncture treatment course (15 sessions every other day), the control – a sham-acupuncture course using the same characteristics but with needles placed not deep enough. The treatment effectiveness criteria included pain severity by visual analogue scale (VAS), the pain attack frequency and duration, evaluated prior to and 3 months after treatment. The data was analyzed with IBM SPSS Statistics and MS Excel software.
Results and Discussion: The majority of participants were women (21 and 18, respectively). The mean age was 35.4±8.2 and 29.1±9.3 in the study and control group, respectively. At admission the VAS score was 7.2±0.9 and 6.9±1.2 points, pain attack frequency was 6.1±1.8 and 6.5±2.1 days per month with its duration 18.8±5.4 and 16.6±3.1 hours in the study and control groups, respectively. After the 3-months treatment pain severity decreased to 1.9±0.5 points in the study group, whereas in the control group it was statistically significantly higher (p<0.05) – 4.8±0.9 VAS points. The pain attack frequency was also significantly lower in the study group than in control (2.5±0.4 and 6.1±1.2 attacks; p<0.05) as well as its duration (6.7±1.3 and 14.7±4.9 hours; p<0.05).
Conclusion: Classical acupuncture in chronic pelvic pain treatment helps to reduce the severity, frequency and duration of pain attacks.
References:
1. Roy H. Brain Sci. 2018;8(10):180.
2. Medvedeva L. Rus J Pain 2019;1(17):121-22.

4390

One-week, low dose opioids do not affect adrenal or immune function in healthy volunteers

Doleman B.[1], Blackwell J.[1], Mcdonald J.[2], Lund J.[1], Williams J.[1]
[1]University of Nottingham - Derby (United Kingdom), [2]University of Leicester - Leicester (United Kingdom)

Background and Goal of Study: Opioids are known to negatively influence adrenal hormones and have a negative effect on immune function [1]. However, it is unknown whether low dose, short course opioids typically prescribed after minor procedures, influence these physiological functions. We aimed to assess the effects of one week of codeine on immune and adrenal function in healthy volunteers.
Materials and Methods: This study was approved by the research ethics committee at the University of Nottingham. Each participant signed an informed consent form prior to enrolment in the study. We studied ten healthy volunteers who were given codeine 30mg four times a day for one week. To assess adrenal function, we measured the response to a short Synacthen® test both before and after treatment. Immune function was assessed by measuring TNF-alpha levels. We also measured compliance and metabolic activation of codeine to morphine using morphine-6-glucuronide levels. We analysed results using repeated measures t tests which are reported as mean differences (MD) with 95% confidence intervals (CI).
Results and Discussion: We excluded one participant who had no detectable levels of morphine-6-glucuronide. There was no difference in cortisol levels after one week of codeine (MD 4.48 ng/ml; 95% CI -7.42 ng/ml to 16.39 ng/ml). There was also no difference in TNF-alpha levels (MD 0.94 pg/ml; 95% CI -1.3 pg/ml to 3.19 pg/ml). These results suggest that one week of codeine treatment does not affect adrenal or immune function.
Conclusion: One week, low-dose opioids do not affect adrenal or immune function.
References:
1. Doleman B, Leonardi-Bee J, Heinink TP, Bhattacharjee D, Lund JN, Williams JP. Pre-emptive and preventive opioids for postoperative pain in adults undergoing all types of surgery. Cochrane Database of Systematic Reviews 2018.
Acknowledgements: Funded by Royal College of Anaesthetists (UK).

4860

Intrathecal vs intravenous morphine chloride for postoperative analgesia after hysterectomy with adnexectomy

Tatic M.[1], Skeledzija-Miskovic S.[2], Zdravkovic R.[3], Ladjinovic D.[2], Radovanovic D.[1], Videnovic N.[4]
[1]University of Novi Sad, Faculty of Medicine - Novi Sad (Serbia), [2]Institute of Oncology of Vojvodina - Sremska Kamenica (Serbia), [3]Institute for Cardiovascular Diseases of Vojvodina - Sremska Kamenica (Serbia), [4]University of Pristina, Faculty of Medicine - Kosovska Mitrovica (Serbia)

Background and Goal of Study: The efficient pain control after surgery leads to the earlier mobilization of patients and their faster recovery, thus leading to shorter hospitalization and lower treatment expenses. The aim of this study was to compare the effects of intrathecal and intravenous administration of morphine chloride after hysterectomy with adnexectomy.
Materials and Methods: This prospective, randomized study consisted of 50 patients (≥18 years, ASA I/II) who were to undergo hysterectomy with adnexectomy. They were divided into two groups of 25 each. The group T patients were given the combination of 0.3 mg of morphine chloride with 1.7 ml of 0.5% levobupivacaine intrathecal, immediately before the surgery, whereas the group V patients were administered 5 mg of morphine chloride intravenous before the end of surgery and after the surgery at certain time intervals. The postoperative pain was assessed by Numeric Rating Scale (NRS) at 1, 6, 12 and 24 hours. Side effects, such as nausea, vomiting, itching and respiratory depressions were followed as well. All patients had urinary catheter so we could not follow urinary retention. In addition, the patients were asked to keep records of their subjective feeling of satisfaction with analgesia. Results and Discussion: There were no statistically significant differences in age, body weight, ASA classification and the length of surgery between the group T and the group V. The postoperative pain was less pronounced in group T at all assessment intervals ($p<0.001$) and consequently the additional need for analgesia 1h after the end of surgery was less in that group ($p<0.001$). There was no statistically significant difference in the incidence of nausea and vomiting. No patients complained of itching and there was no respiratory depression. The subjective feeling of satisfaction with postoperative analgesia was statistically significant in group T ($p<0.001$).
Conclusion: Intrathecal administration of morphine chloride combined with levobupivacaine ensures better postoperative analgesia after hysterectomy than intravenous morphine chloride, their side effects being equally frequent.

4990

Implementation of opioid-free anesthesia during abdominal surgery: a retrospective study

Coeckelenbergh S.[1], Le Corre P.[2], Estebe J. P.[2]
[1]Erasme University Hospital Brussels - Brussels (Belgium), [2]Rennes University Hospital - Rennes (France)

Background and Goal of Study: Opioids are potent analgesics but they have been linked to perioperative morbidity (e.g., post-operative nausea, paralytic ileus, respiratory insufficiency, and death). Opioid free anesthesia has shown potential in increasing perioperative comfort most notably by decreasing postoperative nausea and vomiting. Anesthesiologists in our institution thus decided to progressively switch from an opioid based to an opioid free analgesic strategy during abdominal surgery. The aim of this study was to examine the amount of prescribed drugs during the three main periods of this transition (i.e., opioid-based anesthesia (OBA), opioid-reduced anesthesia (ORA), and opioid free anesthesia (OFA).
Materials and Methods: This retrospective study was approved by the French National Ethics Committee. Three periods were studied: OBA (2011-2012), ORA (2014-2015), and OFA (2017-2018). Single year transitions separated each period. The amount of vials per patient of administered drugs was calculated by six month period. Groups were compared using student t-test.
Results and Discussion: 27. 221 patients were included from 2011 to 2018. There was no statistically significant difference in the number of studied patients during each time period. Non-opioid intravenous analgesics were more often prescribed during the OFA period when compared to the OBA period (ketamine ($p<0.001$) and alpha-agonists (i.e., dexmedetomidine and clonidine) ($p=0.01$)) while long acting opiates (i.e., sufentanil and fentanyl) were more frequently prescribed during the OBA period ($p=0.001$). Postoperatively both morphine and antiemetic prescription significantly decreased during OFA. The amount of morphine required per patient decreased from 2 vials during OBA to less than 0.3 vials ($p<0.0001$) under OFA (Figure 1).

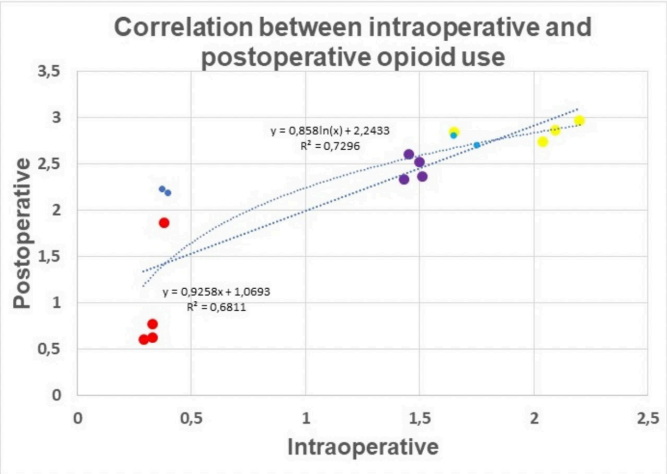


Figure 1
Average intraoperative and postoperative opioid requirements by 6 month period for patients undergoing abdominal surgery are shown during the opioid free (red), opioid reduced (purple) and opioid based (yellow) anesthesia periods. Transitional periods are shown in blue. During this study postoperative morphine requirements decreased with decreasing intraoperative opioid use in patients undergoing abdominal surgery.

Conclusion: Opioid free anesthesia was associated with decreased postoperative morphine use and antiemetic requirements.
Acknowledgements: The authors thank the medical and nursing staff of the Rennes Hospital Operating Theatre as well as Euroanaesthesia 2020.

5375

High therapeutic buprenorphine levels reduce IV fentanyl respiratory depression

Algera M. H.[1], Van Velzen M.[1], Dahan A.[1], Groeneveld G. J.[2], Moss L.[3], Dobbins R.[4]
[1]Leiden University Medical Center - Leiden (Netherlands), [2]Centre for Human Drug Research and Leiden University Medical Center - Leiden (Netherlands), [3]Centre for Human Drug Research - Leiden (Netherlands), [4]Indivior Pharmaceuticals - Midlothian (United States)

Background and Goal of Study: Previous studies indicate that plasma concentrations of the partial mu opioid receptor agonist buprenorphine >2 ng/mL achieve 70% brain mu-opioid receptor occupancy and block the subjective drug-liking effect of full opioid agonists (1). This study examined the effects of sustained intravenous buprenorphine concentrations on respiratory depression induced by intravenous (IV) fentanyl injection.
Materials and Methods: Eight opioid-tolerant patients using >90 mg daily morphine equivalents completed this open-label crossover study. Patients received placebo/fentanyl (PLC) and buprenorphine/fentanyl (BUP). Ventilation was measured at isohypercapnia (baseline minute volume (MV) ~20 L/min), followed by pulsed-continuous infusions of placebo or buprenorphine (targeted plasma concentrations of 1 (n=2), 2 (n=3) or 5 ng/mL (n=3)) for 6 h. Subsequently, IV fentanyl boluses of 250, 350, 500 and 700 mcg/70 kg were administered. Drug effects were measured as a decrease in MV, number/duration of apneic events (lasting >20 seconds), need for ventilatory stimulation and changes in oxygen saturation.
Results and Discussion: During the PLC period, abrupt declines in MV were evident following each fentanyl bolus and 6 of 8 patients (75%) experienced 1 or more apneic events requiring verbal ventilatory stimulation to maintain adequate MV. With BUP, none of the patients required verbal stimulation and oxygen saturation did not drop below 90%. For the high-dose BUP infusion targeting 5 ng/mL, marked changes in MV did not occur after the fentanyl infusions, and repeated apneic events did not occur.
Conclusion: These data suggest that buprenorphine acts as a competitive inhibitor of fentanyl boluses at doses up to 700 mcg/70 kg. This competitive inhibition reduces the magnitude of fentanyl-induced respiratory depression, most notably at buprenorphine concentrations ≥2 and 5 ng/ml. Although this is a small patient sample, the potential protective effect of ≥2 ng/ml and 5 ng/ml plasma concentrations against fentanyl-induced respiratory depression warrants additional investigation.
References:
1. Nasser AF, Greenwald MK, Vince B, Fudala PJ, Twumasi-Ankrah P, Liu Y, et al. Sustained-release buprenorphine (RBP-6000) blocks the effects of opioid challenge with hydromorphone in subjects with opioid use disorder. Clin Psychopharmacol 2016;36(1):18.

5447

The Network of Formulae and Crude Drugs Follows the Power Law and Has Scale Freeness in the Japanese Herbal Medicine System

Sekiyama H.[1], Sawamura S.[1]
[1]Teikyo University - School Of Medicine - Tokyo (Japan)

Background: Japanese herbal medicine system is a representative alternative complement therapy and is widely used not only in pain treatment and perioperative management but also in general clinical practice. It has been formed by sorting out a large number of crude drug over a period of about 1500 years. It consists of about 150 formulae. Each formula consists of two to dozens of crude drugs. However, the network of the combination of formulae and crude drugs is not known. In this study, we mathematically investigated whether the network of the formulae and crude drugs fits the power law.
Methods: We targeted 118 crude drugs that constitute 148 formalae of Japanese herbal medicine. The number of times each crude drug is selected as formulae is totaled according to herbal medicine, and the number of selections (Y) is plotted on the vertical axis, and the rank of crude drugs sorted by number of selections (X) is plotted on the horizontal axis. This was graphed into a double logarithm graph, and its linearity was examined using regression analysis.
Results: The highly linked nodes (hub) considered to be the head part were licorice (94 formulae), ginger (51 formulae), agate (46 formulae), a glaze (44 formulae), and cinnamon (39 formulae). In the long tail, 18 crude drugs selected in 2 formulae and 34 crude drugs selected only in one formula were located. In the double-logarithmic plot, the regression function was logY = 2.622-1.234 logX. The power exponent was 1.234 ± 0.33. The adjusted degree of freedom determination coefficient was 0.912, p <0.0001, and the fitness was significant. This connectivity shows that this network has topology consistent with scale-free networks.
Discussion: This result indicates that the network of the formulae and crude drugs has scale freeness in the Japanese herbal medicine system. This connectivity shows that this network has topology consistent with scale-free networks. Scale-free means system redundancy and robustness. The conditions for the power law to appear include (1) continuous input and growth into the system, and (2) accumulation of strengths and preferential selection within the interior. Japanese herbal medicine is the result of a trade-off based on prior choices at the clinical site in the past. It may achieve further adaptation and evolution in the future.
Conclusion: The network of formulae and crude drugs follows the power law and has scale freeness in the Japanese herbal medicine system.

5588

Can medical hypnosis or Virtual Reality Glasses reduce the amount of additional analgosedatives needed to alleviate pain and anxiety in patients undergoing medical procedures?

Okur Kavak E.[1], Van Berlaer G.[1], Diltoer M.[1], Malbrain M.[1]
[1]UZ Brussel - Brussels (Belgium)

Background and Goal of Study: Patients undergoing medical procedures benefit from distraction techniques to reduce the need for drugs alleviating pain and anxiety. Aim of this study to investigate if medical hypnosis or virtual reality glasses (VR glasses) as adjuvant method reduces the need for additional drugs.
Materials and Methods: In a prospective, randomised, interventional trial, after getting informed consent, patients undergoing procedures were stratified in four age groups, and randomly assigned into three arms by means of a closed envelope system. All patients received standard care for pain before the procedure; the control group received further drugs for pain and stress as indicated by the Visual Analog Scale (VAS; threshold 3/10) and ComfortScore (threshold 14/30), two index groups received either medical hypnosis or VR glasses as a plus before and during the procedure. VAS and Comfort were scored continuously during procedures and analysed with the Kruskal-Wallis Test. Patients, parents and healthcare providers scored their satisfaction at the end.
Results and Discussion: Of 104 included patients 6 to 86 years old, 47% were female. Regardless of the age, pain and comfort scores were similar before and at the start of the procedure (VAS 3.7-4.2; Comfort 16-16.7), but as of 1 minute after starting the procedure, both VAS and Comfortscore reduced significantly more in both index groups compared to the control (p<0.001), remaining far below the threshold for both pain and stress. There was no advantage of one index group over the other (p0.43). There were no adverse effects. Patients in the VR group were more satisfied than in the standard group (p0.02) or in the hypnosis group (p0.04). There was no significant difference in the satisfaction of parents or healthcare providers.
Conclusion: From the very start of the intervention, the application of either medical hypnosis or VR glasses significantly reduces pain and anxiety in patients undergoing medical procedures. More studies are needed but both are promising safe adjuvant tools to standard pharmacological treatment.
References:
1. Kleiber C et al: Effects of distraction on children's pain and distress during medical procedures: A meta-analysis, Nursong Research, 1999, 48:44-4.
2. McCaul K, Malott J,:Distraction and Coping with pain. Psychological Bulletin. 1984, 95:516-553.

6171

Opioid free anaesthesia (OFA) versus balanced anaesthesia: impact on early and late postoperative outcomes after knee arthroplasty

Somerhausen L.[1], Lavandhomme P.[1], Thienpont E.[1]
[1]Cliniques Universitaires St Luc U.C.L. - Brussels (Belgium)

Background and Goal of Study: Opioid free anaesthesia (OFA) has gained in popularity. Whether OFA feasibility and safety have been shown, benefits remain to be established (1). We here assessed whether OFA compared to balanced anaesthesia affected early and late outcomes after major orthopaedic joint surgery. Materials and Methods: After IRB approval, retrospective analysis (January 2017-December 2018) of medical records of patients included in an enhanced recovery programme who underwent knee arthroplasty by a single surgeon was performed. Preoperative and postoperative management were standardized. All patients received general anaesthesia and LIA. Records of 102 OFA patients were matched with 99 patients who received intraoperative balanced anaesthesia. Postoperative opioid consumption in PACU and from day1 to day4, adverse events, pain and functional outcome using the Forgotten Joint Score (2) at 3 and 12 months after surgery were recorded. Statistics used unpaired t-test and Fisher exact test, P<0.05 was significant.
Results and Discussion: Demographic data did not differ (age, BMI, gender, preoperative pain scores and opioid intake). Intraoperative ketamine was 0.8mg/kg (IQR 0.7-1.0) vs 0.4mg/kg (IQR 0.3-0.5), clonidine 150µg (IQR 75-150) vs 0µg (IQR 0-60) respectively in OFA and balanced anaesthesia groups (p<0.001). Average sufentanil dose was 7.5 to 20µg in balanced anaesthesia group. OFA patients had less pain at PACU arrival (p<0.001). PACU morphine dose was similar between groups but OFA patients had significantly less episodes of desaturation (p=0.0059). Confusion, urinary retension, nausea and vomiting were lower in OFA group (n.s.). OFA patients used significantly less postoperative oral morphine, specifically at day2 and day3 (p<0.01). At 3 and 12 months, functional outcome (FJS), knee pain at mobilization and at night did not differ between groups.
Conclusion: Compared with balanced anaesthesia, OFA use in patients undergoing knee arthroplasty with enhanced recovery programme only demonstrated early benefits in term of pain and opioid sparing effects. Later functional outcomes and knee pain at 3 and 12 months were not improved.
References:
1. Kamdar et al, Anesth Analg 2017; (2) Carlson et al, J Arthroplasty 2018.

6313

Detecting hypoventilation on the hospital floor using respiratory volume monitoring and pulse oximetry

Turan A.[1], Rivas E.[2], Imsirovic J.[3], Essber H.[4], Chelnick D.[4], Cohen B.[4]
[1]Outcomes Research and General Anesthesiology, Cleveland Clinic - Cleveland (United States), [2]Hospital Clinic of Barcelona - Barcelona (Spain), [3]Respiratory Motion - Watertown (United States), [4]Outcomes Research, Cleveland Clinic - Cleveland (United States)

Background and Goal of Study: Pulse oximetry is used to assess respiratory status but does not directly measure ventilation, leading to delayed response. Supplemental O2 can further delay detection of respiratory compromise by masking effects of hypoventilation. We used respiratory volume monitoring (RVM) and pulse oximetry to detect hypoventilation and desaturation following abdominal surgery.
Materials and Methods: This observational study monitored minute ventilation (MV) (ExSpiron 1Xi, Respiratory Motion, Watertown, MA) and SpO2 (VisiMobile, Sotera, San Diego, CA) in the post anesthesia care unit (PACU) and up to 48 h on the general hospital floor (GHF). Low minute ventilation events (LMVe) were defined as MV< 40% predicted MV for ≥ 2 min and desaturation events (DSe) as SpO2 < 90% for ≥ 5 min. Patients with ≥ 1 LMVe in the last 1 h of PACU were identified as At Risk. MV, SpO2 and % of patients with LMVe and (DSe) were quantified for each hour on the GHF. Statistical comparisons were performed with mixed effects models.

Results and Discussion: 344 patients were monitored (171 males, age 48 ± 15 yr, BMI 26 ± 5 kg/m2). At Risk group (N = 35) had lower MV compared to Not at Risk (N = 309) (77 ± 13% vs 104 ± 23%, p < 0.001). MV increased for both groups during the GHF course (p < 0.001). The % of patients with LMVe decreased over time for the At Risk group and remained low for the Not at Risk group. Conversely, average SpO2 decreased (p < 0.001) and the percentage of patients with (DSe) increased over postop days 0 and 1. Supplemental O2 was comparable between groups. (Figs 1A-E)
Conclusion: RVM showed improved ventilation over time for patients identified as At Risk of respiratory compromise, while those considered Not at Risk showed on average adequate ventilation throughout. This is consistent with literature which suggests patients are at highest risk for respiratory compromise during the first 24 hours postoperatively. Surprisingly, pulse oximetry showed an increased rate of DSe over postoperative days 0 and 1 for both groups. Reasons for the increase in patients with DSe could be the decrease in supplemental O2, which is known to mask hypoventilation events or increase in false readings with an increased activity level later in the course. Further work is needed to explain this discrepancy in trends of ventilation and oxygenation.

6407

Low-level light therapy (LLLT) reduces the heat pain treshold in a human pain model, a sign for the modulating of the peripheral sensitiziation. A promising tool in pain management

Lang-Illievich K.[1], Bornemann-Cimenti H.[1], Schicho K.[1], Rumpold-Seitlinger G.[1], Winter R.[1], Sailer M.[1]
[1]Medical University of Graz - Graz (Austria)

Background and Goal of Study: Low-level light therapy (LLLT) is an effective analgetic treatment, although the mechanism of action by which LLLT relieves pain is not yet finally clarified. An unanswered question is, in particular, whether peripheral or central mechanisms contribute to the analgetic effect of LLLT. This study aimed to evaluate the effect of LLLT on primary hyperalgesia as an indication for a peripheral mechanism in a human pain model with a view to a possible nonpharmacological analgetic therapy method.
Materials and Methods: In a randomized controlled double-blinded trial with 10 healthy volunteers, a 3cm x 3cm cutaneous capsaicin patch 8% (Qutenza, Grünenthal, Aachen, Germany) with 640 micrograms of capsaicin per cm2 (corresponding to 5.76mg of capsaicin in total) was applied in the middle of both distal forearms of the test persons to produce a neurogenic inflammation. One the of the two forearms was irradiated with pulsating, cold red light of 660 nm wavelength (Repuls7, Repuls Lichtmedizintechnik GmbH, Vienna, Austria) for 12 minutes. The second arm received no irradiation and served as control area. Immediately after the one-sided LLLT application heat pain threshold (HPT) was assessed on both, the LLLT-irradiated and the non-treated forearm (=control) exactly positioned in the area of the capsaicin patch. It was evaluated using the TSA-II Quantitative NeuroSensory Analyzer (Medoc Ltd., Ramat Yishai, Israel) with a 30x30mm thermode.
Results: The comparison of the LLLT treated side vs. the no-treatment side for every single patient is presented in figures 1. The effect size was 1.54 (95% CI: 0.544-2.541) for HPT.
Conclusion: The data presented in this study, indicates that LLLT using red LED light has a significant modulating effect on the peripheral sensitization, gaining a better understanding of the underlying action mechanisms, although there is lack of informtion about the central effect and a possible modulation of the central sensitization. Effective at reducing the heat pain threshold in a human pain model, the results point to a promisingly therapeutic modality in the treatment of acute pain.

4456

Persistent postoperative opioid use in a Swiss university hospital: do we have to worry about an opioid epidemic in Switzerland?

Bourezg A.[1], Mathivon S.[1], Rehberg- Klug B.[1]
[1]University Hospital of Geneva - Geneva (Switzerland)

Background and Goal of Study: Worldwide use of opioid analgesics is increasing, including Switzerland (1). The rising number of drug overdose deaths has triggered warnings (2), suggesting a link between postoperative opioid prescriptions and the "opioid epidemic". No data on postoperative opioid continuation are available for Switzerland. Therefore, we analyzed data of an ongoing study on chronic post-surgical pain (CPSP) to answer the following questions: How many patients use opioid analgesics 6 months after a surgery, and how many of those did not use opioids before surgery?
Materials and Methods: We used data of an ongoing prospective observational trial (ClinicalTrials.gov ID: NCT03164954), for which opioid use is a secondary outcome. Inclusion criteria are adults having surgery with high risk of CPSP such as thoracic surgery, spine surgery, laparotomy, herniorrhaphy, total knee arthroplasty (TKA) or breast surgery. Patients are given questionnaires before surgery and 6 months after surgery with questions concerning pain (BPI, DN4), and opioid use.
Results: We obtained results from 200 patients with completed follow-up at 6 months after having included 240 patients (83% response rate). Of the 200 patients,14 patients (7%) were still using opioids 6 months after surgery. 11 of these 14 patients had spine surgery, and 3 TKA. 10 of these 14 patients used tramadol, and 7 of 14 strong opioids. Only 2 of these 14 patients were not using opioids before surgery.
Conclusion: 33/200 patients (16,5%) were taking opioids before the surgery and 21/33 (64%) gave up using opioids 6 month after surgery. 12 of these 33 patients were still opioid users at 6 months. Patients using opioids 6 months after surgery had a higher mean pain intensity (4.2±2.7) than those not using opioids (2.4±1.7), and a higher BPI interference score (5.3±1.9 vs. 3.1±1.5). 7 of the 14 persistent opioid (50%) users had a positive DN4, versus 15 of 167 non-opioid users (9%). At 6 months, of the 14 persistent opioid users, 57% had not seen a pain specialist.
Learning points: In our centre, we found a rate of 1,2% of new persistent use for surgery of high risk of CPSP, which seems to be less than data from the US suggest (2). Persistent opioid use was more frequent (7%) when including patients already using opioids before surgery, and it was limited to spine surgery and TKA. Persistent postoperative use is correlated with more intense pain, but also with neuropathic pain characteristics.
References:
1. Wertli MM et al.: BMC Health Serv Res. 2017:167.
2. Brummett C et al. JAMA Surg. 2017, e170504

4713

Post-surgical chronic pain – different problems requiring targeted solutions: a case report

Sousa I.[1], Rodrigues J. T.[1], Peixoto C.[1], Morais I.[1], Reis A.[1], Martins A.[1]
[1]Centro Hospitalar de Vila Nova de Gaia/E - Vila Nova de Gaia (Portugal)

Background: The incidence of post-surgical chronic pain varies with the type of surgery, but can be as high as 85%.1 A careful and systematic diagnostic approach must always be employed as several pain syndromes may occasionally overlap.
Case Report: We present a 51-year-old male patient, with no relevant past medical history. In October 2013 he suffered a cervical spine fracture resulting from an accidental fall. He was submitted to cervical arthrodesis with right iliac bone graft. He had no complications in the immediate postoperative period. In March 2018 he is referred to chronic pain consultation. He complained of lower back pain [numeric rating scale (NRS) 6] and pain in the anterior right upper leg (NRS 7) since the postoperative period. Physical examination showed hyperalgesia and allodynia in the inguinal region and right anterolateral thigh. Several myofascial trigger points at the right side (quadratus lumborum and erector spine) were detected, triggering lower back pain. Auxiliary diagnostic tests revealed herniation of L3/L4 and L4/L5 discs without radiculopathy. Electromyography confirmed meralgia paresthetica. We performed an ultrasound guided block of the right lateral cutaneous nerve of thigh, erector spinae plane block and quadratus lumborum block. Pharmacological therapy was optimized. Four months after first contact, pain resolved on the anterolateral region of the thigh and improved on the lower back (NRS 3), but localized pain persisted in the inguinal region (NRS 6). It was decided to use a 179 mg capsaicin skin patch that was repeated 3 months later. Twelve months after the first contact, all leg and groin pain were resolved and the patient only complained of occasional lower back pain (NRS 3).
Discussion: We present a patient with persistent postoperative neuropathic pain resulting from the harvesting of iliac bone graft (meralgia paresthetica and ilioinguinal

nerve territory contribution). The patient developed progressive myofascial lower back pain probably due to persistent long-term neuropathic pain. We were able to distinguish the different pain etiologies and act accordingly.

References:
1. Pain. 2019 Jan;160(1):45-52.

Learning points: Persistent postoperative pain can be complex and of multifactorial etiology. It usually has a neuropathic component and therapeutic strategies are similar to those used to treat neuropathic pain. Capsaicin skin patch may be a useful weapon in the treatment of postoperative neuropathic pain.

4521

Dexamethasone administration reduces the frequency of analgesic use in the first 24 hours after laparoscopic cholecystectomy

Shiba H.[1], Yoshinuma H.[1], Sugiyama D.[1]
[1]Kameda Medical Center - Kamogawa, Chiba (Japan)

Background and Goal of Study: A common complaint who underwent surgery is postoperative pain, which causes prolonged hospital stay and lead to postoperative ileus, nausea, vomiting, and urinary retention, thus increasing morbidity. We usually administrate single perioperative dose of dexamethasone to patients in laparoscopic cholecystectomy in order to prevent postoperative nausea and vomiting (PONV). At the same time, corticosteroid is known to decrease inflammation and may provide postoperative analgesia. In this study, we evaluate the efficacy of dexamethasone in decreasing the frequency of analgesic use after laparoscopic cholecystectomy.
Materials and Methods: This study was a single-center retrospective observational study conducted from May 2019 to October 2019. All patients who underwent elective laparoscopic cholecystectomy under general anesthesia were included (n = 108). Patients with diabetes mellitus and patients who had been received steroid before surgery were excluded. Patients were divided into two groups according to the use of dexamethasone during surgery. The dose of dexamethasone administrated during surgery were between 3.3 – 6.6 mg. Postoperative pain intensity was assessed using a 0 – 10 numerical rating scale (NRS). The primary outcome was the frequency of analgesic use during the first 24 hours after surgery. The secondary outcome was the maximum of NRS during the first 24 hours after surgery. Univariate analysis was performed using t-test and Chi-square test. Linear regressions were performed to analyze the relationships between variables (age, sex, and dexamethasone administration) and the intensity of postoperative pain.
Results and Discussion: A total of 88 patients were included in the analysis. There were no significant differences between the groups in age, the frequency of analgesic use, and the maximum of NRS, except the sex (p = 0.008) with t-test and Chi-square test. However, the frequency of analgesic use during the first 24 hours after surgery in dexamethasone given group was lower than the non-dexamethasone group (95% CI 0.010 – 1.511, p = 0.047), and the maximum of NRS was not (95% CI −0.573 – 1.569, p = 0.358) with linear regression analysis.
Conclusion: Our study suggests that dexamethasone administration during surgery is associated with the decrease in the frequency of analgesic use during the first 24 hours after laparoscopic cholecystectomy.

4524

Evaluation of oral use of dexketoprofen/tramadol in acute postoperative pain in patients undergoing total hip replacement with a minimally invasive anterior approach (amis)

Nikolakopoulou E.[1], Gampopoulou Z.[1], Milaras C.[1], Kanavos K.[1], Tzefronis D.[1], Macheras G.[1]
[1]KAT Hospital - Athens (Greece)

Background and Goal of Study: Pain is a global public health issue and represents the most common reason for both physician consultation and hospital admissions . When unrelieved or poorly controlled, it is associated with medical complications, poor patient satisfaction and increased risk of developing chronic pain. Dexketoprofen is a new NSAID treating acute postoperative pain and when it combined with tramadol may have a better effect. The purpose of this study is to evaluate the analgesic effect of the oral use of the combination of dexketoprofen/tramadole on the reduction of postoperative pain after total hip arthroplasty with minimal invasive anterior approach (AMIS).
Materials and Methods: This prospective, randomized study included 126 patients, with a mean age 67.6 years, who underwent AMIS total hip arthroplasty. All patients were under spinal anesthesia and all patients were given intraarticular injection with a dilution of 100mL N/S 0.9% with 300mg ropivacaine and 0.5mg epinephrine. Population study was divided into 2 groups: Group A (n = 58) was given dexketoprofen/tramadole (25mg/75mg) 2h after surgery every 8h for 72h and group B (n = 68) was given 2h after surgery pethidine IM 50mg and paracetamol 1g every 6h. Pain intensity (VAS score) and analgesic consumption were evaluated within the first 72 hours after surgery for all participants in the study.
Results and Discussion: There were no statistically significant differences between the two groups, with respect to age, sex, BMI, ASA score and surgical duration (p> 0.05). Pain intensity in group A was significantly lower than group B at 8,24,48,72 hours post-operative (p-value <0.05). For the first 24 hours after surgery, analgesic consumption in group A was significantly lower than group B (p-value = 0.001).
Conclusion: Fixed-dose combination of dexketoprofen (25 mg) and tramadol (75 mg) provides a comprehensive multimodal approach for moderate to severe acute pain in patients undergoing unilateral total hip arthroplasty AMIS thanks to central analgesic effect, peripheral analgesic action and anti-inflammatory activity. Together with an effective analgesic efficacy, the combination shows a good tolerability profile.

4556

The effect of Patient Controlled Analgesia containing opioid with and without basal infusion on postoperative pain, Nausea and Vomiting

Lee J. H.[1], Jang H.[1]
[1]Wonkwang University Hospital - Iksan (South Korea)

Background and Goal of Study: Studies comparing the efficacy of PCA with and without a basal infusion for postoperative analgesia vary considerably in terms of dosing and methodologic quality, making it difficult for practitioners to derive clinically useful information. The purpose of this study was to assess whether the addition of a basal infusion to PCA bolus administration of an opioid analgesic is more effective (defined as lower pain scores) than PCA bolus alone in the patients underwent gynecologic surgery.
Materials and Methods: Sixty patients aged 20-60 undergoing gynecologic surgery were randomly to receive postoperative i.v. fentanyl by a patient-controlled analgesia (PCA) system (bolus dose 1 ml with a lockout interval of 15 min) (experimental group) or the same PCA with a basal infusion of 2 ml (control group) for 48 hours postoperatively. Pain intensity with visual analogue scale (VAS) at 1h , 24h and 48h after surgery, postoperative nausea and vomiting, nurses and patients' satisfaction.
Results and Discussion: There were no significant differences in the pain scores of the two groups. PONV in experimental group was significantly less than control group (P = 0.02), however rescue antiemetic administered was not significant between two group. Nurses' satisfaction in experimental group was significantly higher than control group (P = 0.028). Patients' satisfaction was negatively associated with postoperative 48 h pain VAS (r = - 0.38, P = 0.004) and Nurses' satisfaction was positively associated with patients' PONV (r = - 0.27, P = 0,034).
Conclusion: Experimental group with patients with PCA+basal infusion suffered more PONV. Because nurses' satisfaction was positively associated with patients' PONV, PCA without basal infusion is recommend to enhance nurses' satisfaction and appropriate patient analgesia without side effect.

4561

Prediction of early pain score at the post-anesthesia care unit with heart rate variability by the end of surgery

Fu P. H.[1], Ho C. N.[1], Chen J. Y.[1], Chang J. H.[1], Chen Y. C.[1]
[1]Chi Mei Medical Center - Tainan (Taiwan)

Background and Goal of Study: Postoperative pain is highly subjective and distressful, and it imposes adverse effects on multi-systems. To facilitate early intervention and improve pain management, establishing a prediction model of postoperative pain severity would be helpful. Heart rate variability(HRV) is an indirect measure of autonomic nervous system activities that has been used as an indicator of anti-nociception/nociception balance under sedation. Our goal is to predict the pain scores after surgery so we can better perform the pain management in the early recovery stage.
Materials and Methods: Our study protocol was approved by the Institutional Review Boards of the Chi Mei Medical Center on March 26, 2018 (IRB serial

number: 10703-005). We conducted an observational study that enrolled 80 patients scheduled for gynecological surgeries under general anesthesia. Of all, 28 patients received traditional surgery and the others received laparoscopic surgery. All the participants were ASA class 1 to 3 without using drugs affecting HRV. Blood pressure (BP), electrocardiography (ECG) and other physiological signals were collected across the perioperative period. After patients were sent to the post-anesthesia care unit (PACU), the numeric rating scale (NRS) was recorded within 5 minutes upon arrival for evaluation of the pain severity in the early recovery phase. Offline we extracted 10-minute data during the wound-closure period. Time-domain and frequency-domain analyses of HRV were done using Matlab software. Then we compared results between different surgical types and generated a linear regression model for prediction of the NRS in the early recovery phase.
Results and Discussion: There were significant differences in blood pressure, low-frequency power spectrum (LF) of HRV, very low-frequency power spectrum (VLF) of HRV between the laparoscopic group and the traditional group, and this indicated higher sympathetic activities in patients of the traditional group near the end of surgery. However, there were no differences in heart rate, surgical pleth index, opioid consumption between groups. After adjustment for systolic blood pressure (SBP) and surgical type, we could predict the NRS on the arrival of PACU. NRS=0.371*VLF-0.171*Lapa-0.021*SBP (Lapa: 1 for laparoscopy surgery, 0 for traditional surgery)
Conclusion: VLF of HRV in the wound-closing period could predict the NRS on the arrival of PACU after adjustment for surgical type and SBP.

4391

Pre-emptive and preventive NSAIDs for postoperative pain in adults undergoing all types of surgery: a Cochrane review

Doleman B.[1], Leonardi-Bee J.[1], Boyd-Carson H.[1], Carrick L.[1], Lund J.[1], Williams J.[1]
[1]University of Nottingham - Derby (United Kingdom)

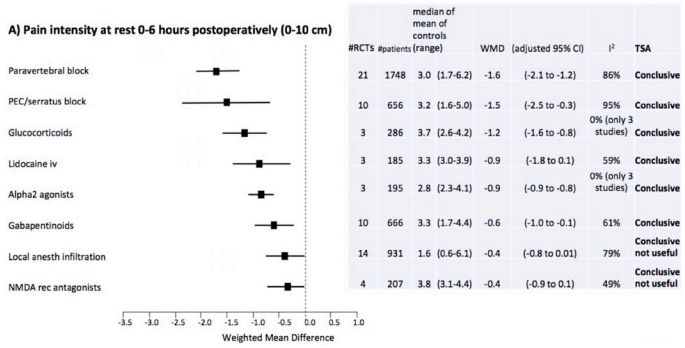
Background and Goal of Study: Postoperative pain is a common consequence of surgery and pre-emptive or preventive analgesia has been suggested to help reduce this. We have previously demonstrated little efficacy for preventive opioids [1]. This review aimed to assess whether NSAIDs have a pre-emptive or preventive effect in all types of surgery.
Materials and Methods: We used standard Cochrane methodology [1]. This included searches for published and unpublished studies, risk of bias assessment, assessment for publication bias and investigation of heterogeneity. The quality of evidence was assessed using GRADE methodology.
Results and Discussion: We included 67 randomised controlled trials. Pre-emptive NSAIDS reduced early pain (MD -0.68, 95% CI -0.97 to -0.39; moderate quality) and 24-hour morphine consumption (MD -5.62mg, 95% CI -9.00mg to -2.24mg; low quality). Preventive NSAIDs reduced late pain (MD -0.37, 95% CI -0.65 to -0.09; low quality) and 24-hour morphine consumption (MD -2.42 mg, 95% CI -4.46 mg to -0.39 mg; low quality). However, there was no reduction in opioid adverse events and effects were not clinically significant. There was some evidence of an influence of baseline risk in agreement with previous studies [2].
Conclusion: Pre-emptive and preventive NSAIDs may reduce acute pain and opioid consumption, which may be more effective in more painful surgeries. Although we could not identify any reduction in opioid adverse effects but data was limited. “This abstract is based on a draft and pre-peer review version of a Cochrane Review. Upon completion and approval, the final version is expected to be published in the Cochrane Database of Systematic Reviews (www.cochranelibrary.com)."
References:
1. Doleman B, Leonardi-Bee J, Heinink TP, Bhattacharjee D, Lund JN, Williams JP. Pre-emptive and preventive opioids for postoperative pain in adults undergoing all types of surgery. Cochrane Database of Systematic Reviews 2018.
2. Doleman B, Sutton AJ, Sherwin M, Lund JN, Williams JP. Baseline morphine consumption may explain between-study heterogeneity in meta-analyses of adjuvant analgesics and improve precision and accuracy of effect estimates. Anesthesia & Analgesia 2018; 126(2): 648-60.

4960

Efficacy and safety of interventions to prevent acute and chronic postoperative pain following breast surgery: a systematic review with meta-analyses and trial-sequential analyses

Lepot A.[1], Elia N.[2], Rehberg B.[2]
[1]Hopitaux Universitaires de Genève - GENEVA (Switzerland),
[2]Hopitaux Universitaires Genève - Geneva (Switzerland)

Background and Goal of Study: Breast surgery is a common surgical procedure, often followed by the emergence of chronic pain. This systematic review compares the efficacy and safety of different interventions to prevent acute and chronic pain after breast surgery.
Materials and Methods: We searched in Pubmed, Medline, Embase, Google Scholar and the Cochrane Library for all RCTs (randomised controlled trials) comparing the prophylactic use of pharmacological or regional anaesthesia interventions to placebo or standard care in the setting of breast surgery. We excluded studies including other types of surgery. Primary outcome was pain intensity up to 6h postoperatively. Secondary outcomes were morphine consumption at 24h, postoperative nausea and vomiting (PONV) and chronic pain 3 to 12 months postoperatively. Random-effects meta-analyses and trial sequential analyses were performed when at least 3 studies were identified for an intervention.
Results and Discussion: We included 73 trials. The overall quality of evidence was rated low to high according to GRADE guidelines. Paravertebral blocks, PECs (pectoralis nerve) and serratus plane blocks, glucocorticoids, intravenous lidocaine, alpha2-agonists and gabapentinoids reduced pain up to 6h postoperatively, whereas local anaesthetic infiltration and NMDA antagonists had no clinically useful impact on pain reduction at 6h postoperatively. PECs and serratus blocks and gabapentinoids reduced morphine consumption at 24h, and paravertebral blocks and glucocorticoids reduced risk of PONV. No conclusive evidence was found regarding chronic pain. Only limited and non-conclusive safety data were found.



	#RCTs	#patients	median of mean of controls (range)	WMD	(adjusted 95% CI)	I^2	TSA
Paravertebral block	21	1748	3.0 (1.7-6.2)	-1.6	(-2.1 to -1.2)	86%	Conclusive
PEC/serratus block	10	656	3.2 (1.6-5.0)	-1.5	(-2.5 to -0.3)	95%	Conclusive
Glucocorticoids	3	286	3.7 (2.6-4.2)	-1.2	(-1.6 to -0.8)	0% (only 3 studies)	Conclusive
Lidocaine iv	3	185	3.3 (3.0-3.9)	-0.9	(-1.8 to 0.1)	59%	Conclusive
Alpha2 agonists	3	195	2.8 (2.3-4.1)	-0.9	(-0.9 to -0.8)	0% (only 3 studies)	Conclusive
Gabapentinoids	10	666	3.3 (1.7-4.4)	-0.6	(-1.0 to -0.1)	61%	Conclusive
Local anesth infiltration	14	931	1.6 (0.6-6.1)	-0.4	(-0.8 to 0.01)	79%	Conclusive not useful
NMDA rec antagonists	4	207	3.8 (3.1-4.4)	-0.4	(-0.9 to 0.1)	49%	Conclusive not useful

Conclusion: Several regional blocks, but not local anaesthetic infiltration can be clinically useful to reduce pain up to 6h postoperatively. A similar effect can be achieved by glucocorticoids, intravenous lidocaine, alpha2-agonists and gabapentinoids. Further research should focus on later endpoints, where comparison is hampered by lack of data.

4654

An investigation of factors associated with postoperative pain trajectories and morphine consumption after hepatic cancer surgery

Yeh C. Y.[1], Chang K. Y.[1], Tsou M. Y.[1]
[1]Taipei Veterans General Hospital - Taipei City (Taiwan)

Background and Goal of Study: Suboptimal pain control after hepatic cancer surgery is an important issue in clinical practice. This retrospective study aimed to investigate the influential factors of postoperative (post-op) pain trajectories and morphine consumption in patient undergoing hepatic cancer surgery and intravenous patient-controlled analgesia (IVPCA) with particular interest in multimodal analgesic regimens.
Materials and Methods: Patients with hepatic cancer receiving tumor resection and post-op IVPCA at a tertiary medical center in Taiwan between January 2011 and December 2016 were collected from our electronic medical records system. Mean numeric rating pain scores and other potentially influential factors were gathered. Linear regression model was used to explore factors associated with morphine consumption after surgery. Latent curve analyses using two latent variables, intercept and slope, were developed to model the variations in post-op pain scores over time. Goodness of fit was assessed using comparative fit index

(CFI) and root mean square error of approximation (RMSEA).
Results: There were 450 patients collected in this study and the mean morphine consumption during the first 3 post-op days was 76.9 mg. The average daily pain scores during the first post-op week ranged from 2.0 to 3.0. Linear regression analysis revealed that male and higher body weight were associated with more morphine consumption (both $p < 0.001$) but elderly ($p < 0.001$) and around-the-clock acetaminophen use ($p = 0.003$) were related to less morphine demand. The latent curve analysis also identified four influential factors of postoperative pain trajectories over time. For the intercept parameter, only longer anesthesia time was associated with higher baseline pain level ($p < 0.001$). With respect to the slope parameter, male gender ($p < 0.001$) and around-the-clock NSAIDs use ($p = 0.012$) were associated with faster pain resolution over time but diabetes was connected to a smoother decreasing trend of pain trajectories (both $p = 0.01$). The goodness of fit of the final latent curve model was acceptable (RMSEA = 0.08, CFI = 0.84).
Conclusions: In the context of IVPCA use, acetaminophen and NSAIDs were associated with reduced morphine consumption and faster pain resolution over time, respectively, after surgery for hepatic cancer. Multimodal analgesia should be considered to provide better pain management in patients receiving hepatic cancer surgery.

6231

The effect of preoperative pregabalin on persistent chronic pain after cardiac surgery

Bouzia A.[1], Ntalouka M.[2], Tassoudis V.[2], Laou E.[2], Chalkias A.[3], Arnaoutoglou E.[3]
[1]University Hospital of Larissa - Larissa (Greece), [2]University Hospital of Larissa - Larissa (Greece), [3]Department of Anesthesiology, Faculty of Medicine, University of Thessaly, University Hospital of Larissa - Larissa (Greece)

Background and Goal of Study: This study investigated the effect of preoperatively administered pregabalin (1) on chronic pain after elective cardiac surgery (2).
Materials and Methods: This prospective-double-blind study included 123 consecutive patients, who were randomly assigned into three groups {Placebo group (P), Oral pregabalin 75 mg group (OP 75), Oral pregabalin 150 mg group (OP 150)}. Patients were assessed postoperatively (12 months and 24 months) regarding the presence of persistent chronic pain (Numeric Rating Scale, NRS) and any potential sleep disturbances (Pittsburg Sleep Quality Index, PSQI). Statistical analysis was performed by using IBM, SPSS statistics, version 22.
Results and Discussion: Patients receiving pregabalin reported lower pain scores (NRS) 12 months {4 in (P group), versus 3 in (OP 75 group), versus 3 in (OP 150 group), p-value = 0.001} and 24 months postoperatively {3 in (P group), versus 2 in (OP 75 group), versus 2 in (OP 150 group), p-value = 0.000}. Of note, at 12 months patients on both groups (OP 75 and OP 150) reported lower daily intake of analgesics {30/41 in (P group) versus 19/41 in (OP 75 group) versus 12/41 in (OP 150 group), p = 0.000} and fewer sleep disturbances {20/41 in (P group) versus 9/41 in (OP 75 group) versus 5/41 in (OP 150 group), p = 0.000} respectively. At 24 months the daily intake of analgesics {28/41 in (P group) versus 17/41 in (OP 75 group) versus 11/41 in (OP 150 group), p = 0.000} and the sleep disturbances {18/41 in (P group) versus 7/41 in (OP 75 group) versus 4/41 (OP 150 group), p = 0.000} were still lower in both groups.
Conclusions: It seems that the preoperative administration of pregabalin, at the dose of 75 mg or 150 mg, in patients undergoing cardiac surgery, results in lower pain scores, lower daily intake of analgesics and fewer sleep disturbances at 12months and 24 months postoperatively.
References:
1. Moore RA, Straube S, Wiffen PJ, Derry S, McQuay HJ. Pregabalin for acute and chronic pain in adults. Cochrane Database Syst Rev. 2009(3):CD007076.
2. Joshi SS, Jagadeesh AM. Efficacy of perioperative pregabalin in acute and chronic post-operative pain after off-pump coronary artery bypass surgery: a randomized, double-blind placebo controlled trial. Ann Card Anaesth. 2013;16(3):180-5.

4676

A TREK channel family activator with well-defined structure-channel activation relationship for polymodal pain

Huang L.[1], Qiu Y.[2], Fu J.[2], Liu J.[1], Yang H.[2], Jiang R.[1]
[1]West China Hospital Sichuan University - Chengdu (China), [2]East China Normal University - Shanghai (China)

Background and Goal of Study: Two-pore-domain (K2P) potassium channels possess four transmembrane helices (M1-M4) with two-pore domains (P1 and P2). K2P channels generate background K+ leak currents, and are involved in the regulation of excitability in neurons. TWIK-related K+ channel (TREK) is a subfamily of K2P, including TREK-1, TREK-2, TWIK-related arachidonic acid-stimulated K+ channel (TRAAK). The TREK subfamily channels share >78% sequence homology and some common activation mechanisms. Recent studies suggest that TREK subfamily is potential analgesic target. However, selective activators of TREK subfamily with both clear action mechanism and in vivo analgesic ability for chronic pain have been lacking.
Materials and Methods: We performed the in-house experimental screenings to identify a small molecular C3001a. Computational analysis and site directed mutagenesis were used to determine the binding modes of C3001a to TREK subfamily channels. The whole-cell patch-clamp electrophysiology in HEK-293T and isolated dorsal root ganglia (DRG) neurons was used to identify the effect of C3001a on TREK subfamily. In a neuropathic pain model of spared nerve injury and the chronic inflammation pain model induced by complete Freund's adjuvant, the analgesic effects of C3001a on thermal and mechanical allodynia were evaluated in mice.
Results and Discussion: C3001a selectively and efficaciously activated TREK-1 and TREK-2 channels, while C3001a showed lower magnitude activation on TRAAK. We defined the binding mode of C3001a within a cavity formed by P1 and TM4 in TREK-1. We identified the carboxyl group of C3001a as a structural determinant for the binding to TREK-1/2, and the D227 as a key residue that defined the subtype-selectivity of C3001a against TRAAK. Furthermore, C3001a reduced the excitability of nociceptive neurons in DRG. In neuropathic pain, C3001a alleviated cold hyperalgesia with similar efficacy compared to pregabalin. In chronic inflammation pain, C3001a attenuated the heat hyperalgesia and mechanical allodynia.
Conclusion: This study reports C3001a as a selective activator of TREK channels. C3001a represents a lead compound with well-defined structure-function relationship, which could advance the rational design of peripherally-acting analgesics targeting K2P channels without opioid-like adverse effects.

4836

Co-analgesics and opioid-sparing effect in parathyroid surgery

Dubrov S.[1], Tarasenko S.[1], Rudenko V.[2], Yefimova O.[2], Lishchinskiy P.[2]
[1]Bogomolets National Medical University - Kyiv (Ukraine), [2]Ukrainian Scientific And Practical Center Of Endocrine Surgery, Transplantation Of Endocrine Organs And Tissues - Kyiv (Ukraine)

Background and Goal of Study: The majority of cases of primary hiperparathyreosis (PHPT) due to solitary adenoma and require the target surgery. Research of new anaesthesia/analgesia methods, which afford to have an opioid-sparing effect, is going. The Goal: Assessment of using combine method anaesthesia with co-analgesics on the intra- and post-op opioid requirement in parathyroidectomy patients.
Materials and Methods: 124 patients with PHPT were divided into 3 groups: the group STI-BCSPB (n=26) was used combined general anaesthesia (GA) with sevoflurane (SEV), the tracheal intubation (TI) with the myorelaxant introduction and bilateral cervical superficial plexus blockade (BCSPB); the group STI (n=82) was used SEV anaesthesia with IT and no BCSPB; the group PLM-BCSPB (n=16) was provided propofol (P) GA with protection air-ways by laryngeal mask (LM) and BCSPB. In both groups (STI-BCSPB and PLM-BCSPB) were used co-analgesics, such as dexamethasone (DXM) 8 mg IV, 2% lidocaine (L) 1,0-1,5 mg/kg IV, metamizole (M) or paracetamol (P) 1 g IV, dexketoprofen (DKTP) 50 mg IV as pre-emptive analgesia 30 min before surgery. Ketamine 25 mg IV was used for induction anaesthesia in theses groups. In STI group only opioid with P were used for induction of GA. Duration of surgery (DoS), anaesthesia (DoA), opioid consumption, time from the operation ending until the eyes opening (EyOp), desaturation were measured. All data M±σ.
Results and Discussion: DoS for STI, STI-BCSPB and PLM-BCSPB was respectively 37.8±13.9, 38.2±14.4 and 35.62±12.6 min (NS), DoA was respectively 59.4±17.9, 63.8±18.5 m and 48,1±16.5 min ($p= 0.028$ STI vs PLM-BCSPB, $p= 0.024$ STI-BCSPB vs PLM-BCSPB, the difference is significant (DS)). EyOp was 15.4±3.6, 15.6±4.0 and 11.2±2.6 min respectively for STI, STI-BCSPB and PLM-

BCSPB (p=0.022 STI vs PLM-BCSPB (DS) and p=0.025 STI-BCSPB vs PLM-BCSPB (DS)) . Desaturation (SpO2 below 92%) due to residual sedation and the effect of myorelaxants was observed in 39 (47.5%) and 12 (46,1%) patients in STI and STI-BCSPB during the first 30 min post-op compared to 2 cases (12.5%) in PLM-BCSPB (both STI groups were DS vs PLM-BCSPB, chi-square test). The dose of intra-op fentanyl was 334.3±56.8, 261.5±86.9 209.3±46.1 mcg in STI, STI-BCSPB and PLM-BCSPB respectively, (DS for PLM-BCSPB vs other groups, DS between STI groups).
Conclusion: Combine methods GA with BCSPB have some benefits vs mono GA. Co-analgesics afford to achieve an opioid-sparing effect.

4821

Endoscopic surgery is associated with lower incidence of chronic postsurgical pain: a nationwide population-based study in Taiwan

Hung I. Y.[1], Chen Y. C.[1], Chu C. C.[1], Yu C. H.[1]
[1]Chi Mei Medical Center - Tainan (Taiwan)

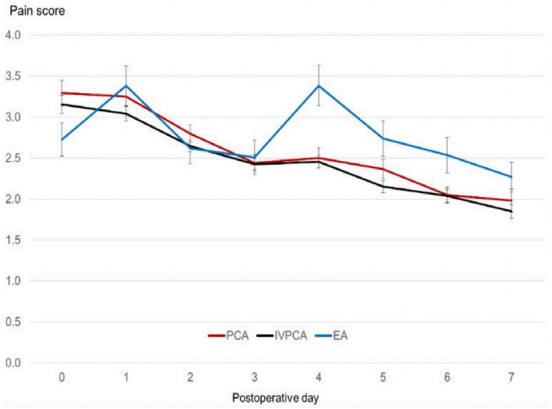
Background and Goal of Study: Chronic post-surgical pain (CPSP) impairs patients' long-term quality of life and causes significant economic burden. However, compared to acute postoperative pain, CPSP is often neglected by clinicians. Most studies on CPSP have collected data in a single institution with a limited number of patients which provide limited power. The reported incidences of CPSP varies between studies and ethnic variation also makes generalization of aforementioned studies to the population in Taiwan not feasible. Thus, we aim to investigate the epidemiology of CPSP in Taiwan and to determine the association between different surgical approaches and its incidence.
Materials and Methods: The data was collected from Longitudinal Health Insurance Database (LHID), a sub-dataset of the National Health Research Dataset (NHIRD) in Taiwan, which contains claim-data of 2 million randomly selected beneficiaries. In-patients who underwent surgery under general anesthesia was identified using the ICD-9-CM code. Prescriptions after operation in out-patient clinics was traced. We evaluated the incidence of prolonged post-operative opioid use more than 3 months and accordingly the incidence of severe CPSP. We compared the incidences for traditional and endoscopic surgery, including thoracoscopy and laparoscopy, using adjusted odds ratios (aOR) with 95% confidence interval.
Results and Discussion: Between 2005 and 2015, we identified 121127 patients who underwent surgery with general anesthesia. 1331 (1.10%) of them developed severe CPSP 3 months after operation. Among different surgical procedures, thoracic surgery (3.26%), hepatectomy (2.80%), renal surgery (1.92%), gastric surgery (1.43%), and cholecystectomy (1.13%) were associated with higher incidence of prolonged opioid use, whereas herniorrhaphy (0.70%), appendectomy (0.50%) and gynecological surgery (0.44%) were associated lower incidence. Compared to traditional surgical approach, endoscopic approach for thoracic surgery (aOR 1.47, 95% CI 1.09-1.99), cholecystectomy (aOR 1.86, 95% CI 1.38-2.52), gastric surgery (aOR 1.91, 95% CI 1.56-2.34), herniorrhaphy (aOR 1.83, 95% CI 1.13-2.98), and renal surgery (aOR 3.00, 95% CI 1.08-8.37) was associated with significantly lower incidence of severe CPSP.
Conclusion: Thoracic and upper abdominal surgery were associated with higher incidence of severe CPSP. Compared to traditional approach, endoscopic surgery was associated with lower incidence of severe CPSP.

4809

An investigation of influential factors of postoperative pain trajectories after surgery for gastric cancer

Hsu F. K.[1], Tsou M. Y.[1], Chang K. Y.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan)

Background: Pain is common after upper abdominal surgery for gastric cancer and this retrospective study aimed to investigate the influential factors of postoperative pain trajectories for patients receiving gastric cancer surgery.
Methods: After the approval of our Institutional Review Board, we performed electronic medical chart review to retrieve data from patients undergoing tumor resection for stage I through III stomach cancer at Taipei Veterans General Hospital in Taiwan from 2012 to 2018. Numeric rating pain scores in the first postoperative week were gathered and mean values were calculated on a daily basis. We also collected patients' demographics, ASA physical status, analgesic methods, anesthesia time, etc. Linear mixed models were employed to evaluate the effects of collected variables on postoperative pain scores over time and potential interactions with time were also assessed. A backward elimination strategy was used to select independent factors significantly associated with the changes in postoperative pain over time.
Results: A total of 497 patients were included in the analysis and on average, daily pain scores during the first postoperative week ranged between 1.9 and 3.2. Linear mixed model analysis identified that ASA class > 3 (p = 0.012), analgesic methods (p = 0.023), age (p = 0.04), anesthesia time (p = 0.005) and postoperative day (POD, p < 0.001) were associated with postoperative pain trajectories and an interaction was noted between POD and analgesic methods or age (p =0.001 and < 0.001, respectively). Sex, body weight and body mass index were not related to the variations in postoperative pain scores over time.



Conclusion: Age, ASA physical status, analgesic methods and anesthesia time were associated with baseline pain trajectories and age and analgesic methods were related to the trend of pain resolution over time after surgery for gastric cancer. Our analytical approach provided valuable information to elucidated the complex and dynamic changes in postoperative pain scores over time.

4790

An Investigation of Factors Associated with Postoperative Pain Trajectories after Abdominal Surgeries Using Latent Curve Model

Chang M. Y.[1], Chang W. K.[1], Tsou M. Y.[1], Chang K. Y.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan)

Background and Goal of Study: Although intravenous patient-controlled analgesia (IVPCA) is commonly used to relieve acute pain after abdominal surgeries, few studies have ever evaluated the influential factors of the variations in postoperative pain trajectories over time in these patients. This study aimed to fill this gap by using latent curve models to analyze postoperative pain trajectories and explore their potential predictors.
Materials and Methods: This retrospective study was conducted in a medical center in Taiwan and we collected data from patients receiving abdominal surgeries and postoperative IVPCA between Jan and Dec 2012 by reviewing our electronic medical recordings. We also collected daily mean numeric rating pain scores in the first postoperative week and other potentially influential factors of postoperative pain trajectories. Latent curve analyses using two latent variables, intercept and slope, were employed to model the changes in postoperative pain scores over time. We also evaluated the effects of collected variables on these two latent variables and conduct the backward model selection processes to determine the final multiple predictors model which best account for the variations in postoperative pain trajectories over time.
Results and Discussion: There were 1243 patients collected in this study and among them, 542 (43.6%) received upper abdominal surgeries and the others underwent lower abdominal surgeries. The mean daily pain scores during the first postoperative week ranged from 2.0 to 2.7. The latent curve analysis identified four influential factors of postoperative pain trajectories over time, including age, weight, sex and surgical sites. Body weight and age were negatively associated with the baseline level of mean pain scores (p < 0.001 and p = 0.001, respectively) Regarding the trends of pain resolution reflected by slop parameters, younger age, male gender and lower abdomen surgery tended to steepen the decreasing trends (p = 0.011, 0.015 and p < 0.001, respectively). The analysis of fit statistics revealed acceptable model fit to the data (RMSEA = 0.08, CFI = 0.92).
Conclusion: Sex, weight, age, and surgical sites worked in combination to affect postoperative pain trajectories over time in patients receiving abdominal surgeries and IVPCA. Latent curve analysis provided insight into the dynamic relationships and complicated interactions between the postoperative pain and their predictors.

4484

Vaso-occlusive Crisis in Sickle Cell Disease: An Acute Pain Challenge

Santos S.[1], Mendes E.[1], Asseiro M.[1], Vieira A.[1], Cortesão J.[1], Gomes P.[1]
[1]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background and Goal of Study: Sickle cell anaemia is an inherited hemoglobinopathy, multisystemic, chronic and debilitating condition characterized by vaso-occlusive episodes which result in severe acute pain. In this context acute pain units play a leading role in the proper control of painful symptoms, since they are the most common reason for resorting to medical care. This study aims to analyse our hospital protocols and compare them to the most recent scientific evidence, aiming to define which are the most effective treatments.
Materials and Methods: Through an observational, descriptive and retrospective analysis we identified all patients with vaso-occlusive painful episodes managed by the acute pain unit, from 2017 to 2019. The therapeutic protocols used, and the respective evolution of pain intensity were investigated, as well as other clinical issues, such as adverse effects and complications that may have resulted from the given analgesic and adjuvant therapy.
Results and Discussion: Among the 4240 patients managed by the acute pain unit, during this time period, 11 met our inclusion criteria: patients with hospital admissions during vaso-occlusive crisis. Patient Controlled Analgesia (PCA), with intravenous opioids, was used in all the cases, morphine being the most commonly used, and others such as nonsteroidal anti-inflammatory drugs (NSAIDs) and paracetamol. The average length of stay in hospital, for pain control, was 7,63 days. Regarding the symptoms, we registered a favourable evolution with minimal side effects.
Conclusions: We highlight that our hospital protocols meet the criteria of the best scientific evidence. However, and despite well-defined strategies for pain management, they are still insufficient in their current state. Little progress has been made in this field, even with recent investigations into new drugs, such as ketamine or gabapentin. We hope for new trials on the latest findings and a better definition about the standard opioid-dosing for these cases.
References:
1. Evidence-Based Practice Standard Care for Acute Pain Management in Adults with Sickle Cell Disease in a Urgent Care Center. 2017. Kim S., Brathwaite R., Kim O.
2. State of the Art Management of Acute Vaso-occlusive Pain in Sickle Cell Disease. 2017. Puri L. et al.
3. Targeting novel mechanisms of pain in Sickle Cell Disease. 2017. Tran H., Gupta M., Gupta K.

5967

Postoperative analgesia techniques in major pancreatic surgical resection – Is subarachnoid morphine an effective alternative to thoracic epidural?

Sá A. F.[1], Lourenço S.[1], Moreira Z.[1], Esteves S.[1]
[1]Centro Hospitalar do Porto - Porto (Portugal)

Background and Goal of Study: Pancreatic surgical resection remains the only curative treatment for pancreatic cancer. As a major abdominal procedure, thoracic epidural (TE) is considered the analgesic gold standard. However, there are important limitations described such as high failure rates and postoperative hypotension. Hence, subarachnoid morphine (SM) has been hypothesized as an equally effective and simpler approach. This study aims to compare the post-operative analgesic efficacy between SM and TE with opioids and local anaesthetics administration in patients undergoing open pancreatic surgical resection.
Materials and Methods: We retrospectively investigated medical records of patients who underwent open pancreatic surgical resection between September 2017 and September 2019. Demographic data, perioperative variables, analgesic techniques and post-operative numerical pain scale (NPS) were analysed. Descriptive and comparative statistics were performed using SPSS Statistics® software; to compare the analgesic performance of SM with TE, NPS scores during the first three post-operative days were studied using Mann-Whitney U test.
Results and Discussion: A total of 66 patients were included. The majority were males (57.6%), and were older than 60 years (68.2%). More than two-thirds of patients were classified as ASA II. TE analgesia was performed in 16 (24.2%) patients and SM in 24 (36.4%). NPS information from the first three post-operative days was available in 25 patients (8 for TE and 17 for SM). Along the three days, around 90% of patients scored ≤ 3 in NPS with both techniques. Median pain score with TE decreased from 1 (IQR 2) to 0 (IQR 2) from the first to the second day, only to increase to 1 again (IQR 2) on the third day. In contrast, SM patients showed a median pain score of 0 (IQR 2) on the first day with an increase to 2 (IQR 2) on the second day; day three showed median amelioration to 0.5 (IQR 3). Pain reports showed no significant differences during the three days of analysis (p>0.05).
Conclusion: Both techniques showed good analgesic results along the first three post-operative days, with no significant differences between them. Despite the small sample size, these findings combined with its lesser technical complexity, support subarachnoid approach with morphine as a possible viable option to TE. The promising results should motivate further investigation.

5699

A Study of Factors Affecting Use of Patient Controlled Analgesia Systems: Nurse Anesthetists Perspective

Wenchu W.[1], Chen J. Y.[1]
[1]Chi Mei Medical Center, Tainan, Taiwan - Yongkang district, Tainan (Taiwan)

Background: Pain management is a critical but complex issue for the relief of acute pain, particularly for postoperative pain and severe pain in cancer patients. It also plays important roles in promoting quality of care. The introduction of pain management decision support systems (PM-DSS) is considered a potential solution for addressing the complex problems encountered in pain management. This study aims to investigate factors affecting acceptance of PM-DSS from a nurse anesthetist perspective.
Materials and Methods: A questionnaire survey was conducted to collect data from nurse anesthetists in a case hospital. A total of 113 questionnaires were distributed, and 101 complete copies were returned, indicating a valid response rate of 89.3%. Collected data were analyzed by structure equation modeling using the partial least square tool.
Results and Discussion: The results show that perceived information quality (γ=.451, p<.001), computer self-efficacy (γ=.315, p<.01), and organizational structure (γ=.210, p<.05), both significantly impact nurse anesthetists perceived usefulness of PM-DSS. Information quality (γ=.267, p<.05) significantly impacts nurse anesthetists perceptions of PM-DSS ease of use. Furthermore, both perceived ease of use (β=.436, p<.001, R2=.487) and perceived usefulness (β=.443, p<.001, R2=.646) significantly affected nurse anesthetists of PM-DSS acceptance (R2=.640). Thus, the critical role of information quality in the development of clinical decision support system is demonstrated.
Conclusion: The findings of this study enable hospital managers to understand the important considerations for nurse anesthetists in accepting PM-DSS, particularly for the issues related to the improvement of information quality, perceived usefulness and perceived ease of use of the system. In addition, the results also provide useful suggestions for designers and implementers of PM-DSS in improving system development.

5416

Laser acupuncture after cesarean section: a prospective, double-blind, randomized, placebo controlled study

Brase A.[1], Volk T.[2], Morinello E.[2], Gottschling S.[2], Schöpe J.[2], Schneider S. O.[2]
[1]Universitätsklinikum des Saarlandes - Homburg (Germany), [2]Universitätsklinikum des Saarlandes - Homburg (Germany)

Background and Goal of Study: The aim of our prospective, randomized, double-blind, placebo-controlled study is to investigate whether active laser acupuncture treatment is superior to placebo laser treatment in postoperative pain control of women undergoing cesarean section. The study was approved by the ethical committee of the University of Saarland and is registered with the number 133/17. 80 women (mean age 32 ±5 years) giving birth through cesarean section under spinal anesthesia at the Universitätsklinik des Saarlandes, Homburg, Germany were enrolled for this trial.
Materials and Methods: Patients were randomized to receive a course of 3 treatments over 3 days with either active or placebo laser. The treatment was highly standardized, each acupuncture session treated Di-4 at the hand and Shen-men of the ear on both sides, for one minute each. The primary outcome measure was a difference in pain severity in rest on the first postoperative day measured with Numeric Rating Scale (NRS) between the placebo group and the active laser treatment group. Furthermore we analyzed pain on movement and worst pain on each postoperative day. Secondary outcome measures included changes in analgesic medication consumption and time to mobilization and hospital

discharge. Treatment occurred on the operation day and on the following two days. Measurements were taken on the day before the operation as well as on the first and the second postoperative day and on the day of discharge.
Results: The mean pain severity in rest on the first postoperative day after cesarean section showed no significant difference (p=0,850) between the treatment group (mean pain 3,32±2,07) and the placebo group (mean pain 3,24±1,98). We obtained similar results for pain in rest on the second postoperative day (p=0,525) and on the day of discharge(p=0,227). Secondary outcome measures regarding analgesic medication consumption was not significantly different in NSAR use in postoperative Opioid use between treatment and placebo group. Laser acupuncture showed no effect on the mobilization of the patients. The day of hospital discharge was also no significantly different between the two groups (p=0,162).
Conclusion: Our analysis showed no additional pain control effect through laser acupuncture on patients with postoperative pain after cesarean section. Further studies are needed to investigate the role of laser acupuncture in postoperative pain therapy.

4744

Ketamine added to morphine patient-controlled analgesia for acute postoperative pain in patients suffering from sickle-cell disease: a retrospective study

Zuccarini F.[1], Bali M.[2], Ortscheid L.[2], Aoragh A.[2], Veliziotis I.[2], Kapessidou P.[2]
[1]CHU Saint-Pierre - Brussels (Belgium), 2CHU Saint-Pierre - Bruxelles (Belgium)

Background and Goal of Study: Sickle cell disease is an autosomal recessive inherited hemoglobinopathy. The main clinical expression is the vaso-occlusive crisis (VOC) which leads to intense pain syndromes. Treatment is challenging due to its episodes of unpredictable severe pain, managed mainly with an opioids based patient-controlled analgesia (PCA).Ketamine added in morphine PCA has shown its efficacy in improving postoperative analgesia. It has never been investigated in the context of sickle cell disease. The aim of this study was to evaluate whether the addition of ketamine to morphine PCA could be effective in the treatment of vaso-occlusive event related acute pain.
Materials and Methods: After approval of institutions ethics committee (CE/19/12/24), we retrospectively analysed medical records from patients suffering from sickle cell disease, referred to the acute pain service, from Jan. 2015 to Nov. 2019. Patients who benefited from morphine (M gr.) or morphine and ketamine (MK gr.) PCA were compared for the following parameters from day (D) 1-6: demographics, ketamine and morphine total doses, VAS pain scale in rest and movement, PCA duration, attempted and administered bolus and adverse effects. Statistical analysis was realised using the T-test, Bartlett's, Shapiro-Wilks, Wilcoxon test, and Pearson's test for the correlations between variables. Results are expressed in means ±SD, p < 0.05 considered significant.
Results and Discussion: Data from 43 patients, (21 M gr. And 23 MK gr.), were analysed. 20 males and 23 females, aged 30.71 ± 10.00, were enrolled in the study. Patients in M gr. presented lower VAS max at rest on D1 (5.18 ± 2.20 vs 3.57 ± 2.23, p=0.021) and lower attempted boluses on D1 (19 vs 35, p=0.024), D2 (13 vs 34.5, p= 0.002), and total (62 vs 154, p= 0.001).Patients using MK PCA received more boluses on D1 and D2 (13 vs 20.5; 12 vs 27). Similarly, the total administered bolus were 52 in M gr. comparing to 101.5 in MK gr. (p<0.001).PCA use was shorter for the M gr. comparing to MK gr. (4 [2-5] vs 4[4-5.75], p= 0.04).The total dose of morphine administrated was significantly higher in the MK than in M gr. (207 vs 104 mg; p<0.001).No correlation was found between PCA duration and total ketamine dose or VAS.
Conclusion: Our results suggest that ketamine co-administered with morphine PCA, does not seem to be beneficial in controlling VOC related acute pain.

5213

Benefits of intraoperative intravenous infusion of lidocaine for acute pain management after laparoscopic gastric sleeve

Cindea I.[1], Balcan A.[2], Gheorghina V.[2], Samoila B.[3], Popescu R.[1], Costea D.[1]
[1]Emergency Clinical Hospital Constanta - Constanta (Romania), [2]Ovidius University of Constanta - Constanta (Romania), [3]John Radcliffe Hospital Oxford - Oxford (United Kingdom)

Background and Goal of Study: Postoperative pain treatment after laparoscopic bariatric surgery is a challenging task for the anesthesiologist because bariatric population is highly sensitive to cardiorespiratory depressant effects of opioid usage. Our prospective randomized double blind placebo controlled study analyzes the impact on the quality of postoperative analgesia after laparoscopic gastric sleeve of lidocaine, intravenously infused during surgery versus saline.
Materials and Methods: After institutional approval and informed written consent were obtained, 42 patients (BMI=38-45kg/m2) scheduled for laparoscopic gastric sleeve under standard general anaesthesia were recruited for the study. They were randomly assigned to one of the two groups: group S (n=22 patients), that received 1mg/kg lidocaine as iv bolus, followed by a continuous infusion of 2mg/kg/h during surgery and group C (n=20 patients), treated with the same volume of a saline placebo, administered according to the above mentioned protocol. The primary outcomes were pain intensity assessed by VAS every 6 hours and total morphine consumption by PCA during first 24 hours postoperatively. The secondary outcomes were the incidence of nausea/vomiting and sedation documented during the same period. Data were analyzed by means of ANOVA and Fisher's exact test, the statistical significance being considered for p<0,05.
Results and Discussion: No differences between groups were found in terms of demographics and duration of surgery. Statistically lower VAS scores were documented in lidocaine group versus placebo (p<0,05). Patients in group S required significantly less morphine compared to those from group C during study period (p<0,05). Concerning the adverse events, the advantage of group S was remarkable, too. Thus, we reported for both nausea/vomiting and sedation statistically reduced values of incidence in group S compared to group C (p<0,05).
Conclusion: Lidocaine, intravenously infused during laparoscopic gastric sleeve seems to be a cheap, efficient and safe agent that improves the quality of postoperative recovery comparing to placebo, by a significant decrease of acute postoperative pain intensity and reduction of opioid request.

4644

Upregulation of NaV1.7 sodium channels expression and the effects of pulsed radiofrequency treatment in rat DRG with resiniferatoxin-induced neuropathic pain

Hidaka K.[1], Maruta T.[1], Kuroki M.[1], Koshida T.[1], Shirasaka T.[1], Tsuneyoshi I.[1]
[1]University of Miyazaki - Miyazaki (Japan)

Background and Goal of Study: Resiniferatoxin (RTX) is an ultrapotent analog of capsaicin and irreversibly binds transient receptor potential vanilloid 1 (TRPV1). RTX treatment can deplete capsaisin-sensitive C fibers in rats and produces long-lasting paradoxical changes in thermal and mechanical sensitivity; diminishes the thermal pain sensitivity but increases the sensitivity to tactile stimulation, which mimic the unique clinical symptoms of postherpetic neuralgia (PHN). Pulsed radiofrequency (PRF) treatment was effective for RTX-induced mechanical allodynia in rats (Tanaka N, et al. Anesth Analg. 2010;111:784-90). The objective of this study was to investigate the mechanism of PRF treatment of RTX-induced mechanical allodynia.
Materials and Methods: For the culture study, the dorsal root ganglion (DRG) were dissected from Sprague-Dawley (SD) rats (ages 3 weeks) under sevoflurane anaesthesia. These neurons were then treated in the fresh medium without or with RTX for 1 week after 3 to 4 days in culture and NaV1.7 expression was measured using western blot. For the whole-body study, Adult SD rats were used. Rats received PRF (2Hz) to the right sciatic nerve for 2 minutes 1 week after RTX treatment (200 µg/kg, intraperitoneally). von Frey test was conducted before and 1 week after RTX treatment and 1, 2, 3, and 4 weeks after the PRF procedures. On the day 35, at the end of the last behavioral test, L3-L6 DRGs were dissected and NaV1.7 expression was measured using PCR.
Results and Discussion: In cultured DRG with treatment of RTX (1, 10, 100 nM, and 1 µM) for 1 week, NaV1.7 was upregulated in a concentration-dependent manner (P = 0.038). In the whole-body study, the both hindpaw withdrawal thresholds were significantly decreased 1 week after RTX treatment as compared to baseline (right paw: 6.6±0.9 vs. 45.4±2.8 g; P < 0.001, and left paw: 5.7±0.8 vs.

45.5±1.5 g; P < 0.001, respectively). RTX+PRF group (right paw) had a significantly greater antiallodynic effect compared with RTX group (left paw) for 4 weeks after PRF treatment. On the day 35 after RTX injection, NaV1.7 was upregulated in left DRG, and this NaV1.7 upregulation was inhibited in right DRG (Control vs. RTX vs. RTX+PRF: 1 vs. 1.31±0.11 vs. 1.0±0.14; P = 0.028).
Conclusions: NaV1.7 is upregulated by RTX and PRF inhibits RTX-induced upregulation of NaV1.7 in DRG. These findings may provide a better understanding of the molecular alterations in the development of RTX-induced neuropathic pain.

4784

Potassium- and pH-dependent controlled release of local anesthetics (LAs) from nanometric metal-organic frameworks (nMOFs) to achieve favourable pharmacokinetics

Plotkin Y.[1], Chen W. H.[2], Lilienthal S.[2], Fischer A.[2], Vazquez-Gonzalez M.[2], Willner I.[2]
[1]Hadassah Ein-Carem University Medical Center - Jerusalem (Israel), [2]Institute of Chemistry, Center for Nanoscience and Nanotechnology, The Hebrew University of Jerusalem - Jerusalem (Israel)

Background and Goal of Study: Some of the pharmacokinetic properties of LAs (i.e. lower activity in acidic environments and poor cell penetration) can often limit their efficacy and safety. nMOFs are a novel class of nanomaterials (e.g. ZIF-8, ZIF-90, UIO-68) used in an expanding array of applications, including as smart drug carriers. The goal of this study was to develop and characterise novel nMOF drug carriers for LAs and thus improve their pharmacokinetic properties and bypass current limitations.
Materials and Methods: We synthesized ZIF-8 particles loaded with either lidocaine or bupivacaine. These particles degrade faster when exposed to a more acidic environment. Similarly, we created pH-sensitive UIO-68 particles loaded with doxorubicin (DOX), as a model for LAs, by capping them with pH-responsive i-motif DNA strands. We measured the release of DOX using fluorometry and the release of LAs using HPLC, after exposure to solutions with different acidity. We synthesized ZIF-90 particles, loaded them with DOX and demonstrated potassium-dependent release of the payload by capping them with potassium-responsive G-quadruplex DNA sequences and exposing them to solutions containing different concentrations of potassium.
Results and Discussion: We were able to show faster release of lidocaine from ZIF-8 particles at a lower pH, simulating the conditions around hypermetabolic tumors and infections. The same effect was not seen with the release of bupivacaine, which was pH-independent and several theories are proposed for this discrepancy. The UIO-68 particles also released their payload faster when exposed to a lower pH, by a different mechanism. The ZIF-90 particles released DOX faster when exposed to higher concentrations of potassium, simulating the intracellular environment. The nMOFs are known to be able to penetrate eukaryotic cellular membranes and can thus bypass its chemical barrier, preferentially releasing the LAs in the potassium-rich intracellular environment. Faster release in acidic environments can create higher local concentrations of LAs in painful acidic conditions (e.g. abscesses).
Conclusion: We have shown that it is possible to use certain nMOFs as novel drug carriers for LAs, to modify their pharmacokinetic properties, and potentially, to introduce better therapeutic options for patients in pain.
References:
1. Kahn, J. S., Freage, L., Enkin, N., Garcia, M. A. A., Willner, I., Adv. Mater. 2017, 29, 1602782.

4787

Selective activation of TASK-3 K+ channels in trigenminal ganglion attenuates chronic migraine

Ren Y.[1], Jiang R.[1]
[1]West China Hospital Sichuan University - Chengdu (China)

Background and Goal of Study: Migraine is one of the most prevalent headache disorders, chronic migraine (CM) is more disabling, and for which the treatments is limited and also induces adverse side effects. The sensitization of trigeminal ganglion (TG) neurons plays an important role in the pain transmission of migraine, and activation of two-pore-domain potassium (K2P) channels inhibits sensory neuron excitability. TWIK-related acid-sensitive K+ 3 (TASK-3, KcnK9) channel, a member of K2P channel family, has been detected in dorsal root ganglion (DRG) and TG. We recently discovered a selective TASK-3 agonist which has shown therapeutic potential in treating chronic neuropathic and inflammatory pain that involves DRG1. But It is not known if selective activation TASK-3 in TG is effective against migraine. In this study we hypothesized that CHET3 may contribute to CM related pain and TASK-3 channel in TG serves as a therapeutic target for migraine.
Materials and Methods: The nitric oxide (NO)-induced CM model of C57BL/C mice was used in this study. Mechanical allodynia and cold hyperalgesia were measured by Von-Frey and acetone stimulus, respectively, in periorbital area, after intraperitoneally injecting CHET3 (10 mg/kg) or topiramate (30mg/kg) or vehicles. In situ hybridization (ISH) (RNAscope technique) was applied to map the mRNA expression of TASK-3 in TG.
Results and Discussion: Mechanical allodynia and cold hyperalgesia were reduced following both CHET3 and topiramate injection. Compared to topiramate, CHET3 has similar analgesic effect during 30 minutes to 90 minutes. ISH revealed that KcnK9 was identified in a subset of neurons in TG, and was down-regulated in CM mice. TRPv1 and TRPm8 were abundantly expressed in KcnK9+ neurons, respectively. Furthermore, more than 50% of KcnK9+ neurons express TH, whereas KcnK9 rarely colocalized with P2rx3 or Ntrk2.
Conclusion: CM down-regulation of the expression of TASK-3 channel in TG neurons, which may contribute to the hyper-excitability of the nociceptive neurons, leading to the occurrence of CM. Enhancing TASK-3 mediated K+ conductance in nociceptive neurons effectively relieves pain behaviors in a mouse model of CM.
References:
1. Liao, P. et al. Selective activation of TWIK-related acid-sensitive K⁺ 3 subunit–containing channels is analgesic in rodent models. Science Translational Medicine 11, eaaw8434, doi:10.1126/scitranslmed.aaw8434 (2019).

5034

Polydeoxyribonucleotide ameliorates the pain by diminishing the inflammation and apoptosis in the Achilles tendon injury rats

Han J. H.[1], Hwang T. J.[1], Chung J. Y.[2], Rho J. H.[3]
[1]Kyunghee University Hospital - Seoul (South Korea), [2]Kangdong Kyunghee University Hospital - Seoul (South Korea), [3]Graduate School, Kyunghee University - Seoul (South Korea)

Background: Achilles tendon disorders including tendinopathy and rupture frequently cause pain and disability in athletes and non-athletic individuals. These injuries are difficult to treat, require prolonged rehabilitation and have a high frequency of recurrence. Polydeoxynucleotide (PDRN), an A2A receptor agonist, has been suggested for the treatment of various diseases and broadly studied for its anti-inflammatory effect. In the present study, the effect of PDRN on Achilles tendon injury using rats was investigated.
Materials and Methods: Achilles tendon injury was induced by cutting half of the Achilles tendon with surgical scissors after anesthesia. One day after Achilles tendon injury, PDRN in 100 μL respective dose (2 mg/kg, 4 mg/kg, and 8 mg/kg) was directly applied to the injured Achilles tendon, once a 2 days for 16 days (total 6 times). Von Frey test and plantar test for the pain threshold were conducted. For this study, histological analysis was performed by hematoxylin and eosin staining. Enzyme-linked immunoassay (ELISA) for tumor necrosis factor-α (TNF-α), interleukin (IL)-6, and cyclic adenosine-3',5'-monophosphate (cAMP) were performed. Additionally, immunohistochemistry for cleaved caspase-3, -9, and western blotting for cAMP response element-binding protein (CREB), protein kinase A (PKA), Bax, Bcl-2.
Results and Discussion: In the present results, Achilles tendon injury increased pain susceptibility. In addition, Achilles tendon injury was found to remarkably up-regulate the inflammation and apoptosis. In contrast, PDRN treatment suppressed inflammation and apoptosis, resulting decreased pain susceptibility. These results showed that PDRN facilitated inhibited pain susceptibility, inflammation, and apoptosis from Achilles tendon injury.
Conclusion: Here in this study, it can be suggested that PDRN can be used a new therapeutic intervention for pain control from Achilles tendon injury.

5055

Effects of N-type calcium ion channel function on the neuronal activities of the primary somatosensory cortex in inflammatory pain model

Okada T.[1], Nomura Y.[1], Obata N.[1], Mizobuchi S.[1]
[1]Kobe University Hospital - Kobe (Japan)

Background and Goal of Study: Accumulated evidence suggests that plastic changes of neuronal circuits in the primary somatosensory cortex (S1) are essential for the transition of acute to chronic pain. In this study, we focused on calcium ion (Ca2+) channel expression in S1 of inflammatory pain model, and investigated the effects of antagonists on neuronal activities and pain threshold.
Materials and Methods: This study was approved by the Animal Research Committees of Kobe University and the National Institute of Neural Science (Permission number: P170801). We used C57BL6 male (6-8 weeks) mice for all experiments. We used inflammatory pain model received the injection of Complete Freund's adjuvant (CFA) into the right hind paw. Three days after the injection of CFA, S1 brain tissue was dissected, and the expression of each Ca2+ channel (L-type, P/Q-type, N-type) was analyzed by flowcytometry compared to wild type (WT) mice. In addition, intraventricular administration of N-type Ca2+ channel blocker (PD173212) and local administration to S1 of slow release drug of PD173212 were performed, and the pain threshold and S1 neuronal activity were analyzed. Behavioural responses to mechanical stimulation (von Frey filament) and thermal stimulation (hot-plate) were evaluated in this study. To visualize neuronal activity, the adeno associated virus encoding the synapsin promoter driven calcium indicator protein GCaMP6f was expressed in excitatory neurons of S1 hind paw region. Then, in vivo two-photon calcium imaging was repeated and traced single cell activity before and after the administration of PD173212. We used MATLAB to analyze imaging data. Data were analyzed by repeated measures ANOVA followed by a Bonferroni's multiple comparison test or paired t-test, and a value of $P < 0.05$ was considered statistically significant.
Results and Discussion: In acute phase of inflammatory pain, the expression of N-type Ca2+ channel was significantly increased compared to WT mice, but the other type Ca2+ channels were not significantly different. Intraventricular administration of PD173212 significantly inhibited S1 neuronal activity and improved pain threshold. Moreover, local administration to S1 of slow release drug of PD173212 significantly improved pain threshold of inflammatory pain model.
Conclusion: This research suggests that neuronal activity via S1 N-type Ca2+ channel may affect with the threshold of inflammatory pain.

5023

The regulation of spinal RNF31 on bias excitement of Gαi signal pathway via ubiquitin-MrgC in bone cancer pain

Ma Z.[1], Gu X.[1], Sun Y.[1], Liu Y.[1], Zhang W.[1], Yang Y.[1]
[1]Affiliated Drum Tower Hospital of Medical School of Nanjing University - Nanjing (China)

Background and Goal of Study: Our previous studies confirmed that Mas-related G-protein-coupled receptor subtype C (MrgC) plays a vital role in the development of bone cancer pain (BCP). And its ubiquitination level increased in spinal neurons during the process of BCP. E3 ubiquitin ligase RNF31 can produce a complex of linear ubiquitin chains and may serve as a critical mechanistic link in the relationship between bias excitement of Gαi signal pathway and MrgC. However, whether RNF31 participates in BCP by mediating ubiquitination of MrgC remains unclear. To answer this question, we designed and performed this study.
Materials and Methods: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeN mice to induce progressive BCP. Adenoviruses expressing RNF31-small interfering RNA (siRNA) and expressing RNF31 were repeated intrathecal administration on day 14 after BCP was successfully carried out. The pain behaviors, the MrgC ubiquitination levels, the expression of Gai, RNF31, NF-κB and intracellular calcium concentration in spinal neurons were measured before and after injection, respectively.
Results and Discussion: Osteosarcoma cells were implanted into the intramedullary space of the right femurs of C3H/HeN mice to induce BCP. With comparison to normal and sham group, mice in tumor group exhibited serious pain on day 14, and the level of MrgC ubiquitination, Gai, RNF31, NF-κB and intracellular calcium concentration in spinal neurons was significantly higher. Intrathecal repeated injection of Adenoviruses expressing RNF31 attenuated pain hypersensitivity, up-regulated spinal MrgC ubiquitination, Gai protein and RNF31 expression, down-regulated the expression of spinal NF-κB , and decreased intracellular calcium concentration in spinal cord dorsal horn (SCDH) neurons. Conversely, repeated intrathecal injection of siRNA, produced the opposite effect. Meanwhile, MrgC-like immunoreactivity (IR) co-localizes with ubiquitination, Gai, RNF31, NF-κB in SCDH neurons.
Conclusion: The present study demonstrates that the regulation of spinal RNF31 on bias excitement of Gai signaling pathway via ubiquitin-MrgC may be crucial in the process of BCP. These findings may provide further insight into the mechanisms and treatment of BCP.
Acknowledgements: This work was supported by National Natural Science Foundation of China (no. 81870871) and Medical Science and Technology Development Foundation, Nanjing (QRX17138, ZKX18018).

4478

Functional macrophage subtype changes in a mouse model of inflammatory low back pain/radiculopathy

Zhang L.[1], Xie W.[2], Lee S.[2], Berta T.[2], Strong J. A.[2], Zhang J. M.[2]
[1]Beijing Friendship Hospital, Capital Medical University - Beijing (China), [2]University of Cincinnati - Cincinnati (United States)

Background and Goal of Study: Macrophages play key roles in many pain states. They have been broadly classified as M1 or pro- inflammatory, and M2 or anti-inflammatory/involved in tissue repair. Macrophages can change their polarization in response to the local tissue environment. Our previous studies in rat showed that macrophage density (pan-macrophage Iba1 labeling) increased in the DRG after localized inflammation of the DRG (LID; a low back pain/radiculopathy model), but little is known about the functional macrophage subtypes involved in low back pain. In this study, we examined how different functional macrophage subtypes were involved in the LID model.
Materials and Methods: The CX3CR1 eGFP/+ CCR2 RFP/+ transgenic mouse model was used to separately label CX3CR1-expressing (primarily resident) macrophages and CCR2-expressing (primarily infiltrating) macrophages. The LID model was established by a 3 µl immune activator zymosan (2 mg/ml) injection into the right L4 intervertebral foramen, over the DRG.
Results and Discussion: Local DRG inflammation caused mechanical hypersensitivity and increased guarding (spontaneous pain) in the ipsilateral paw, as previously shown for rats. Quantitative microscopy revealed that infiltrating macrophages increased after LID in the inflamed DRG on day 4, 7 and 14. Liposomal clodronate or vehicle (200 µl) was injected intravenously 2 days before LID surgery in order to deplete macrophages, as verified by decreased expression of CCR2+ macrophages in spleen and DRG. After clodronate, the mice had less LID-induced mechanical hypersensitivity and spontaneous pain, compared with i.v. vehicle-injected mice. We found it feasible to amplify specific macrophage polarization markers with qPCR using small samples of individually identified fluorescently labeled macrophages isolated from blood or DRG, which will enable further characterization of the polarization state of these two macrophage subtypes in this model over time.
Conclusion: Overall, our results to date suggest that infiltrating macrophages may contribute to inflammatory pain in a mouse model of low back pain and radiculopathy.

5256

Antinociceptive effect of Avenanthramide C in a rat model of inflammatory pain

Kim Y. O.[1], Han X. H.[1], Lee H. G.[1], Choi J. I.[1], Yoon M. H.[1]
[1]Chonnam national university medical schoool - Gwangju (South Korea)

Background and Goal of Study: Avenanthramides (Avns) extracted from oats and those synthetically prepared exhibit potent antioxidant properties in vitro and in vivo. Avenanthramides C (Avn-C), one of the major forms of Avns has the highest antioxidant activity in vitro. Therefore, the purpose of this study was to examine the effect Avn-C in the rat formalin test.
Materials and Methods: An intrathecal catheter was inserted in male Sprague-Dawley rats. For induction of pain, 50 µL of 5% formalin solution was applied to the hind paw. Pain behavior was quantified by periodically counting the number of flinches of the injected paw after injection. The number of flinches was counted for 1min periods at 1 and 5 min and at 5 min intervals from 10 and 60 min. For the intrathecal dose-response study, Avn-C was administered intrathecally 10 min before the formalin injection.
Results and Discussion: Intrathecal administration of Avn-C decreased dose-dependently the sum of the number of flinches during phase 2, but not during phase 1 in the formalin test.
Conclusion: These findings indicate that Avn-C is effective against facilitated pain evoked by formalin injection at the spinal level. Thus, the spinal Avn-C may be useful in the management of tissue injury pain.

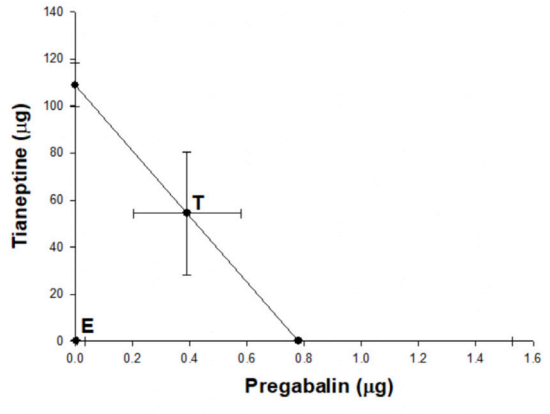
Acknowledgements: This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2018R1D1A1B07041771).

5718

Combined pregabalin and tianeptine effect in spinal nerve ligation induced neuropathic pain rats

Song J.[1], Yoon M.[1], Cho S.[1]
[1]Chonnam National University Hospital - Gwangju (South Korea)

Background and Goal of Study: Neuropathic pain impaired quality of life around 7~8% of adults, but the treatment was not satisfied because of partial pain relief and side effects in clinical settings. Pregabalin and tianeptine are used for first line drug of neuropathic pain. The experiment study evaluate the pharmacological interaction of pregabalin and tianeptine in a neuropathic pain model.
Materials and Methods: Neuropathic pain was induced by L5 nerve ligation in Sprague–Dawley rats. The effect of intrathecal tianeptine (30, 100, 300 μg) and pregabalin (0.3, 1, 3 μg) were investigated (5–7 rats per group) in allodynia using the von Frey hair test. And dose-response curves and isobolograms were used for investigating drug interactions.
Results and Discussion: Intrathecal administration of pregabalin and tianeptine dose - dependently reduced tactile allodynia. The ED50 values of pregabalin was 0.76 μg and tianeptine was 110 μg. Pregabalin + Tianeptine at 1:1 ratios were characterized as synergistic fashion by isobolographic analysis.
Conclusion: In this study, we demonstrated that intrathecally administered pregabalin and tianeptine have synergistic interaction on decreasing allodynia using spinal nerve ligation rats.



5743

Caspase-1 inhibitor reduces remifentanil-induced postoperative hyperalgesia in rat

Tianyao Z.[1], Cheng Z.[1], Peng L.[1]
[1]West China Hospital, Sichuan University - Chengdu (China)

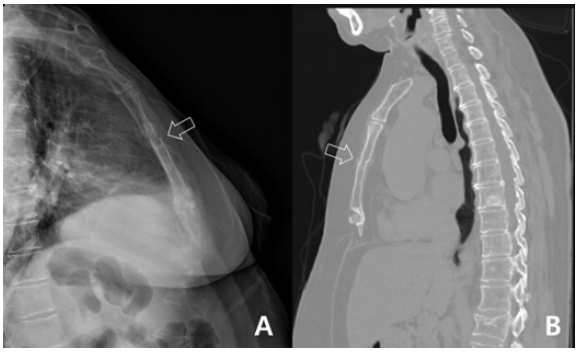
Background and Goal of Study: Remifentanil induces postoperative hyperalgesia, which may affect postoperative recovery of patients. This study was designed to evaluate the relationship between remifentanil-induced postoperative hyperalgesia and caspase-1 in spinal dorsal horn in a rat model of incisional pain.
Materials and Methods: Sixty male Sprague-Dawley rats, aged 6-8 weeks, weighing 200-250 g, were randomized divided into 4 groups (n = 15 each group): incisional pain group (group I), incisional pain + remifentanil group (group IR), incisional pain + caspase-1 inhibitor group (group IA) and incisional pain + remifentanil + caspase-1 inhibitor group (group IRA). Normal saline (2 ml) was intravenously infused for 90 min in group I and IA after incisional surgery. Remifentanil at dose of 1 μg·kg-1·min-1 was intravenously infused in group IR and IRA for the same period. Caspase-1 inhibitor Ac-YVAD-CMK 10 nmol (dissolved in 10 ul DMSO) was intrathecally injected 30 min before surgery and once a day during 5 five days after incision in group IA and IRA, while the same intrathecal injection with DMSO in group I and IR. The mechanical withdrawal threshold (MWT) and paw withdraw thermal latency (PWTL) were measured respectively at 30 min before surgery and at 2 hours, 1, 2, 3, 4, 5 days after surgery.
Results and Discussion: MWT and PWTL of all rats from the four groups decreased at 2 hours after surgery in the incisional side. MWT and PWTL of healthy foot only decreased in group IR and IRA at 2 hours after surgery. MWT significantly declined and PWTL shortened in IR and IRA group at 2 hours after surgery compared with group I and IA. MWT increased and PWTL prolonged in IRA group at 2 days after surgery compared with IR group. This study indicates that caspase-1 inhibitor could cut off the formation of hyperalgesia induced by remifentail since 2 hours after surgery by modulating the process of pyroptosis conducted by caspase-1 spinal dorsal horn.
Conclusion: Caspase-1 inhibitor could be effective to decrease the development and maintenance of remifentanil-induced hyperalgesia, as well as increase pain threshold in rats.Further study could focus on the specific relationship between opioid induced hyperalgesia(OIH) and the pyroptosis conducted by caspase-1.

4776

Effectiveness of ultrasound-guided paravertebral nerve block on isolated sternal fracture

Park J.[1], Kim S. O.[1]
[1]Kyungpook National University Chilgok Hospital - Daegu (South Korea)

Background: Isolated sternal fracture is usually treated with conservative treatment (1), but in some cases, it is difficult to perform conservative treatment. Ultrasound-guided paravertebral nerve block is known to be a useful method for pain control in patients with chest wall injury or rib fracture (2).
Case Report: A 70-year-old female patient presented with anterior chest pain that had persisted for 2 weeks despite conservative treatment. Sagittal reconstruction chest computed tomography and sternum lateral oblique x-ray revealed an isolated sternal fracture.



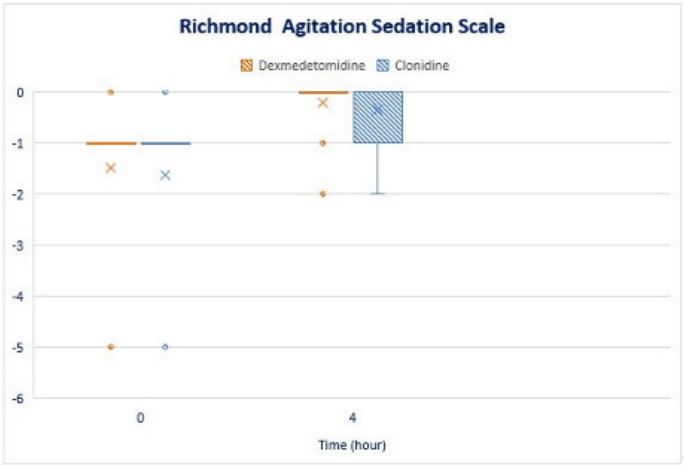
An ultrasound-guided bilateral paravertebral nerve block was performed for pain control. After performing the procedure twice at a 1-week interval, the patient reported complete pain alleviation, and no other problems were observed over the 3-month follow-up period.
Discussion: Isolated sternal fracture is considered a benign injury in the absence of other associated cardio-pulmonary conditions. Conservative treatment is typical, and delayed complications rarely occur. However, conservative treatment may be insufficient in older patients, those with conditions contraindicating the use of oral analgesics, or those that need to quickly resume normal activities. In these cases, an ultrasound-guided bilateral paravertebral nerve block may help control pain and allow the patient to return to normal activities sooner than with treatment with oral analgesics alone.
References:
1. Klei DS, de Jong MB, Öner FC, Leenen LPH, van Wessem KJP. Current treatment and outcomes of traumatic sternal fractures—a systematic review. Int Orthop 2019;43(6):1455-1464.
2. Bondár A, Szucs S, Iohom G. Thoracic paravertebral blockade. Med Ultrason 2010;12:223-7.
Learning points: Isolated sternal fracture is usually treated with conservative treatment, but conservative treatment may be difficult if the patient is old, has a condition requiring attention for the use of oral analgesics, or if he or she has to return to daily life earlier. In these situations, an ultrasound-guided bilateral paravertebral nerve block can help patients with isolated sternal fracture to manage pain and return to activity of daily life earlier.

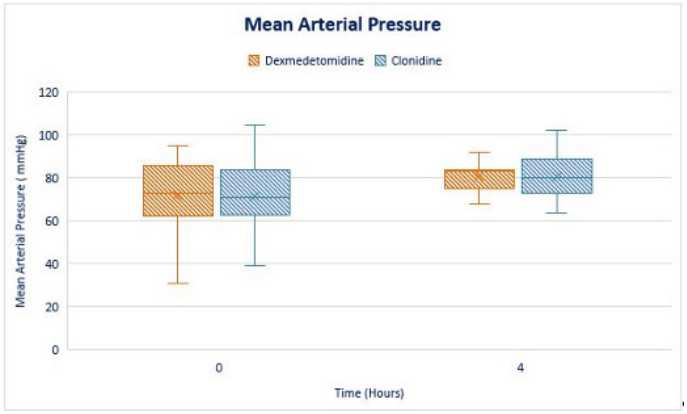
4885

Efficacy of dexmedetomidine or clonidine as adjuvants to bupivacaine hydrochloride for serratus plane block in patients undergoing minimally invasive thoracic surgery

Pedoto A.[1], Metha M.[1]
[1]Memorial Sloan Kettering Cancer Center - New York (United States)

Background and Goal of Study: Clonidine and Dexmedetomidine have been used to prolong the duration of local anesthetics in peripheral nerve blocks. With the present study we looked at the role of Dexmedetomidine compared to Clonidine when added to bupivacaine hydrochloride for serratus plane block (SPB) in patients undergoing minimally invasive lung lobectomy (MITS).
Materials and Methods: After IRB approval, 46 records of MITS were retrospectively reviewed. Dexmedetomidine (Group D, N=19, 50 mcg) or Clonidine (Group C, N=27, 100 mcg) were used in adjunct with dexamethasone (4mg) to prolong the duration of bupivacaine hydrochloride (0.375%) in ultrasound guided SPB administered at the end of surgery. Cases receiving neuraxial analgesia were excluded. Multimodal analgesia was used in every patient. Intra- and post-operative morphine equivalents, non-opioid anti-inflammatory drugs requirements, sedation (Richmond Agitation Sedation Scale), pain scores and mean arterial pressure (MAP) were compared between the two groups at PACU arrival and after 4 hours. Fisher's exact test was used for categorical variables, and Wilcoxon rank sum test for continuous one.
Results and Discussion: Demographic data and comorbidities were comparable between the two groups. Group D required less intraoperative narcotics in the presence of similar multimodal analgesia. There was no difference in time for first opioid rescue, RASS, pain score and MAP on arrival and at 4 hours in PACU. Postoperative use of narcotics and adjuvants was similar in the two groups. There was no difference in surgical times, PACU and hospital length of stay.
Conclusions: In the presence of multimodal analgesia, Dexmedetomidine seems to be comparable to Clonidine for postoperative analgesia, sedation and hemodynamics when added to bupivacaine hydrochloride in patients undergoing SPB for MITS.





4936

Comparison between bipolar pulsed radiofrequency and genicular nerve radiofrequency ablation in chronic knee pain

Molero Díez Y. B.[1], Michel Tactuk M.[1], Sanchis Dux R.[1], Macía Abraham J.[1], Sánchez Tabernero Á.[1], Vega Cruz M. S.[1]
[1]Complejo Asistencial de Zamora - Zamora (Spain)

Background and Goal of Study: Gonarthrosis is one of the most common articular diseases in older adults. Pain treatment using bipolar transcutaneous pulsed radiofrequency (TPRF) is very well extended therapeutic procedure in units of chronic pain during the last years; nevertheless, many studies have shown some efficacy for pain management with genicular nerve techniques. The main goal of our study is comparing the analgesic efficacy of genicular nerve radiofrequency ablation (GNRFA) to TRRF treatment.
Materials and Methods: We reviewed the clinical files of those patients who had these procedures between January 2014 and December 2018 at our Chronic Pain Department. We evaluated the analgesic efficacy of both techniques. Besides, we also measured Patient Global Impressions-Improvement (PGI-I) and Clinical Global Impressions-Improvement (CGI-I) in both techniques. The statistical study was performed with SPSS® program. Qualitative variables were analyzed with chi-square test and Fisher's exact test; meanwhile, quantitative variables were analyzed with no parametric Mann Whitney-U test.
Results and Discussion: A total of 55 patients were analyzed: 80% (44 patients) had TRPF, and 20% (11 patients) had GNRFA. There were no differences between sexes. Before the technique, NRS mean at movement was 8 (IQR: 9-7) and at rest was 4 (IQR:4-2) for bipolar TRPF, meanwhile for those with GNRFA was 8 (IQR:10-7) at movement and 3 (IQR:7-0) at rest. After performing these techniques, NRS during activity and rest were 7 (IQR: 8-5) and 2 (IQR: 3-0) for bipolar TRPF, and 7 (IQR: 10-5) and 3 (IQR: 7-0) for GNRFA, respectively. We did not find any differences among both groups, but there is a tendency in pain reduction, which we can also find in the literature. The majority of our patients related not feeling "any change" after performing both techniques, and there were no significant differences among both techniques. Improvement perception by physicians was similar without finding differences among both groups.
Conclusion: Patients' NRS, both at rest and at movement, improved lightly in both groups, without significant differences between them. The majority of patients in both groups referred not feeling "any change". We cannot conclude that one procedure is better than the other regarding pain reduction or patient satisfaction.

4736

Peroperative pain management in Breast Reconstructive Deep Inferior Epigastric Perforator (DIEP) artery Flap Surgery: a retrospective study

Carmona Blesa A.[1], Tejedor A.[1], Deiros C.[1], Bassas E.[1], Espejo S.[1], Masdeu J.[1], Anaesthesiology Department
[1]Consorci Sanitari Integral - Sant Joan Despi, Barcelona (Spain)

Background and Goal of Study: Pain management in reconstructive breast surgery with Deep Inferior Epigastric Perforator (DIEP) artery flap remains a challenge. There is no consensus about what's the most suitable analgesic approach nor which paper locoregional anesthesia may have. The aim of our study was to audit acute postoperative pain management and to assess its impact on peroperative outcomes in our patients
Materials and Methods: After approval from IRB (19/46), we gathered data from medical records of patients who underwent DIEP flap surgery in our centre between 2014 and 2019. We collected: anthropometric data, ASA, comorbidities, anesthetic technique, peroperative complications; postoperative numerical pain rating scale (NPRS) and morphine consumption; hospital stay, chronic pain rate and outcomes. Results were reported as mean (SD) in quantitative data and percentage in qualitative data. Student's t-test was used to test differences between continuous data and $\chi 2$ test to assess relationship between categorical data. If not applicable, we ran a Mann–Whitney U or a Fisher's Exact Test respectively. P values <0.05 were considered statistically significant. Analyses were carried out using SPSS v 22.0
Results and Discussion: Sixty-seven patients were included: 35.8% under general anaesthesia (GA), 64.2% under combined anaesthesia (CA): BRILMA and/or TAP block, ESP block, Paravertebral and/or interpectoral block, thoracic epidural. Postoperative analgesia consisted on NSAIDs and morphine if needed. NPRS at rest and movement at 24h postintervention were lower in CA group (p=0.032/p=0.004 respectively). Seven patients (10.4%) required morphine PCA; 6 of them in GA group (p=0.004). Complications related to analgesia were all due to morphine secondary effects. Nine patients developed postoperative chronic pain: incidence was higher when NPRS at rest and movement were higher in postanaesthesia unit

(p=0.008/p=0.002 respectively) and in GA group (66.7% in GA, p=0.038). Thirty patients had postsurgical complications, 62.5% in GA group (p=0.029). Time to perambulation was faster in CA group (p=0.036). There were no differences in hospital stay

Conclusion: Despite the wide range of locoregional techniques, patients where peripheral nociception was blocked had better outcomes: better acute postoperative control, lower incidence of chronic pain and postoperative complications. A poor initial pain control may be associated with a higher pain chronification.

5270

Factors affecting the spread of local anesthetic in fascial-sheath blockade of the anterior abdominal wall in the cadaver experiment

Bespalov E.[1], Zaytsev A.[1], Zhukova S.[2], Pominalnaya V.[3]
[1]Petrovsky Russian Research Center of Surgery - Moscow (Russia), [2]I.M. Sechenov First Moscow State Medical University (Sechenov University) - Moscow (Russia), [3]Pletnev City Clinical Hospital №57 - Moscow (Russia)

Background and Goal of Study: In recent years, there has been an increasing interest in various methods of regional anesthesia, including fascial-sheath blockade of the anterior abdominal wall (FSBAAW). FSBAAW have proven themselves in clinical practice. Unfortunately, the factors affecting the spread of local anesthetic (LA) in the fascial sheath are still unclear and so an objective of this study was to investigate these unknown factors.

Materials and methods: Studies were performed in the pathology department in 15 corpses (m=6, W=9), which at the time of death was from 54 to 80 years. The weight of the corpse was 44-97 kg, height 163-185 cm. 10 lateral, 10 upper and 10 lower TAP-blocks were performed with the ultrasonic (US) navigation. Identical blocks were performed on two sides on one corpse. The FujiFilm Sonositeedgeinc-US device with a Sonosite HFL 38 13-6 MHz linear ultrasonic sensor and SonoPlexStimCannula needles 22G 60-120 mm were used. To assess the solution's distribution the methylene blue was used for 20 (group A) or 30 (group B) ml. The dependence of the solution's distribution on the volume, weight and growth of the corpse as well as on damage in the area of the solution's distribution (surgical incision and scars) was studied. The spread of the dye was assessed 20 minutes after the injection.

Results and discussion: The injection of a larger dye volume led to a larger area of distribution. The injection of the solution in group A didn't provide the necessary coverage area in corpses whose growth exceeded 175 cm (n=11). The weight of the corpse didn't significantly affect the zone of solution's distribution. Thus, the area of solution's distribution in the fascial sheath depended on the growth of the corpse and almost didn't depend on the weight. Damage of anatomical structures in the dye distribution zone led to restriction of its distribution which led to a decrease in the staining zone (n=6).

Conclusions: The preliminary data suggest that the patient's weight has little effect on the volume of LA must be administered when performing FSBAAW. The volume of the fascial sheath more depends on the patient's height. Growth determines the volume of LA that must be injected for adequate analgesia. Injection of 20 ml of LA may not be sufficient for adequate analgesia when performing FSBAAW in patients whose height is higher than 175 cm. Injuries in the AREA of LA may cause restriction of LA distribution and inadequate analgesia.

5611

Transversus Abdominis Plane Block in Acute Pancreatitis pain management

Deiros Garcia M. C.[1], Gonzalez Martinez S.[1], Pueyo Periz E. M.[1], Tejedor Navarro A.[1], Masdeu Castellvi J.[1]
[1]Consorci Sanitari Integral - Sant Joan Despi, Barcelona (Spain)

Background and Goal of Study: Acute Pancreatitis (AP) is a common inflammatory disease generally characterised by severe abdominal pain. Pain management in AP ranges from low dose NSAIDs to high-dose opioid analgesics and even to thoracic epidural anaesthesia. TAP block has recently been described as an effective analgesic technique for chronic pancreatitis, but it has not been tested in AP pain management.

Materials and Methods: Case series study on patients with acute pancreatitis with the following inclusion criteria: > 18 years, no coagulopathy, absence of Multiple Organ Failure, Numeric Pain Rating Scale (NPRS) equal to or greater than 5 after NSAIDs and Morphine as rescue analgesia; and written informed consent. Under standard monitoring, US guided posterior TAP block was performed bilaterally. We administered Mepivacaine 2% 10 ml plus Bupivacaine 0,5% 10 ml per side and observed an appropriate diffusion pattern of local anaesthetics. Data collected were: NPRS prior to the procedure, at half an hour later, and then daily until hospital discharge. Results were reported as mean (SD) in quantitative data and percentage in qualitative data. Analgesic effectiveness was measured by comparison of NPRS before and after TAP block by non-parametric test of Wilcoxon signed-ranks test between two quantitative variables. P values <.05 were considered statistically significant. Analyses were carried out using SPSS v22.0.

Results: Twelve patients underwent bilateral TAP block. 83% of patients had a mild to moderate AP and 2 patients were exitus due to AP complications. Mean NPRS before TAP block was 7.33 (SD 1.67) and after block was 1.25 (SD 1.66), 1.91 (SD 1.97), 1.18 (SD 1.17), 0.91 (SD 1.30) at 30 minutes, 24 hours, 48 hours and 72 hours respectively. The decrease in pain was significant (p 0.002) and it occurred in the first 30 minutes after performing TAP block. The effect persisted the following days in patients who completed the follow-up (p 0.003). No patients required to repeat the procedure. After TAP block, patients with mild AP did not need opioids for pain control and were able to reinitiate oral intake with good tolerance.

Conclusions: In our case series, TAP block was a safe, effective and easy to perform procedure in AP pain management diminishing opioid consumption. More research must be conducted in order to confirm effectiveness of TAP blocks in this clinical setting and which role could this block have in AP pain management.

5680

Fluoroscopy is not superior to ultrasound for steroid injection in chronic lumbar pain: A meta-analysis of randomized controlled trials

Torres A. D.[1], Zorrila Vaca A.[1], Calvache J. A.[2]
[1]Universidad del Valle - Cali (Colombia), [2]Universidad del Cauca - Popayan (Colombia)

Background and Goal of Study: Fluoroscopy (FL) guidance is a time tested modality for all interventional procedures in patients with chronic lumbar pain. However, recent studies have yielded similar and even better outcomes using ultrasound (US) as compared to FL. Our aim is to evaluate the efficacy of US-guided steroid injections for the treatment of lumbar pain [M1] [AZ2] compared to FL-guidance.

Materials and Methods: A systematic review was designed searching for randomized controlled trials (RCT) comparing US and FL approaches for steroid injections in patients with lumbar pain. The primary outcome was pain score at short (3-4weeks) and long-term (2-3 months). Secondary outcomes were functional status as measured by the Oswestry disability index (ODI), duration of the procedure and the rate of intravascular puncture.

Results and Discussion: A total of 11 RCTs (n=706 patients) were included in this meta-analysis. Similar pain scores were evidenced between FL and US techniques at short-term (SMD -0.06, 95%CI -0.21 to 0.09, P=0.42) and long-term after the procedure (SMD 0.06, 95%CI -0.10 to 0.22, P=0.48). In addition, there was no evidence of a significant difference in the improvement of ODI between these two techniques at both short-term (SMD -0.12, 95%CI -0.29 to 0.05) and long-term (SMD -0.06, 95%CI -0.24 to 0.11). There was a lower risk of intravascular puncture in the US group (RR 0.11, 95% CI 0.02-0.57, P=0.009).

Conclusion: FL and US-guided interventional procedures have similar effectiveness in pain reduction and functional outcomes in chronic lumbar pain management. However, US seems to have a better safety profile due to the lower rates of intravascular injection.

References:

1. Foster NE, Anema JR, Cherkin D, et al. Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet (London, England) 2018;391(10137):2368-2383.
2. Wang D. Image Guidance Technologies for Interventional Pain Procedures: Ultrasound, Fluoroscopy, and CT. Current pain and headache reports 2018;22(1):6.
3. Evansa I, Logina I, Vanags I, Borgeat A. Ultrasound versus fluoroscopic-guided epidural steroid injections in patients with degenerative spinal diseases: a randomised study. Eur J Anaesthesiol. 2015 Apr;32(4):262-8.

6205

Ultrasound Guided Bilateral Cervical Plexus Block Versus Multimodal Analgesia For Thyroid Surgery

Romdhani C.[1], Naas I.[1], Fares K.[1], Elaskri H.[1], Labbene I.[1], Ferjani M.[1]
[1]Military hospital of Tunis - Tunis (Tunisia)

Background and Goal of Study: The pain after thyroid surgery is considered of moderate intensity and short duration. Ultrasound-guided bilateral Superficial Cervical Plexus Block is proposed to relieve pain from patients undergoing thyroid surgery in the postoperative period. This study aimed to evaluate the analgesic effect of ultrasound (US) guided bilateral superficial cervical plexus block (SCPB).
Materials and Methods: We conducted a randomized, comparative, prospective, simple blind study undergoing 80 patients allocated to receive either Ultrasound-guided superficial cervical plexus block associated with multimodal analgesia or multimodal analgesia (control group). We included ASA class I or II patients aged more than 18 years and scheduled for elective thyroid surgery under general anesthesia. We performed ultrasound-guided SCPB before general anesthesia (10ml of bupivacaine 0.25 % injected bilaterally). Multimodal analgesia was performed by ketamine and lidocaine, kétoprofene, acetaminophen, and nefopam. We assessed postoperative pain using the Visual Analogue Scale (VAS) and the total morphine consumption. We administered morphine titration if the VAS is more than 30. Statistical significance was stated at p-value < 0.05.
Results and Discussion: We included 40 patients in the SCPB Group and 39 patients in the control group (we excluded one patient due to hemodynamic instability). There was no statistically significant difference in the demographic data and the incidence of postoperative nausea and vomiting between the two groups. The peroperative consumption of remifentanil was reduced in the SCPB group. The postoperative pain score (VAS) was higher in the control group at the 15, 30, 60, 75, 90,105, 120 postoperative minutes and 6, 12, 18, 24 postoperative hours (p < 0.05). Postoperative morphine consumption was higher in the control group (p < 0,05).
Conclusion: Ultrasound-guided SCPB for thyroidectomy under general anesthesia decreases postoperative pain score and postoperative morphine consumption.

6301

Unusual displacement of subcutaneously tunnelled intrathecal catheter

Siddique Z.[1], Hudson E.[1], Hearty C.[1]
[1]Mater Misericordiae University Hospital - Dublin (Ireland)

Background: Intrathecal drug delivery systems (IDDS) are used in the care of patients with complex chronic non-cancer pain and cancer-related pain. IDDS deliver drugs into the intrathecal space by way of a subcutaneously tunnelled catheter. The catheter may be connected to an internally implanted IDDS or an external pump and reservoir. Subcutaneously tunnelled catheters connected to an external pump via an implanted Port-A-Cath are considered a reliable and safe method of intrathecal drug delivery.
Case Report: External displacement of subcutaneously tunnelled intrathecal catheters is widely not reported in the literature. A subcutaneously tunnelled intrathecal catheter and Port-A-Cath connected to an external pump was placed in a patient with complex cancer-related pain. We aim to present a case report of intrathecal catheter displacement through the patient's skin. The subcutaneously tunnelled catheter was removed with a minor complication. The patient did not suffer any sequelae.
Learning points: Displacement of subcutaneously implanted intrathecal catheters through skin may occur, leading to potential complications for patients.

6352

Is Transnasal Sphenopalatine Ganglion Block a worth trying technique in Chronic Headaches? – A series of cases

Coles I.[1], Vieira C.[1], Gonçalves J.[1], Gouveia I.[1]
[1]ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background: Transnasal Sphenopalatine Ganglion Block (SPGB) is emerging as an effective and safe option for the treatment of several disabling headaches1. The authors describe a serie of cases in which SPGB was used to treat chronic headaches with complete resolution of the symptoms.
Case Reports: (1). 56 years-old (yo) woman was referred to Chronic Pain Unit (CPU) due to frontal tension headache refractory to several therapies. Structural changes were excluded by a MRI. Patient complained of an oppressive,non-pulsating pain. Acupuncture sessions were made and suspended for lack of results. SPGB with Ropivacaine 0.2% (w/Ropi 0.2%) was performed with immediate relief of symptoms, which recurred after 4 weeks. SPGB was repeated with symptoms resolution. (2). 47-yo man with neuropathic pain in superficial peroneal right nerve territory, caused by a nerve injury following hospitalization in ICU (status pos pancretitis). He also presented a right upper limb pain after a meningoencephalitis. He was under several analgesics (gabapentin, opioids, capsaicin and baclofen) with adequate pain control. He began to experience an intense and fronto-coccipital tension headache. An occipital block was performed without pain relief. SPGB w/ Ropi 0.2%was performed with sustained relief of symptoms for 4 weeks. Symptoms recurrence was noticed and a new SPGB produced a definitive resolution of the headache. (3). 61-yo woman with history of depression and obesity. Medicated with gabapentin, fluoxetine, amitriptyline. Referred to CPU for constant cervical pain with occipital irradiation in the last 4 years. From the study performed we report a Chiari Malformation. Patient was oriented for neurosurgery consultation. Cervical TENS was realized with a brief pain relief. A SPGB w/Ropi 0.2%was performed with immediate symptom relief for 4 weeks. Total resolution of headache was possible after brain surgery
Discussion: SPGB is an easy and effective technique that can be used for treatment of various aetiologies of headache. Further studies need to be conducted to determine the best pharmacologic agents, the optimal guided technique and how it may be use as part of a headache management program
References:
1. Mojica, J. SPGB in the Management of Chronic Headaches.Curr Pain Headache Rep(2017)21:271.
Learning points: These clinical cases show the value of SPGB in symptomatic relief of chronic headache which successfully solved the pain and it's associated with high patient´s satisfaction level.

6212

Complete recovery after triple epidural blood patch for the treatment of spontaneous orthostatic headache

Carvalheiro Fagulha L.[1], Matute Crespo M. M.[2], Groizard Botella M. J.[2], Palumbo M.[2], Montero Matamala A.[2]
[1]University Hospital Arnau de Vilanova - Lleida (Spain),
[2]Hospital Universitario Arnau de Vilanova - Lerida (Spain)

Background: Cerebrospinal fluid (CSF) leakage might be iatrogenic or spontaneous in its nature. This outflow of CSF leads to intracranial hypotension that is felt as an orthostatic headache by the patient. Epidural Blood Patch (EBP) is considered the therapy of choice for orthostatic headaches derived from intracranial hypotension. Even though the EBP is considered the gold-standard treatment, its administration method (treatment level, volume used, number of EBPs and interval between them) for optimal efficacy is still debatable.
Materials and Methods: A 42 year old female presents intense orthostatic headaches in the temporo-occipital region. No iatrogenic cause was found. After conservative treatment failure, she underwent several lumbar punctures, MRI scans and CAT scans and was diagnosed with Liquor-Hypotension Syndrome. A Cisternography showed multiple CSF leakages from thoracic to lumbar L4-L5 levels. Our Pain Management Unit was consulted. During our visit, 45 days after the onset of the headaches, the patient presented bilateral temporo-occipital orthostatic headache 6/10, increasing bilateral tinnitus. Three EPB were perfomed with 1month interval between each, following the same protocol using 20ml of autologous blood which was drawn meanwhile an epidural needle was inserted into the L4-L5 intervertebral level with saline loss of resistance technique. The blood was slowly injected (30-60 seconds). VAS scales were accessed before, 1min after ,1 hour after and 1 week after which were 6-3-2 and 0 respectively and a complete recovery 2 months past.
Results and Discussion: According to bibliography, there seems to be a need for additional EBPs when it comes to spontaneous orthostatic headaches or multiple

CSF leakages compared to iatrogenic orthostatic headaches(1).This is probably due to larger dural tears and multilevel CSF leakage associated with spontaneous orthostatic headaches and also the fact that lumbar leaks have higher CSF pressure due to the effect of gravity and EBP have increased risk of relapse. This leads us increase the time interval between EBP (normally between 5-15 days), the volume of autologous blood drawn (20ml) and the number of EBP to a maximum of 3.
Conclusion: Patients with spontaneous orthostatic headache from multiple CSF leakages can benefit from our protocol which could be used in large clinical trials in the future to verify efficacy and safety.
References:
1. Spontaneous CSF Leaks.Mokri.2013, American Headache Society.

5563

Continuity of Postoperative Analgesia for Postsurgical Pain Control, Lithuanian University of Health Sciences Kaunas Clinics: Audit of 2016 vs 2018

Jazokaite L.[1], Gudaityte J.[1], Saduikyte B.[1]
[1]Lithuanian University of Health Sciences - Kaunas (Lithuania)

Background and Goal of Study: Aim of the study is to assess the quality and continuity of postoperative analgesia using multimodal analgesia with respect to the effect of the guidelines in 2018.
Materials and Methods: After bioethical approval, a prospective analysis of 80 patients (pts), who underwent elective surgery in Departments of General Surgery, and Urology of Hospital of Lithuanian University of Health Sciences Kaunas Clinics in November, 2018 was performed. The results were compared with a 2016 study of 94 pts using the same patients selection criteria and methodology of the study. Following this study performed in 2016, the General Surgery Unit introduced pain management recommendations. Meanwhile, the Urology Unit did not follow the pain management recommendations. The data of the prescription and nursing sheets including the range, dosage of analgesics, methods of administration, pain scores (VAS 0-10) were analysed. Data are presented as ratio, no (%) of cases, mean ± SD, range, analgesics dosage as mg and g. SPSS 23.0 was used for statistic calculations. Traits evaluated as significant at $p < 0.05$.
Results and Discussion: Median pain intensity in Post-Anesthesia Care Unit (PACU) assessed in 88.6 % vs 97.5 % of cases was 1.2 vs 1, ranging from 0 to 6 scores, 2016 vs 2018. Pain intensity was neither assessed nor documented in surgery units (SUs). The doses of i/v analgesics assessed in PACU, and SUs in 2016 vs 2018 according to the anestesiologist's recommendations are shown in Figure 1. Most common prescriptions, % of cases, in SUs were as follows: ketorolac 34 vs 36.2, diclofenac 20.2 vs 5, dexketoprofen 5.3 vs 7.5, 2016 vs 2018.

Postoperative analgesia 2016 vs 2018

Analgesics 2016 vs 2018	Recommendation	Given in PACU	g/mg PACU	Given in Urology Unit	Given in Surgery Unit	g/mg SUs
Paracetamol	40.4% vs 91.3%, p=0.000*	35.1% vs 92.5%, p=0.000*	2.4±0.9 vs 1.9±1.1	0.0% vs 10.0% p=0.059	3.3% vs 80.0%, p=0.000*	1.5 ± 0.7 vs 3.7 ± 0.6
Ketoprofen	35.1% vs 91.3%, p=0.000*	30.9 % vs 80.0%, p=0.000*	151.7±66.4 vs 143.1 ±49.9	61.8% vs 73.3% p=0.325	1.7% vs 22% p=0.001*	208.7± 94.9 vs 218.18±91.7
Pethidine	76.6% vs 91.3% p=0.010*	75.5% vs 72.5%, p=0.649	96.8±76.3 vs 83.0±39.6	29.4% vs 13.3 % p=0.120	61.7% vs 20% p=0.000*	56.4 ± 16.9 vs 110.7± 56.1

Note. Values are percent of cases, mean ± SD, where appropriate. * $p < 0.05$.

Conclusion: The majority of patients during the stay in PACU, receive postoperative analgesia according to the anestesiologist's recommendations. Adherence to the recommendations of postoperative analgesia in Department of Urology is low. Implementation of postoperative analgesia guidelines in Department of General Surgery has positive effect in terms of reduction of opioid consumption and better management of multimodal analgesia.

5214

PAIN OUT Project at "Luigi Vanvitelli" University Hospital (Naples, Italy): get the situation in hand!

Sansone P.[1], Pace M. C.[1], Giaccari L. G.[1], Colella U.[2], Scafuto A.[1], Aurilio C.[1]
[1]University of Campania "L. Vanvitelli" - Napoli (Italy),
[2]AORN dei Colli - Monaldi Hospital - Napoli (Italy)

Background and Goal of Study: PAIN OUT is an international quality improvement and registry project that provides a unique and user-friendly web-based information system to improve treatment of patients with postoperative pain. The main objective of the PAIN OUT project is to develop and to validate a system for measurement and feedback of outcome quality and support of decision making. Evaluation of these results helps identify deficits so that improvements can be implemented.
Materials and Methods: The study is conducted by collecting data about perioperative pain management from patients in surgical wards of general and maxillofacial surgery in "L. Vanvitelli" Hospital (Naples, Italy) from April 2018 to November 2019. The inclusions criteria are as follows: 1. Time of data collection is POD 1 and patients is 6 hours minimum in ward; 2. Patient is consenting age or over; 3. Patient has given assent or consent to participate.
Results and Discussion: 198 patients were enrolled: 171 underwent general surgery (G group) and 27 oral and maxillofacial surgery (OM group). In G group the mean least pain collect 6 hours minimum after surgery was 1.73±1.82, with a mean worst pain of 5.51±2.96. The percentage of time the patient experienced severe pain was 26.67±19.96. In OM group patients experienced a mean least pain of 1.33±1.80, with a mean worst pain of 3.78±3.12. The percentage of time the patient experienced severe pain was 27.41±31.69. In both groups, pain didn't interfered to doing activities in bed, breathing deeply or coughing, and sleeping. 58% of patients underwent general surgery was out of bed versus 81% of patients underwent oral and maxillofacial surgery without interference in activities such as walking, sitting in a chair, or standing at the sink. Low interference in emotions was reported in both groups. Adverse effects such as nausea, drowsiness, itching and dizziness were rarely recorded. Finally, pain relief was of 76.43% in G group and 85.19% in OM group with good satisfaction level (8.33 vs 8.93).

	GENERAL SURGERY	ORAL AND MAXILOFACIAL
DEMOGRAPHICS		
Number of Patients	171	27
Sex (Female/Male)	71% - 29%	29% - 71%
Age (years)	53.28 (15.38)	58.33 (16.78)
Weight (kg)	75.28 (21.26)	78.15 (18.55)
PAIN INTENSITY		
Least Pain	1.73 (1.82)	1.33 (1.80)
Worst Pain	5.51 (2.96)	3.78 (3.12)
Time in Severe Pain	26.67 (19.96)	27.41 (31.69)
PAIN INTERFERENCE WITH		
Activities in Bed	2.77 (2.89)	1.74 (2.58)
Coughing/Taking Deep Breath	2.49 (2.96)	0.78 (2.17)
Sleep	2.35 (2.85)	1.11 (2.21)
Proportion out of Bed (Yes/No)	58% - 42%	81% - 19%
Activities out of Bed	2.46 (2.65)	0.82 (1.53)
INTERFERENCE WITH EMOTIONS		
Anxiety	1.84 (3.08)	1.07 (2.43)
Helplessness	1.34 (2.54)	0.78 (2.31)
ADVERSE EFFECTS		
Nausea	2.12 (3.02)	0.93 (2.30)
Drowsiness	2.59 (3.31)	2.15 (2.63)
Itch	0.67 (1.72)	0.00 (0.00)
Dizziness	1.15 (2.43)	0.48 (1.40)
PERCEPITION OF CARE		
Pain Relief	76.43 (28.08)	85.19 (24.86)
Allowed Partecipation	1.86 (3.19)	2.81 (4.25)
Satisfaction	8.33 (2.13)	8.93 (2.09)
Wish More Treatment (Yes/No)	11% - 89%	15% - 85%
Receipt of Information (Yes/No)	35% - 65%	48% - 52%
PROCESSES		
Wound Infiltration (Yes/None given/Not possible to obtain information)	20% - 76% - 4%	9% - 86% - 5%
Intra-Op RA (Yes/None given/Not possible to obtain information)	51% - 49% - 0%	38% - 62% - 0%
Ward RA (Yes/None given/Not possible to obtain information)	6% - 93% - 1%	0% - 100% - 0%
Intra-Op Opioid (Yes/None given/Not possible to obtain information)	100% -0% - 0%	100% - 0% - 0%
Ward Opioid (Yes/None given/Not possible to obtain information)	60% - 40% - 0%	43% - 52% - 5%
Non-Pharmaceutical Methods (Yes/No)	12% - 88%	11% - 89%

Conclusion: The preliminary data show good practice in postoperative pain management. Patients reported high level of pain relief and satisfaction.

6119

Perioperative acute pain management in Chinese institutions: priliminary result from a perioperative acute pain registry

Liu Y.[1], Feng Y.[2], Mi W.[1]
[1]Chinese PLA General Hospital - Beijing (China),
[2]People's Hospital, Peking University - Beijing (China)

Background and Goal of Study: Perioperative acute pain is still an important clinical problem worldwide. Chinese medical institutions also made great efforts to relieve patients' acute pain after surgery. However, there is still no large-scale investigation on the current acute pain management in China. Therefore, led by the Chinese Association of Anaesthesiologists, we started an observational study using the perioperative acute pain management registration database in China. In this abstract, we analyzed the initial results of the study to evaluate the postoperative acute pain control.
Materials and Methods: This study was approved by the ethics committee of Chinese PLA General Hospital. At present, 45 medical institutions in mainland China participated in this study. 2069 patients aged ≥18 years old were asked to complete a pain outcome questionnaire. Medical treatment that related to pain management was documented. Descriptive statistical analysis was used to analyze the demographic data, pain treatment and patients' reported pain outcomes. The differences of pain outcomes among different surgical departments were compared with ANOVA.
Results and Discussion: 2012 patients were included in the current analysis. The worst postoperative pain reported by patients was scored at 4.0 ± 2.6 (Figure 1), and the duration of worst pain was 17.6 ± 24.7%. Patients' reported satisfaction score was 8.5 ± 1.8. The degree of postoperative pain in obstetric patients was significantly higher than that in other departments. In addition, the departments with the worst pain score higher than 4 were orthopedics, urology and thoracic surgery (Figure 2).
Conclusion: In this abstract, we have made a preliminary analysis on the current profile of postoperative acute pain management in China. Our further study, we believe, will be able to provide valuable information to improve acute pain management in China, which include find the most vulnerable patients who need the most attention.
Acknowledgements: We thank for the contribution of our colleague in the 45 hospitals participated in our study.

6314

Prospective audit: adequacy of pain assessment in the medical and surgical ward

Cherestes R. X.[1], Iancu I. B.[1], Singh V.[1]
[1]Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)

Background: Accurate assessment of pain is associated with improved pain management, which can lead to better patient outcomes1. Pain is a fifth vital sign in Early Warning Scoring (EWS) chart2. The Royal College of Anaesthetists has recommended regular pain assessment3.
Aims: 1. Determine the prevalence of pain experienced by patients in Our Lady of Lourdes Hospital, Drogheda. 2. Determine the accuracy of documentation on observation charts and analgesia plans available for pain.
Method: After approval from the local audit committee, a prospective audit was conducted in the medical and surgical wards. Data was collected on proforma by direct questioning as well as reviewing patient charts.
Results: Of the 81 patients included, 55% were from the medical ward and 45% from the surgical ward. Documentation of pain was not universal, with 52 patients having no score documented with their last set of observations, but on direct questioning, 21% of patients had a pain score ≥4/10. Of those with a score recorded, the recorded score was not found to correlate with the scores reported on direct questioning in 60% of patients. Approximately 88% of the patient had appropriate analgesia plan available in charts.
Conclusions: The documentation of pain in the wards falls below the standard set by the Royal College of Anaesthetists3. Regular education and training programmes are needed to improve pain assessment and management to enhance the patient experience.
References:
1. Atkinson VJ. A prospective audit project into the adequacy of pain assessment in the medical and surgical wards in a North London District General Hospital. Brit J Pain 2013; 8(2): 78-83.
2. Booss J, et al. Pain as the fifth vital sign toolkit. Report (revised), Veterans Health Administration, Washington, DC, October 2000
3. James DN. Guidance on the provision of anaesthesia services for acute pain management. London: The Royal College of Anaesthetists, 2013.

4996

Patient Related Outcome Domains in Studies related to Postoperative Pain Management after Total Knee Arthroplasty and Sternotomy A comparison between two procedures

Bigalke S.[1], Maeßen T.[2], Kaiser U.[3], Liedgens H.[4], Zahn P.[5], Pogatzki-Zahn E.[6]
[1]University Hospital Muenster - Muenster (Germany), [2]Clinic for Anaesthesiology, Operative Intensive Care Medicine and Pain Therapy, University Hospital Münster - Muenster (Germany), [3]University Pain Centre, University Hospital Carl Gustav Carus Dreseden - Dresen (Germany), [4]Grünenthal GmbH, Aachen - Aachen (Germany), [5]Clinic for Anaesthesiology, Intensive, Palliative and Pain Medicine, Ruhr-Universität Bochum, BG-University Hospital Bergmannsheil gGmbH - Bochum (Germany), [6]Clinic for Anaesthesiology, Operative Intensive Care Medicine and Pain Therapy, University Hospital Münster - Münster (Germany)

Background and Goal of Study: In clinical trials, the efficacy of a treatment is assessed through endpoints; however, endpoints are often inconsistent representing different "outcome domains" which in turn are assessed by different instruments ("outcome measures"). This heterogeneity hinders standardization and thus comparability of research. Furthermore, there is increasing discussion about the endpoint pain intensity that might not be – at least not alone – the ideal predictor of treatment efficacy in pain trials. Thus, the development of an agreed standardized set of clinical relevant outcomes (a "core outcome set") might solve these problems
Materials and Methods: Here, we performed as a first step of such a process two SRs related to pain management after surgery, one after total knee arthroplasty (TKA) and one after sternotomy (ST). The SRs followed the recommendations of the Cochrane Collaboration. Briefly, after searching in Embase, Medline and Central, screening for eligibility was done by two independent reviewers (inclusion criteria: RCT and prospective observational study, acute pain management intervention, TKA or sternotomy, adults). Subsequently, data were extracted and analyzed descriptively. (Registration: TKA: CRD42018093838; sternotomy: CRD42018095137).
Results and Discussion: After screening 1590 (TKA) and 1092 (ST) trials, 299 studies were included for TKA and 138 for ST. In almost all studies, the outcome domain "pain intensity" was assessed. Other frequently recorded domains were "physical function" (TKA: 53,5%; ST: 17,4%), opioid consumption (88%/85,51%) and side effects (69,7%/64,5%). However, clear definition of domain by authors was often missing and combination of outcome domains differed between surgical procedures. Finally, subdomains differed between studies of the same procedure as well as between procedures.
Conclusion: Studies on the efficacy of postoperative pain management after TKA and sternotomy show considerable heterogeneity regarding the outcome domains recorded and indicate a need for the development of a consented core outcome set of domains.

4684

Postoperative pain management in France: national study of 3315 patients

Rouxel P.[1], Tran L.[2], Sitbon P.[3], Martinez V.[4], Beloeil H.[5], Pain and regional anaesthesia committee
[1]University Hospital of Rennes - Rennes (France), [2]Pasteur 2 Hospital - Nice (France), [3]Gustave Roussy Hospital, Paris-Saclay university - Villejuif (France), [4]Raymond Poincaré Hospital, APHP - Boulogne Billancourt and Garches (France), [5]Rennes University Hospital and School of Medicine, CHU de Rennes - Rennes (France)

Background and Goal: The last French audit on postoperative pain realized in 20081 revealed that 51% of the patients experienced severe pain after a surgery. To allow national surveys concerning postoperative pain, the French Society of Anaesthesiology and Intensive Care designed an online tool, AlgoSFAR. By analysing the data collected from multiple centres, this study aimed to assess postoperative pain in France 10 years after the last audit and further suggest possible improvements.
Methods: French anaesthesiologists use AlgoSFAR to register pain data of their patients. All centres willing to audit their practice can use AlgoSFAR. After written institutional review board approval we analysed the data implemented in AlgoSFAR from January 2017 to December 2018s. All patients older than 16 years old were eligible. We realized analyses using $\chi 2$ and Student parametric tests and Fisher and Mann-Whitney-Wilcoxon nonparametric tests for comparisons.

Results: 3315 patients were included in the general analysis. Combining intraoperative and PACU data, 31% of the patients received at least 4 non-opioid analgesics and 23% received opioids with a median morphine dose 6 mg (IQR 4 – 9). In PACU, 81% of the patients experienced a NRS ≤ 3. Maximal NRS and morphine consumption from postoperative day (POD) 0 to 6 and during the hospitalization are presented Table 1. Opioid's adverse effects were rare. Concerning sub-groups, patients who had a preoperative NRS > 0 had significantly higher pain scores during their hospitalization. Patients who benefited of a regional anaesthesia (RA) were more painful than others on POD 1 and 2.
Conclusion: Our study showed that good quality postoperative analgesia is possible without high opioid consumptions. Thanks to a systematic use of multimodal analgesia involving the frequent use of RA and the association of 2 non-opioid analgesics at least, only 32% of patients received opioids during their hospitalization. These results contrast with other countries where the vast majority of the patients receive postoperative opioids2.
References:
1. Fletcher, D. Pain 137, 441–451 (2008); 2. Memtsoudis, S. G. Anesthesiology 128, 891–902 (2018)

POD	Maximal NRS			Morphine consumption
	≤ 3	≥ 7	10	Median (IQR)
0 (n = 2589)	2018 (78%)	119 (5%)	8 (< 1%)	10 mg (10 - 20)
1 (n = 1450)	951 (66%)	99 (7%)	10 (< 1%)	13.5 mg (10 - 40)
2 (n = 842)	566 (67%)	55 (6%)	2 (< 1%)	16.5 mg (10 - 40)
3 (n = 583)	409 (70%)	32 (5%)	2 (< 1%)	12.5 mg (10 - 30)
4 (n = 404)	287 (71%)	23 (6%)	2 (< 1%)	10 mg (10 - 30)
5 (n = 244)	179 (73%)	12 (5%)	1 (< 1%)	10 mg (10 - 30)
6 (n = 144)	96 (67%)	7 (5%)	0	10 mg (10 - 24)
Whole hospitalization				10 mg (6 - 30)

4444

Dose of intrathecal diamorphine (ITD) for laparoscopic colorectal resections: a survey of current practice in the UK

Morgese C.[1], Patel J. M.[1], Gao-Smith F.[1]
[1]University of Birmingham - Birmingham (United Kingdom)

Background and Goal of Study: Intrathecal diamorphine (ITD) is an established technique to provide post-operative analgesia following laparoscopic colorectal resections in the UK. However, there is no consensus on the optimal dose that should be used. The aim of this survey was to establish the dose of ITD used by consultant anaesthetists across the UK.
Materials and Methods: Online questionnaires were distributed to anaesthetists at 100 UK hospitals. Respondents were asked to indicate the most common and the maximum dose of ITD they use, the timing of injection in relation to the anticipated length of surgery and the number of patients that they anaesthetise per month for laparoscopic colorectal resections. Frequencies of each dose were calculated. Non-parametric data are reported as medians (IQR) and were compared using Mann-Whitney U-test. Pearson's correlation was used to determine the association between the number of patients anaesthetised per month and the dose of ITD.
Results: Overall, 479 consultants responded. Of these, about 60% use ITD as primary mode of analgesia. The majority of spinal injections are performed with the patient awake [n=372, 77.7%], regardless of the anticipated duration of surgery. The commonest dose of ITD used is 500 mcg [n=96/350, 27.4%; range= 200-1500 mcg; median=500 mcg; IQR=350]. The most frequent maximum dose used is 500 mcg [n=103/350; 29.4%; range=200-2000; median=600, IQR=500]. There was a positive correlation between the number of patients anaesthetised per month and the dose of ITD used, both in terms of most common dose [r=0.129, p=0.015] and maximum dose used [r=0.105, p=0.049]. Consultants who use higher doses of ITD (e.g. >500 mcg) anaesthetise more patients per month compared to those who use lower doses (e.g. =<500 mcg) [medians= 3 vs 2, respectively, IQR=1, p=0.012].
Discussion & Conclusions: We demonstrated that ITD is the most common primary mode of analgesia used for laparoscopic colorectal resections but the range of doses used is considerably large, indicating that there is currently no consensus on the dose of ITD. Consultants who perform anaesthesia for these procedures more regularly use higher doses of ITD, suggesting that higher doses of ITD may be more effective and improve patient outcomes. Dose-response trials, specific to the colorectal population, are needed to investigate the relationship between doses of ITD and patient outcomes.

4614

Analysis of postoperative pain registers of bariatric surgery during the period 2012-2018

Trillo Urrutia L.[1], Arbones Aran E.[1], Adalid Hernandez I.[1], Soldevilla Garcia M.[1], Montes Perez A.[1], Garcia Alvarez J.[1]
[1]Department of Anaesthesia and Intensive Care Medicine, Parc de Salut Mar - Barcelona (Spain)

Background and Goal of study: Severe pain after bariatric surgery occurs in 20-40% of patients. An epidemiological study 1 that analyzes the intensity of pain in the first 24 hours places it in place 37 of the 176 surgical procedures evaluated. The aim of our study is to analyze the indicators of Acute Postoperative Pain (APP) during hospitalization after bariatric surgery, to assess the effectiveness of the implementation of analgesic protocols.
Materials and Methods: We have analyzed 379 bariatric surgeries performed during the period 2012-2018. Postoperative analgesia consists of Continuous Epidural Perfusion (CEP) of levobupicaine 0.0625% + fentanyl 2µg / ml with an infusion rate between 2 to 4 ml / h during 48 h, plus dexketoprofen 50 mg / 8 h iv, paracetamol 1 gr / 6 h iv and morphine 0.05 mg / kg sc if pain ≥ 3 according to Verbal Numerical Scale (VNS) (0 = absence of pain, 10 = worst possible pain). The indicators analyzed were: percentage of patients with: VNS ≥3, VNS ≥7, and mean VNS value on the 1st and 2nd postoperative day.
Results and Discussion: We performed 379 bariatric surgeries (by pass and sleeve).Table 1 shows the percentage of patients with VNS ≥3 and VNS ≥7 and mean VNS value during the 1st and 2nd postoperative day. We believe that VNS ≥3 and VNS ≥7 percentages, better reflects patient's pain intensity throughout the process.
Bibliography:
1. Gerbershagen et al. Pain intensity on the first day after surgery. A prospective cohort study comparing 179 surgical procedures. Anesthesiology 2013; 118(4):934-44.

Year	%Patients VNS ≥3 1st day	%Patients VNS ≥7 1st day	%Patients VNS ≥3 2nd day	%Patients VNS ≥7 2nd day	Mean VNS 1st day	Mean VNS 2nd day
2012	26.4	3.7	30.2	3.7	1.7	2.1
2013	27.4	9.8	35.3	3.9	1.7	1.7
2014	46	8	36	4	1.9	1.8
2015	29.6	3.7	31.5	0	1.2	1.4
2016	30.9	3.6	18.2	1.8	0.7	1.1
2017	40.7	7.4	16.7	0	1	1
2018	45	6.4	14.5	1.6	0.9	0.8

VNS: Verbal Numeric Scale

Table 1: Percentage of patients with VNS ≥3 and VNS ≥7 and Mean VNS value during the 1st and 2nd postoperative day.

5704

To Investigate the Knowledge and Attitudes of Opioids Prescribing in Board Certified Physician Specialists in Medical Center and Regional Hospital in Taiwan

Huang C. F.[1], Cheng K. I.[2], Tseng K. Y.[1], Chen M. C.[1]
[1]Department of Anesthesiology, Kaohsiung Medical University Hospital, Kaohsiung Medical University - Kaohsiung (Taiwan), [2]Department of Anesthesiology, Kaohsiung Medical University Hospital, Graduate Institute of Medicine, College of Medicine, Kaohsiung Medical University - Kaohsiung (Taiwan)

Background and Goal of Study: The purpose of the investigation is to recognize the attitudes of opioids prescribing among the different field of specialists.The investigate for physicians of certificated specialist either in medical center or in regional hospital included of knowledge and attitude of opioids prescribing and its, related side effects and adverse events, long-term opioids treatment, reasonable dose consumption, and frequency of prescriptions.
Materials and Methods: The physicians of certificated specialist either in medical center or in regional hospital were invited to participate this cross-sectional questionnaire survey.
Results and Discussion: From 297 out of 304 valid questionnaires processing, opioid-related knowledge responses from specialists present better in the field of adverse effects than regulations. Regarding to correctness from the understanding to use controlled drugs and their adverse effects, a significant difference among different field of Board certified physician (BCH) specialists, physicians working place, and the habituation of prescription frequencies. In addition, BCH specialists

in groups of seniority and high prescription frequencies may increase acceptance in patients long-term opioids prescribe practice and increasing daily dose consumptions in part of attitude to administer opioids. There is a positive correlation between attitude to administer controlled drugs and either the item of knowledge of opioids prescribing or hours spent in controlled drugs continuing education. Hours spent in controlled medicines continuing education also has a positive correlation with increased prescription frequencies. However, knowledge of opioids prescribing showed no positive correlations with hours spent in controlled drugs continuing education.
Conclusion: The controlled drugs continuing education should consider the trend. How to provide a proper continuing education program for physicians to improve prescriptions information in the future is an important issue. Due to the item of knowledge of prescribing opioids showing positive correlation with long-term Opioids use only, we suggest to enhance continuing education on how to safely prescribing and tapering Opioid doses to improve prescription physicians clinical related knowledges.

4680

Exploring Influential Factors of Postoperative Pain Resolution after Hip Fracture Surgery in Elderly Patients Using Latent Growth Curve Analysis

Liu Y. C.[1], Chang K. Y.[1], Tsou M. Y.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan)

Background: Hip fractures among elderly patients are major public health issues around the world and early surgery is of paramount importance to reduce morbidity and mortality of these patients. However, few studies have ever explored factors associated with the variations in postoperative pain trajectories over time in these patients and we conducted this retrospective study to investigate influential factors of postoperative pain after hip fracture surgery using latent curve models.
Methods: After the approval of our Institutional Review Board, we collected data from patients aged 70 or more with hip fracture surgery by electronic chart review between January 2012 and December 2015 in Taipei Veterans General Hospital in Taiwan. We also collected numeric rating pain scores in the first three days post-op days, demographic variables, ASA physical status, chronic renal insufficiency, diabetes, perioperative blood transfusion, type of anesthesia and so on. Latent curve models with two latent variables, intercept and slope, were used to depict the variations in postoperative pain trajectories over time. The effects of collected variables on these two latent variables were estimated as well and backward model selection processes were employed to determine the final multiple predictors model which explained the changes in postoperative pain resolution most parsimoniously. The comparative fit statistic (CFI) and root mean square error of approximation (RMSEA) were also used to evaluate the model fit to the collected data.
Results: There were 1034 patients included in our analysis and the mean pain scores of the first, second and third postoperative days were 3.9, 3.1 and 2.8, respectively. After the model selection, four influential factors were identified to be associated with postoperative pain trajectories over time. Increasing anesthesia time was correlated with higher baseline level of postoperative pain ($p = 0.005$) and general anesthesia, use of epidural analgesia and aging were connected to faster pain resolution after surgery ($p = 0.008$, 0.046 and 0.015, respectively). The fit statistic analysis demonstrated good model fit (RMSEA = 0.03, CFI = 0.98).
Conclusions: Anesthesia time, general anesthesia, use of epidural analgesia and aging were associated with the variations in postoperative pain trajectories over time in elderly patients receiving hip fracture surgery.

6035

Risk factors for chronic pain in open inguinal hernia repair- a multicentric prospective observational study (preliminary results)

Coelho M.[1], Mendes E.[2], Saraiva L.[1], Neto L.[1], Baptista C. R.[3], Dahlem C.[4], Study Group: Bettencourt M, Carrapatoso G, Martinho J, Monteiro C, Neves P, Oliveira C, Azevedo L, Granja C.
[1]Centro Hospitalar do Baixo Vouga - Aveiro (Portugal), [2]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal), [3]Centro Hospitalar Entre Douro e Vouga - Santa Maria da Feira (Portugal), [4]Centro Hospitalar Entre Douro e Vouga; Center for Health Technology and Services Research - CINTESIS - Santa Maria da Feira; Porto (Portugal)

Background and Goal of Study: Open inguinal hernia repair is one of the commonest ambulatory surgeries, reaching approximately 155.9/100.000 inhabitants/year in Portugal. Most patients experience at least moderate pain during the following days, and chronic postsurgical pain might be as high as 50%. We aim to assess the incidence and risk factors for the development of chronic postsurgical pain after open inguinal hernia repair.
Materials and Methods: This is a subgroup of a multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 2 Portuguese ambulatory units, from September to November 2018. Perioperative data including pain and anxiety were collected. Postoperative pain was assessed through blind telephone interviews up to one year after surgery. Association between pain, anxiety and midazolam were assessed, including subgroup analysis and multiple regression techniques; alpha=0.05.
Results and Discussion: 66 men and 11 women were included, mean age 57,0 (1,5); 19% were smokers and 87% ASA< 3. Three months after surgery, 57,3% of patients referred at least some pain, 10,7% referred moderate to severe pain and 18,4% had criteria for neuropathic pain. One year after surgery, 50,6% of patients referred at least some pain, 13,0% referred moderate to severe pain and 13,0% had criteria for neuropathic pain. Multivariate regression identified risk factors for persistent pain after one year: older age (p=0,001), preoperative pain (p=0,028), chronic benzodiazepine consumption (p=0,008), active worker (p=0,047) and female gender (p=0,017). Lichtenstein technique (p=0,021) and higher education level (p=0,005) were risk factors for neuropathic pain at one year. Anxiety and midazolam administration did not predict pain at one year, but preoperative anxiety did predict pain at 3 months (p=0,043). Pain intensity at 1 year correlated to 24h (p<0,001), 7-day (p<0,001) and 3-month pain (p=0,013). Authors reporting chronic pain refer to different time frames, but IASP defines 3 months as the time criteria for chronic post surgical pain. In our study, the incidence of chronic pain did not change significantly from 3 to 12 months after surgery.
Conclusions: One year after open inguinal hernia repair, 50,6% of our patients have some level of pain. Modifiable risk factors include surgical technique and chronic benzodiazepine consumption.

5867

Relief of neuropathic pain after spinal cord stimulator implantation in a patient with intramedullary cystic tumor. A case report

Márquez Garrido G.[1], Orozco A. C.[2], Vicente M.[2], Zamora A.[2], Fraga G.[2]
[1]Hospital Universitario Severo Ochoa - Madrid (Spain),
[2]Severo Ochoa - Madrid (Spain)

Background: Syringomyelia is commonly associated with Chiari malformations, spinal trauma, arachnoiditis, or tumors. Intramedullary ependymal cysts of the spinal cord are rare, benign, fluid-filled cysts usually situated along the ventral surface of the spinal cord. Syringomyelia is characterized by an intraspinal cavity, it may cause central neuropathic pain.
Case Report: We report a case in a 25 year- old woman with 3 year history of cystic lesion intramedullary cystic tumor presented to the pain clinic. Clinical assessment demonstrated constant neuropathic pain which extended from left axila to thigh. She rated her pain 5-6 / 10 on a numerical ranting scale, which worsened over the day and increased to 10 / 10 during frequent exacerbations. SL was prescribed multiple medications for pain including oxycodone, pregablin, amitriptyline, duloxetine. Despite these, pain remained uncontrolled. Magnetic resonance imaging demonstrated a C6 nonenhancing anterior intramedullary hyperintense signal change at the T1 level spanning cephalocaudal 12 mm, 5,5 mm anteroposterior and 6,3 mm transversal. SCS was proposed due to her significant refractory pain. The patient has reported long periods of excellent relief of pain (VAS 1) with occasionally increased pain (VAS 3) relative to emotional stress
Discussion: The supposed pain mechanism was spinothalamic tract injury due to the syrinx cavity. In several studies, no correlation has been found between cyst

dimension using MRI and clinical symptoms of the syrinx, including the intensity of neuropathic pain. According to some authors, the position of the syrinx, rather than its size, may be better correlated with the clinical findings. The mechanisms behind the efficacy of this method remain unclear. We have successfully treated the patient and based on our case, neuromodulation with SCS has been found to be successful in the treatment of the selected patient with medication-resistant neuropathic pain related to syringomyelia.

References:

1. Ducreux, D, Attal, N, Parker, F, Bouhassira, D. Mechanisms of central neuropathic pain: a combined psychophysical and fMRI study in syringomyelia. Brain, 2006;129;963-976.
2. Jeon, YH. Spinal cord stimulation in pain management: a review. Korean J Pain, 2012;25;143-150.

Learning points: SCS is a safe technique in patients with neuropathic pain with intramedullary cystic tumor.

5876

Unusual manifestations of the pain caused by psoas muscle

Lee H. K.[1]
[1]Gyeongsang University Hospital - Jinju (South Korea)

Background: Psoas muscle is a big, long muscle which originates from T12 to L3 or L4 and extends to lesser trochanter of thigh. This muscle comprises of a lot of nerves that innervate the large parts of body including low back, pelvis and thigh. This means psoas muscle can cause various manifestations of pain according to the nerve affected by psoas muscle. Psoas works as a main hip flexor. We report cases of psoas-caused pain which are very unusual and treated by psoas muscle injection.

Case Report: Case 1. A 44-year old female underwent a gynecologic surgery and 2 weeks later she complained of low back pain, anterior thigh pain and inguinal area pain. The pain was not controlled by oral analgesics. She was transferred to pain clinic. On physical examination severe tenderness of psoas muscle was found and psoas muscle injection was done. The patient was pain free after two injections. Case 2. A 58-year old male complained of both knee pain and the X-ray showed no abnormality. The patient showed mild dysthesia on both anterior thigh and tenderness on both psoas. One injection to psoas removed the knee pain. Case 3. A 59-year old male was suffered from severe pain of ant thigh after hard tractor work. He could not walk and flex or extend his hip at all. Oral analgesics could not relieve his pain at all. Because the patient showed severe tenderness on psoas muscle of painful side. Two injections of psoas muscle could relieve the pain. Case 4. A 65-year old female complained of severe pain of inner thigh when she stood up from the bed. On physical examination there was a severe tenderness on symphysis pubis where the adductor muscles of thigh originate. The injection of this area relieved the pain only several days and pain developed again. Meticulous examination of psoas muscle showed the tenderness comparing with the contralateral side.

Discussion: The psoas muscle is a important muscle in low back pain. Also, this muscle contains nerves to thigh and pelvis area and lots of nerves around the psoas can be affected by psoas muscle dysfunction. It is necessary to check up the psoas muscle meticulously when the pain of pelvis, thigh, knee is not well controlled by the conservative measures such as oral analgesics and nerve blocks.

References:

1. Finkelstein I, Ko G: Ultrasound-guided injection of the psoas muscle with Botulinum Toxin A: Novel approach to treating chronic low back pain. j.toxicon 2008:51:47.

5769

Billiard player's unexpected neuralgia

Ozdemir M.[1], Tuncer Z.[2], Erkin Y.[3]
[1]Dokuz Eylul University School of Medicine Hospital - Izmir (Turkey),
[2]Sakarya Eğitim Araştırma Hastanesi - Sakarya (Turkey),
[3]Dokuz Eylul University School of Medicine Hospital - İzmir (Turkey)

Background: Digital nerve blocks are often used for many finger surgeons. Although many methods have been described, the traditional method of performing local anesthesia laterally to the extensor tendons by marking the finger at the base of the finger is the most preferred.

Case Report: We report the case of a 38-year-old male introduced himself with prickly pain, which was sudden, stabbing, stinging and tapping triggered in the middle finger of the left hand 2 years ago. There weren't any similar symptoms on the right hand. He said that all the symptoms began right after Paronychia. As a medication, Pregabalin was used. One year later, the patient reports a transmission of the pain on the left hand in the middle finger onto the index finger as well. Digital nerve block(DNB) was applied with 1% Pirilocaine and complaints significantly decreased. During DNB, the patient's wife told us that the patient had played Billiards for 10 years. When we asked the patient, he told us that he didn't use any glove while he was playing Billiards. In digital neuralgia, the level of the digital nerve damage ranges from minor damage as neuropraxia to more severe damages as neurotmesis. Etiology can be due to many reasons. It's diagnosed with nerve findings and symptoms that accompany the lesion which is often seen in chronic conditions. Treatment is primarily provided by awareness of risk scales and avoidance of repetitive activities that may pose a particular risk. The neural block may be applied as a therapy.

Discussion: It is useful to pay attention to handgrip in billiards and to be awake against neuralgia-like complaints. This a rare occasion but we should still take this into consideration and hence, promote the measurements for the people who play Billiards professionally, who have an increased risk of suffering from digital neuralgia.

References:

1. Agur, A.M. and A.F. Dalley, Grant's atlas of anatomy. 2009: Lippincott Williams & Wilkins.
2. Dobyns, J., Digital nerve compression. Hand clinics, 1992. 8(2): p. 359-367.
3. Dobyns, J.H., et al., Bowler's Thumb: Diagnosis and Treatment A REVIEW OF SEVENTEEN CASES. JBJS, 1972. 54(4): p. 751-755.

Learning points: In conclusion, acute neuralgia carries the danger of developing into chronic neuralgia if not diagnosed and treated early. Therefore, taking these pains into consideration and taking the necessary precautions in time is extremely important for the prognosis of patients.

6203

Preauricular infiltration in a case of persistent idiopathic facial pain

Pereira A.[1], Anastácio M.[2], Valentim A.[2]
[1]Centro Hospitalar e Universitário de Coimbra - EPE - Coimbra (Portugal), [2]Centro Hospitalar e Universitario de Coimbra - Coimbra (Portugal)

Background: Persistent idiopathic facial pain (PIFP) is a peculiar disease, with non-specific symptoms, often related to psychological aspects. It's an excruciating disorder of the face that cause persistent pain usually on one side of the face and that occurs in the absence of autonomic signs, laboratory or imaging abnormalities. It is usually described as a burning sensation.

Case Report: A 54 years-old male, referral due to excruciating facial pain in the left preauricular region, which started a year ago. He has pathological history of anxiety and left masseter surgery 20 years ago. At the time of examination, he had a continuous pain in preauricular region, with sensation of electric shocks, that was rated on the visual analogue scale of 10, with interference with sleep. The episodes of pain relieved when he was hurrying in the area. The patient denied trauma, infections, headache and sensitive tongue disorders. On clinical examination, he presented allodynia in the left preauricular region. The cranioencephalic nuclear magnetic resonance exclude organic lesion and the computed tomography of the temporomandibular joint had a slight irregularity of the left condyle with millimeter osteophyte labiation on its posterior side, with no other alterations. The patient was treated with oxacarbamazepine 600 mg 12/12hr, tapentadol 50mg 12/12hr and paracetamol1000mg SOS3, reporting 60% relief. Subsequently we did preauricular infiltration with 3ml of 0.2% ropivacaine with 100% relief of pain lasting about 3 months without the need for systemic medication. The patient repeated just one more infiltration and currently has controlled pain.

Discussion: PIFP has a much lower persistence than trigeminal neuralgia and can be quite disabling. The diagnosis is difficult and there are no curative therapies. The pathophysiology remains poorly understood, and patients often present with psychological complaints. The 1st-line treatment is a low-dose tricyclic antidepressant and in 2nd-line: SSRIs, SNRIs and anticonvulsnts. Finding new, more effective treatments for PIFP will allow better understanding of pathophysiology

References:

1. Atypical Facial Pain: a Comprehensive, Evidence-Based Review, Weiss A. et al,Curr Pain Headache Rep 2017,21:8.

Learning points: Local anesthetic infiltration is a relatively simple and safe technique that can be effective in some cases and allow pain control, reducing the need for systemic drugs and their adverse effects,as well as invasive surgical measures.

5923

Ultrasound-guided pulsed radiofrequency in the management of unresponsive oncologic pain

Fusco P.[1], Maggiani C.[2], Valente L.[3], Volpe D.[3], Chiavari R.[3], Marinangeli F.[3]
[1]P.O. San Salvatore L'Aquila U.O.C. Anestesia Rianimazione e Terapia del Dolore - L'Aquila (Italy), [2]Università degli Studi dell'Aquila - L Aquila (Italy), [3]Università degli Studi dell'Aquila - L'Aquila (Italy)

Background: Pulsed radiofrequency (PRF) is a novel therapeutic approach that could be useful in the management of oncologic pain unresponsive to conventional therapeutic strategies.PRF is based on an alteration in synaptic transmission and a neuramodulatory-type effect.(1)
Case Report: We report a case of a 59-year-old male patient, with metastatic colorectal cancer and a 5 cm mass infiltrating left ileopsoas muscle. The patient came to our attention due to severe pain (9 on NRS) to the anteromedial face of left thigh and knee paresthesia. Poor response and the onset of side effect to oxycodone/naloxone 10/5mg twice daily, pregabalin 75mg twice daily, fentanyl 100 mcg, were reported. On the basis of neuropathic pain, we applied ultrasound-guided (USG) PRF to the hip articular branches of femoral nerve and accessory obturator nerve (PENG), putting the active needle tip at 5 o'clock position. After sensory and quadriceps motor stimulation test, PRF was performed in "pulse dose" mode, delivering 1200 pulses at 42°C. 20 ml ropivacaine 0,15% plus dexamethasone 4 mg were administered at the end of stimulation. Then we proceeded to apply PRF on the left obturator and saphenous nerves, with an overall dose of 480 pulses at 42°C for each nerve, followed by injection of ropivacaine and dexamethasone according to the previous scheme. After 7 days follow-up visit, the patient reported pain relief with a significant reduction on NRS score from 9 to 4. Unfortunately, long term follow-up was not achieved due to patient's death two months later.
Discussion: This case showed efficacy and safety of USG-PRF neuromodulation in oncologic pain associated with a major neuropathic component, unresponsive to conventional treatments. Moreover, it seems that PRF can improve quality of life of oncologic patients for long periods, with the possibility to repeat the treatment if needed.(2)
References:
1. Chua NH et al. Pulsed radiofrequency treatment in interventional pain management: mechanisms and potential indications-a review.2011 Apr;153(4):763-71.
2. Miceli et al. Pulsed Radiofrequency Analgesia in a Patient With Abdominal Wall Metastasis From Colorectal Cancer: A Case Report. 2019 Nov 19.
Learning points: PRF is a minimally invasive, well tolerated and safe procedure. It's a valid alternative to conventional treatments for oncologic neuropatic pain in patients unresponsive or suffering from side effects.

5973

The effect of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain – a randomized controlled study

Shevtsova G.[1], Kheylo A.[2], Medvedeva L.[2], Zagorulko O.[2]
[1]First msmu - Moscow (Russia), [2]Petrovsky National Russian Research Center of Surgery - Moscow (Russia)

Background and Goal of Study: After headaches and chronic fatigue, low back pain(LBP) is the most reported complaint, with more than 80% of the population reporting LBP at some point in their life.[1]This study aims to evaluate the effectiveness of a two-week osteopathic visceral manipulation in patients with non-specific chronic low back pain.
Materials and Methods: The prospective randomized study included 162 patients with chronic non-specific low back pain (nsLBP), turned to spine surgery department in Aug.2018–Aug.2019.All the patients were allocated to two groups(81 each) using the sealed envelope method: study group–osteopathic visceral manipulation(OVM) and contol group–placebo visceral manipulation(PVM).OVM and PVM were 40min long and performed once per week for two weeks. Evaluations were performed before the first session, two weeks and six months after treatment, and involved interview, manual testing, the Oswestry Disability Index(ODI),Visual analogue scale(VAS).
Results and Discussion: Man age was 38.1±8.2 and 42.3±6.7 in the study and control group, respectively. At admission the VAS score was 5.5±2.1 and 6.2±1.8,ODI–31.4±4.5%,36.3±2.9% in the study and control group,respectively, whereas manual testing revealed tenderness and visceral laxity restriction in the abdominal and pelvic regions in 95% of the enrolled patients as well as sacroiliac joint movement restriction on the painful side in 92%.In two weeks after treatment patients showed following results: VAS score decreased to 3.2±2.4 and 4.7±1.8,ODI–18.6.1±3.9%,32.7±4.4% in the study and control group, respectively. Manual testing revealed the increase in the range of sacroiliac joint movements in the study group in 73%(versus 28% in the control group).In a 6-month period patients of study group showed significant decrease in VAS score–2.9±0.8 and ODI improvement–20.2(comparing to the controls:4.5±0.7 and 34.1±3.5%).
Conclusion: The majority of patients with nsLBP demonstrated visceral laxity restriction and muscle tone changes in the abdominal and pelvic regions without clinical symptoms' manifestation but accompanied with visceral palpation tenderness. Followed by OVM muscle tone and visceral movement normalization cause less visceral palpation tenderness, adequate pelvic bone biomechanics and pain relief in most patients of the study group. Patients with nsLBP may benefit from OVM.
References:
1. Balague F. Lancet 2012;379:482–91.

6223

Mesenteric Panniculitis: an often forgotten treatable cause of chronic abdominal pain

Coles I.[1], Vieira C.[1], Gonçalves J.[1], Gouveia I.[1]
[1]ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background: Management of chronic abdominal pain is challenging since the symptoms are frequently disabling and aetiological causes are diverse. Accurate characterization of symptoms often allows a correct diagnosis and avoids unnecessary invasive procedures. The authors present a case of chronic abdominal pain completely solved after the corticoid therapy.
Case Report: 77-years-old man presented to Chronic Pain Unit for persistent abdominal pain unresponsive to convencional analgesia. His past medical history was positive for insulin-treated Type II Diabetes and prostate carcinoma (stable and with no evidence of metastatic disease). The patient complains of spontaneous pain to the left upper quadrant of the abdomen with irradiation to the left hemithorax, with 4 years of evolution, worsen in the last 2 years. Pain was stab-like, had night aggravation and relief with gauze emission (patient denied intestinal transit disorders). Gastroenterological pathology was excluded. An abdominopelvic CT showed an incipient mesenteric panniculitis (MP), with no other relevant changes. Patient medication was optimized without any improvement. In the absence of any other aetiology, a therapeutic trial with prednisolone 20mg/day was started and gabapentin dose was adjusted. After 2 weeks, patient experience a markedly pain relief, with full resolution of symptoms after 4 months, allowing weaning of corticosteroids as well all analgesic medication. No recurrence of symptoms was noticed
Discussion: MP is a benign condition characterized by chronic inflammation leading to fibrosis of the mesentery. Although there are many different clinical presentations, abdominal pain is the most frequent (up to 70%)1. Radiological features are very helpful, but just histological findings provide a definitive diagnosis. Despite MP represents a rare cause of abdominal pain, because of its favourable response to corticosteroids, this disorder should not be forgotten, especially when patient present risk factors.
References:
1. Sahin A, et al.An Overlooked Potentially Treatable Disorder:Idiopathic Mesenteric Panniculitis.Med Princ Pract.2017;26(6):567–572.
Learning points: This report highlights the importance of clinical doubt for final diagnosis, especially in chronic abdominal pain where there are many possible aetiologies. MP is a rare disorder but can be successfully treated conservatively, this emphasis that treatable causes should always be excluded.

6267

The hidden culprit: Splenosis as a cause of Chronic Abdominal Pain

Coles I.[1], Vieira C.[1], Gonçalves J.[1], Gouveia I.[1]
[1]ULSM Hospital Pedro Hispano - Senhora da Hora (Portugal)

Background: Disseminated splenosis (DS) is a rare condition caused by metastatic deposits of splenic tissue following trauma or surgery1. Although DS is usually asymptomatic, it can also be present as persistent abdominal pain or other serious complications. This case report aims to alert to the fact that splenosis can be a hidden cause of chronic abdominal pain (CAP).
Clinical Report: A 79-year-old woman with history of degenerative osteoarticular disease, bladder cancer, paracetamol+codeine-induced hepatitis and multiple abdominal surgeries, including a splenectomy. She suffered from CAP with 15 years of evolution, with multiple unsuccessful treatment attempts. She even performed a total colectomy for megacolon (a possible contribute for CAP). After this surgery, the

pain was localized to left hypochondrium (LH). Patient realized multiple analgesic schemes, including gabapentin, pregabalin, amitriptyline, lidocaine patch and other therapies like dorsolumbar transcutaneous electrical stimulation, intercostal nerve fluoroscopy-guided block, lumbar square and paravertebral ultrasound-guide blocks (USB). Neither of these procedures produces pain relieve. Patient was than presented to our Unit for realization of another USB. At this time the patient was under gabapentin 100 mg tid and cyclobenzaprine 10mg id and she wasn't receptive to any other oral medication. She complains of LH constant and burning pain irradiated to the back and abdomen's lower left quadrant, with a maximum pain score of 8/10. Before deciding another intervention, an abdominopelvic CT scan was performed, which revelled splenosis. The case was presented to General Surgery and definitive surgical solution was proposed.
Discussion: Despite splenosis affects up to 2/3 of patients that underwent a splenectomy, it is often silent and therefore sometimes a forgotten diagnosis. The existent literature especially addresses the surgical aspects and not the need of a high suspicion index for an early diagnosis.
Refrences:
1. Santos, A.(2018) Chronic Abdominal Pain from Disseminated Splenosis. Journal of General Internal Medicine,33,976-97.
To conclude: In all patients with a history of spleen surgery, splenosis should be consider in differential diagnosis of CAP. In symptomatic patients surgery is the definitive solution and that way avoid years of ineffective treatments to pain control. It is essential that physicians be aware of this diagnosis in order to manage correctly this rare cause of CAP.

6262

Clinical utility of ozone therapy in chronic shoulder pain

Pereira A.[1], Anastácio M.[1], Valentim A.[1]
[1]Centro Hospitalar e Universitário de Coimbra - EPE - Coimbra (Portugal)

Background: Oxygen-Ozone therapy is a treatment with anti-inflammatory and analgesic effects that relieves pain and improves joint function. Ozone is bacteriostatic, fungicidal and viricidal with a low risk of infection. Thus, it is advantageous in musculoskeletal disorders, including low back pain, disc herniation, periarticular shoulder disease and knee osteoarthritis, and is considered a satisfactory treatment with low risk of complications and high success rate.
Case Report: A 87 years-old female, referred due to right omalgia because of degenerative osteoarticular pathology. It was an institutionalized patient, partially dependent on activities of daily living, with multiple pathologies (heart failure, dyslipidemia and liver function disorders) and polypharmacy which contraindicate surgical intervention and limit the therapeutic options. The maximum pain was rated on the visual analogue scale of 10 and minimum of 6 in the rest. The patient was treated with paracetamol 500mg SOS3 and it was performed an infiltration of the shoulder with local anesthetic and corticosteroids, without pain relief. Subsequently the patient was proposed for shoulder ozone therapy sessions. Infiltration was performed with 10ml of ozone at 15ug/ml. The patient repeated four more sessions, one month apart. After only 4 sessions, the patient had a pain improvement of about 60% and functional capacity improvement with maximum VAS of 4 an minimum VAS of 0 and PGIC (patient global improvement change scale) of 7.
Discussion: Intrarticular ozone therapy can be effective in reducing shoulder osteoarticular pain and allows improvement of functionality. It is a relatively safe and well tolerated technique and is an important therapeutic weapon, especially in cases of severe pain injuries that have failed conservative treatment and in patients not candidates for surgery.
References:
1. Clinical utility of ozone therapy for musculoskeletal disorders, Seyam O. et al, Med Gas Res 2018;8(3):103-110.
Learning points: Degenerative osteoarticular pathology is very prevalent in the eldery and there isn't always surgical indication. Although there are many therapeutic proposals, none are curative or free of risks and adverse reactions. Ozone therapy acts in several inflammatory pathways and may be promising in reducing pain, promoting recovery of function and improvement of quality of life.

5598

The timing of the formation of neuropathic pain in children with leukemia. Efficacy and tolerability of pain therapy

Adamchuk N.[1], Sorokina O.[2]
[1]Ukrainian Medical Stomatological Academy - Poltava (Ukraine), [2]State Institution «Dnipropetrovsc Medical Academy of The Ministry of Health of Ukraine - Dnipro (Ukraine)

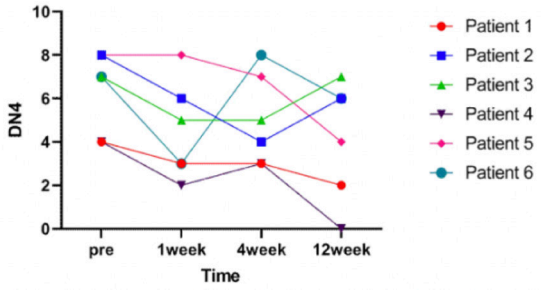
Background and Goal of Study: Neuropathic pain in pediatric oncology can occur as a result of various injuries of the somatosensory system. The aim of the study was to analyze the pain syndrome in children with hemoblastoses at the first stage of chemotherapy and compare the effectiveness of various methods of pain treatment.
Materials and Methods: Conducted cohort prospective study, which included 60 children with newly diagnosed hemoblastoses, aged 6 to 18 years. All the children were divided into three groups depending on the treatment of pain. The I group received morphine analgesia, II group received morphine in combination with gabapentin and the III group received paracetamol with gabapentin. Venous blood was tested in 40 children for the activity of superoxide dismutase (SOD) and catalase, the content of sialic acids (SC) and malondialdehyde (MDA).
Results and Discussion: The study found that pain syndrome in most children - 51 children (85%) occurs after 15 days of chemotherapy protocol. On the 1st day of the manifestation of pain in 8 children (13%), the result on the neuropathic component of pain was negative, in 48 children (80%) - doubtful, and in 4 children (7%) - positive. On the 30th day of chemotherapy in 2 children (3%), the data for neuropathy are negative, in 56 children (91%) - doubtful, and in 4 children (6%) - positive. On the 64th and 78th day of chemotherapy, the data for neuropathy are the same and are: in 53 children (88%) doubtful, and in 7 children (12%) positive. Signs of oxidative stress were found - SOD activity was 35.4 times lower than normal, the amount of MDA and SC was 7.5 and 1.8 times higher than normal, respectively. The pain intensity according to VAS on day 30 was in the I group ≤5 points, in the II group ≤4 points and in the III group ≤3 points. On day 78, the intensity of pain in group I was ≤5 points, in groups II and III, ≤3 points. Severe asthenia was observed only in 6 children (10%) of the first group, moderate asthenia in 45 children (75%) and the fatigue reaction in 9 children (25%)
Conclusion: Results of the study show that the manifestation of pain should be expected with 15 days of chemotherapy protocol. At the 1st stage of chemotherapy, there are already demyelinating processes and the formation of neuropathic pain.

5253

Prospective open labeled pilot study of quercetin as an add-on therapy on chemotherapy-induced peripheral neuropathy

Kim E.[1], Lee D.[1], Kwon J. Y.[1], Kim H. K.[1], Suh D. S.[1], Kim H. K.[2]
[1]Pusan National University Hospital - Busan (South Korea), [2]MD Anderson Cancer Center - Houston (United States)

Background and Goal of Study: Chemotherapy-induced peripheral neuropathy (CIPN) is one of the common side effects of chemotherapy. It can affect physical, emotional, cognitive functioning in cancer survivors. The life quality of patient and treatment schedules can also be disrupted. However, CIPN is difficult to treat and there is no established treatment. Recently, it has been reported that Quercetin (3,3′,4′,5,7-pentahydroxy-2-phenylchromen-4-one, QU) has many antitumor, anti-inflammatory, antioxidant effect. Therefore we aimed to investigate efficacy of QU on CIPN as an add-on therapy with conventional therapy.
Materials and Methods: A total of 6 patients developed CIPN were given QU and taught to take 500mg QU by mouth twice daily for 12 weeks. Severity and quality of neuropathic pain (primary outcome) were evaluated through questionnaires for Douleur Neuropathique 4 Questions (DN4) and Neuropathic Pain Scale (NPS). And cancer-related symptoms (secondary outcome) were assessed with MD Anderson Symptom Inventory (MDASI) and Edmonton Symptom Assessment Scale (ESAS). Changes in DN4 and NPS, MDASI, ESAS were measured repeatedly through the preparation of questionnaires on the first, fourth and 12th weeks after taking the drug.
Results and Discussion: DN4 score of 6 patients were significantly reduced after taking QU for 12 weeks (p=0.036). Pain quality was also decreased in 4 patients, but 2 patients showed increased NPS score due to their cancer progression (p=0.63). Also effects of QU on other cancer-related symptoms were minimal, as investigated by MDASI (p=0.70) and ESAS (p= 0.65).



Conclusion: DN4 score of 6 patients were significantly reduced after taking QU for 12 weeks (p=0.036). Pain quality was also decreased in 4 patients, but 2 patients showed increased NPS score due to their cancer progression (p=0.63). Also effects of QU on other cancer-related symptoms were minimal, as investigated by MDASI (p=0.70) and ESAS (p= 0.65).

4340

Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in acute cerebrovascular pathology

Oreshnikov E.[1], Oreshnikova S.[1], Oreshnikov A.[1]
[1]Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress adaptation hormones in relation to the neurological status by the end of the acute period of cerebral stroke in acute cerebrovascular pathology.
Materials and Methods: In 626 adult patients in the acute period of cerebral stroke (regardless of its type, variant, etc.) who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, in cerebrospinal fluid and venous blood samples colorimetric determination of adenine, guanine, hypoxanthine, xanthine, uric acid, magnesium was carried out, enzyme-linked immunosorbent assay for cortisol and dehydroepiandrosterone, thyroid-stimulating hormone, thyroxine and triiodothyronine.
Results and Discussion: The relative risk of subsequent depression of consciousness is high when a stroke is detected on the 1st day of elevated levels of magnesium (3.34) and cortisol (2.33) in blood serum, hypoxanthine (2.82) and cortisol (2.52) in cerebrospinal fluid, as well as upon detection of a stroke on the 1st day of low level of adenine in the cerebrospinal fluid (2.60); when a stroke level of 3 cortisol (11.0), magnesium (2.13), uric acid (2.06) and xanthine (2.05) in the blood serum is detected on the 3rd day of a stroke. The highest chances of worsening neurological status by the end of the acute period of cerebral stroke in detecting elevated serum levels on the 1st day of magnesium (OR = 7.08), cortisol (OR 3.0), adenine (OR = 2.77); increased content on the 1st day in the cerebrospinal fluid of cortisol (OR 3.38) and hypoxanthine (OR = 4.69), low content of adenine in the cerebrospinal fluid (OR 4.21); increased content on the 3rd day in the blood serum of magnesium (OR 3.25), cortisol (OR 21), uric acid (OR 4.18), hypoxanthine (OR 3.03), xanthine (OR 2 9), adenine (OR 2.83), guanine (OR 2.77).
Conclusion: In patients in the acute period of cerebral stroke (regardless of its type), indicators of the purine spectrum, stress-adaptive hormonal status are highly informative factors in predicting worsening neurological status. The most “powerful” prognostic factors are cortisol and uric acid levels.

4342

Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in acute cerebral ischemia: diagnostic and prognostic aspects

Oreshnikov E.[1], Oreshnikova S.[1], Oreshnikov A.[1], Khristoforov V.[1]
[1]Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: We compare the prognostic value of indicators of the exchange of purines, magnesium, stress adaptive hormones in relation to the neurological status in acute cerebral ischemia.
Materials and Methods: In 402 adult patients in the acute period of cerebral ischemic stroke, who were treated in the intensive care unit and intensive care unit of the angioeurological department, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.
Results and Discussion: The relative risk of subsequent depression is high when a 3-day stroke is detected in serum with elevated cortisol (4.5), hypoxanthin (2.48), xanthin (2.85), adenin (2.16), guanine (2.08), uric acid (2.09); in the liquor with elevated total activity of xanthine-oxidase (2.25). The highest chances of deterioration of the neurological status by the end of the acute period of ischemic stroke are found at the detection of its increased content in the blood serum of magnesium (OR 4.8), cortisol (OR 2.5), reduced total activity of xanthine-oxidase in the blood serum (OR 2.5), reduced activity of the first stage of xanthine-oxidase reaction in the liquor (OR 3.27). There are high chances of deterioration of neurological status at detection of increased content of adenine (OR 4.0), guanine (OR 4.27), hypoxanthin (OR 7.7) in blood serum for 3 days, Xanthine (OR 5.1), uric

acid (OR 5.37), cortisol (OR 7.36), magnesium (OR 2.67), malone dialdehyde (OR 2.5), increased total activity of xanthine-oxidase in the CSF (OR 3.5).
Conclusion: In patients with acute cerebral ischemia, the parameters of the purine spectrum, stress-adaptation hormone status are highly informative factors in predicting the deterioration of the neurological status. The most prognostically "powerful" of the studied parameters are the levels of hypoxanthin and cortisol.

4343

Purine metabolites, magnesium, corticosteroid, thyroid hormones and letal outcome in acute cerebral ischemia: diagnostic and prognostic aspects

Oreshnikov E.[1], Oreshnikova S.[1], Grigoryev V.[2], Oreshnikov A.[1]
[1]Chuvash State University - Cheboksary (Russia),
[2]Postgraduate Doctors' Training Institute of the Chuvash Republic - Cheboksary (Russia)

Background and Goal of Study: We study the possibility of predicting the onset of a fatal outcome using various hormonal and metabolic parameters in acute cerebral ischemia.
Materials and Methods: In 402 adult patients in the acute period of cerebral ischemic stroke, who were treated in the intensive care unit and intensive care unit of the angioeurological department, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.
Results and Discussion: The most sensitive predictors of lethal outcome of ischemic stroke were: increased xanthine concentration on the 1st and 3rd day of stroke (0.83 and 0.76), reduced xanthine oxidase activity (in the second stage of the xanthine oxidase reaction - 0.61). Among the most specific such factors: an increased concentration of uric acid in the blood serum on the 1st and 3rd day of a stroke (0.91 and 0.98), a combination of an increased content of uric acid in the blood serum and cerebrospinal fluid on the 1st day of a stroke (0.93). The relative risk of death is highest when a stroke concentration of uric acid in the blood serum is detected on the 3rd day (3.93). The highest chances of a fatal outcome when a stroke is detected on the 3rd day of an elevated blood serum uric acid (OR 21.5), adenine (OR 3.55), guanine (OR 3.27); a combination of increased serum uric acid and cerebrospinal fluid (OR 3.37), increased serum uric acid (OR 2.87), decreased xanthine oxidase activity in the second stage of the xanthine oxidase reaction on the 1st day of stroke (OR 2,67).
Conclusion: In patients with acute cerebral ischemia in the acute period of cerebral ischemic stroke, the most prognostically “powerful” lethal outcome factors are uric acid level and xanthine oxidase activity.

4344

Purine metabolites, magnesium, corticosteroid, thyroid hormones and neurological status in intracranial hemorrhage: diagnostic and prognostic aspects

Oreshnikov E.[1], Oreshnikova S.[1], Oreshnikov A.[1], Ermolaev V.[1]
[1]Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: We study the diagnostic and prognostic value of indicators of the exchange of purines, magnesium, stress adaptation hormones in relation to neurological status by the end of the acute period of hemorrhagic stroke. Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke, who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric measurements of adenine, guanine, hypoxanthine, xanthan were carried out in samples of cerebrospinal fluid and venous blood uric acid, magnesium, malondialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.
Results and Discussion: The most sensitive factor (0.72), "predicting" subsequent depression of consciousness by 7-10 days of hemorrhagic stroke, was increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction). The most specific factors were reduced levels in the cerebrospinal fluid of adenine (0.92) and guanine (0.86) on the 1st day of stroke. The relative risk of subsequent depression of consciousness is also high when detecting a reduced content of adenine in the cerebrospinal fluid (3.38) and increased serum xanthine oxidase activity (in the first stage of the xanthine oxidase reaction, 3.04) on the 1st day of stroke. The highest chances of deterioration of the neurological status by the end of the acute period of hemorrhagic stroke with the detection of reduced concentrations of adenine (OR 5.77) and guanine (OR 3.75) in cerebrospinal fluid, increased xanthine oxidase activity in blood serum (in the first stage of the xanthine oxidase reaction - OR 4.31) on the 1st day of a stroke.
Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factors in the deterioration of neurological status are the level of cerebrospinal fluid adenine and serum xanthine oxidase activity.

4345

Purine metabolites, magnesium, corticosteroid, thyroid hormones and letal outcome at hemorrhagic stroke: diagnostic and prognostic aspects

Oreshnikov E.[1], Oreshnikova S.[1], Ivanova V.[1], Oreshnikov A.[1]
[1]Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: We study the possibility of predicting the onset of death with the help of various hormonal and metabolic indicators in the acute period of cerebral hemorrhagic stroke
Materials and Methods: In 224 adult patients in the acute period of cerebral hemorrhagic stroke who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, colorimetric determination of adenine, guanine, hypoxanthine, xanthine, uric acid, magnesium, malonic was carried out in samples of cerebrospinal fluid and venous blood dialdehyde. Based on the concentration ratio of uric acid / xanthine, xanthine / hypoxanthine, uric acid / hypoxanthine, the activity of the first and second stages of the xanthine oxidase reaction and the total xanthine oxidase activity were calculated. Enzyme immunoassays examined the levels of cortisol and dehydroepiandrosterone, thyroid stimulating hormone, thyroxine and triiodothyronine.
Results and Discussion: The most sensitive factors for the subsequent onset of death in hemorrhagic stroke were: increased concentration of uric acid stroke in the cerebrospinal fluid on the 1st day (0.98), increased permeability through the BBB on the 1st day of guanine stroke (0.75) hypoxanthine (0.74), adenine (0.72). The most specific similar factors were: a combination of increased uric acid in blood serum and cerebrospinal fluid on the 3rd day of stroke (0.99); increased concentration on the 3rd day of a stroke in the blood serum of uric acid (0.97) hypoxanthine (0.83) and guanine (0.83). The relative risk of a fatal outcome is high when a stroke of an increased concentration of uric acid in the cerebrospinal fluid is detected on the 1st day of stroke (5.77); elevated serum levels on the 3rd day of a stroke of uric acid (3.0), hypoxanthine (2.50), a combination of elevated uric acid in serum and cerebrospinal fluid (2.31). The highest chances of a fatal outcome when a stroke of uric acid in the cerebrospinal fluid is detected on the 1st day (OR 8.75); when a stroke concentration of uric acid (OR 15.0), hypoxanthine (OR 5.0), guanine (OR 4.09), a combination of increased serum uric acid and cerebrospinal fluid (OR 10.2).
Conclusion: In patients with secondary cerebral ischemia in the acute period of hemorrhagic stroke, the most prognostically significant factor in fatal outcome is the blood level of uric acid.

4341

Purine metabolites, magnesium, corticosteroid, thyroid hormones and lethal outcome in acute cerebrovascular pathology

Oreshnikov E.[1], Oreshnikova S.[1], Kichigin V.[1], Oreshnikov A.[1]
[1]Chuvash State University - Cheboksary (Russia)

Background and Goal of Study: We study the possibility of predicting the onset of death with the help of various hormonal and metabolic indicators in the acute period of cerebral stroke.
Materials and Methods: In 626 adult patients in the acute period of cerebral stroke (regardless of its type, variant, etc.) who were treated in the intensive care unit, along with generally accepted instrumental and laboratory tests, in cerebrospinal fluid and venous blood samples colorimetric determination of adenine, guanine, hypoxanthine, xanthine, uric acid, magnesium was carried out , enzyme-linked immunosorbent assay for cortisol and dehydroepiandrosterone, thyroid-stimulating hormone, thyroxine and triiodothyronine.
Results and Discussion: The most specific factors were: increased concentration of uric acid in the blood serum on the 1st and 3rd day of stroke (0.89 and 0.98), combination of an increased content of uric acid in blood serum and cerebrospinal fluid on the 1st and 3rd day of a stroke (0.90 and 0.97); reduced guanine in cerebrospinal fluid (0.84) on the 3rd day of stroke; increased content of free fractions of triiodothyronine and thyroxine on the 1st day of stroke (0.86 and 0.76). The relative risk of a fatal outcome is high when a stroke of increased concentration in the blood serum of cortisol is detected on the 1st and 3rd day (3.25 and 7.39); increased content of hypoxanthine (2.49), xanthine (2.49) and uric acid (3.53) on the 3rd day of stroke, a combination of increased serum uric acid and cerebrospinal fluid (2.71). The highest chances of a fatal outcome when a stroke is detected on the 1st day of a stroke are elevated concentrations of cortisol and free thyroxine in blood serum (OR 4.98 and 2.59, respectively), uric acid in cerebrospinal fluid (OR 2.79); when a stroke concentration of adenine (OR 2.61), guanine (OR 3.75), hypoxanthine (OR 4.55), xanthine (OR 3.60), urine is detected in the blood serum on the 3rd day of a stroke acid (OR 20.0), cortisol (OR 10.4), a combination of high uric acid in blood serum and cerebrospinal fluid (OR 23.3).
Conclusion: In patients in the acute period of cerebral stroke (regardless of its type), indicators of the purine spectrum, stress-adaptive hormonal status are highly informative factors in predicting the onset of a fatal outcome. The most prognostically “powerful” of the studied parameters is the blood level of uric acid.

4579

Analysis of patients with stress induced hyperglycemia after burns and insulin pharmacotherapy

Belba M.[1], Naco M.[1], Aleksi A.[1], Belba A.[2], Nezha I.[3], Belba G.[3]
[1]University Hospital Center"Mother Teresa"Tirana Albania - Tirana (Albania), [2]KULeuven - Leuven (Belgium), [3]University Hospital center "Mother Teresa" - Tirana (Albania)

Background and Goal of Study: The hyperglycemic condition from dysregulation of glucose homeostasis has been defined Stress Induced Hyperglycemia (SIH).In the burned patients SIH is present in the ebb phase (up to 24 hours after trauma) and in the flow phase (till the closure of wounds).Surviving Sepsis Campaign in 2016 specifies as a strong recommendation with high level of evidence commencing insulin dosing when 2 consecutive blood glucose levels are >180 mg/dL. The aim of this study is to evaluate the prevalence of SIH in the burned patients in the two periods of the disease Our hypothesis is if testing critical hyperglycemia in the first 24 hours after burn can we predict the probability of critical hyperglycemia during the disease?
Materials and Methods: This is an observational prospective cohort study. Population is composed of adults hospitalized in ICU of the Service of Burns near University Hospital Center, Tirana, Albania in the last 5 years. Patients are grouped according blood glucose(BG) values in three categories: Patients with Euglycemia (BG=80-120 mg/dL), Moderate Hyperglycemia (BG=121-180 mg/dL) and Critical Hyperglycemia (BG> 180 mg/dL).To respond to our clinical question, we designed a hyperglycemia prediction test based on BG level in the first 24h of admission. We calculated the Test Performance and the Accuracy of our test. Discrimination of the patients developing critical hyperglycemia or not during the disease is also graphically presented by the ROC Curve.
Results and Discussion: The prevalence of critical hyperglycemia in the burned adult population in our center is 15.6% on admission and 7% during the disease. Using the value 180 mg/dL as cutoff we found that the test had a Sensitivity of 66.67 % and Specificity of 88.20 %, Positive Likelihood Ratio (PLR) is 5.65 and Negative Likelihood Ratio (NLR) is 0.38.We analyzed test performance concretely: Positive Predictive Value (PPV) is 29.63 %, Negative Predictive Value (NPV) is 97.26 %, Accuracy is 0.86 (Figure 1)ROC Curve for BG values on admission and during the burn disease is presented in Figure 2.
Conclusion: BG values on admission, as one of the derangement features of the burn shock, are prognostic factors for critical hyperglycemia during the disease. Insulin has benefits in the complexity of treatment in patients with burns. Measures of test performance (PPV, NPV) help in interpreting the results.

5105

Diagnostic challenge of Euglycemic Diabetic Ketoacidosis in the ICU setting

Tan F.[1], Heng D.[2], Yeo L.[2]
[1]Department of Anaesthesia, Khoo Teck Puat Hospital - Singapore (Singapore), [2]Khoo Teck Puat Hospital - Singapore (Singapore)

Background: In surgical patients with intestinal pathology who are on SGLT2 inhibitors (SGLT2-I), the pre-operative period of poor feeding coupled with the post-operative inability to initiate feeds makes the management of Euglycemic diabetic ketoacidosis (EuDKA) challenging. We present a rare case of a patient with persistent EuDKA on SGLT2-I.
Case Report: Mdm. X was a type 2 diabetic who was on Dapaglifozin. She presented with clinical dehydration, hypotension and severe abdominal pain. She was diagnosed with a rectosigmoid tumour complicated by sealed perforation. As she presented with the triad of normoglycemia, high anion gap metabolic acidosis and ketonemia, a diagnosis of EuDKA was suspected and she was immediately started on IV insulin infusion. As her ketones normalized, she was transitioned to a subcutaneous insulin sliding scale regimen. However, she was kept fasted as she was planned for a trephine colostomy the next day. She then developed rebound ketosis requiring IV insulin.
Discussion: In patients with acidosis, the differentials of lactic acidosis and starvation ketosis should also be considered. The pathogenesis of euglycemic DKA includes decreased insulin secretion in the setting of increased counter-regulatory hormone secretion (1). In contrast to starvation ketosis, it has a precipitating critical illness, a bicarbonate concentration lower than 18mmol/L and rapid resolution of clinical abnormalities with administration of insulin (2). Our patient’s malignancy, infection, decreased dietary intake secondary to loss of appetite coupled with the use of SGLT2 inhibitors may have precipitated her condition. It is interesting to note that her EuDKA persisted despite having stopped dapaglifozin for 5 days. This appears to be longer than what was previously reported.
References:
1. Umpierrez et al. Differences in metabolic and hormonal milieu in diabetic- and alcohol-induced ketoacidosis. J Crit Care 2000;15:52–59.
2. Kitabchi et al. Hyperglycemic crises in adult patients with diabetes: a consensus statement from the American Diabetes Association. Diabetes Care. 2006;29:2739–48.
Learning points: We suspect that the duration of action, metabolism and excretion of SGLT2 inhibitors could be longer in high risk patients. More studies should be performed to determine the appropriate duration to cease this medication preoperatively in order to minimize EuDKA risk.

4549

Increase in serum sodium predicts mortality in ICU patients, even for patients admitted with mild hyponatremia

Grim C. C. A.[1], Termorshuizen F.[2], Helmerhorst H.[1], De Keizer N.[2], De Jonge E.[1], Delta-Natrium
[1]Leiden University Medical Center - Leiden (Netherlands), [2]University Medical Center Amsterdam - Amsterdam (Netherlands)

Background and Goal of Study: Hyponatremia and hypernatremia in ICU patients are independently associated with mortality. It is unknown whether the association of mild hyponatremia with mortality is causal and whether correction improves survival. Our objective was to assess the independent association of change in serum sodium in the first 48 hours after ICU admission with hospital mortality.
Materials and Methods: Multicenter cohort study in ten Dutch ICUs between January 2011 and April 2017. Inclusion criteria: patients with at least one serum sodium measurement within 24 hours of ICU-admission [Na1] and at least one serum sodium measurement 24-48 hours after ICU admission [Na24-48h]. A Cox proportional hazard model adjusted for age, gender, and APACHE-IV score was used to assess the association between Δ48h-[Na] ((mean-[Na24-48h])-[Na1]) and hospital mortality.
Results and Discussion: In total, 36,660 patients were included for analysis.

Patients admitted with severe hyponatremia (<125 mmol/L) and hypernatremia (>145 mmol/L) had a higher risk of mortality. For mild hyponatremia, normonatremia, and hypernatremia at ICU admission, a Δ48h-[Na] >5 mmol/L was associated with larger hazards of mortality (Figure 1). Based on our findings, it is possible that mild hyponatremia may be a protective mechanism in critical illness, which questions common practice of routinely correcting serum sodium when it is too low.
Conclusion: An increase in serum sodium in the first 48 hours of ICU admission is independently associated with a higher mortality in patients admitted with mild hyponatremia, normonatremia, and hypernatremia. Future interventional trials are necessary to determine optimal policy in patients with mild hyponatremia, for whom unintentional or intentional correction of low serum sodium could be detrimental.

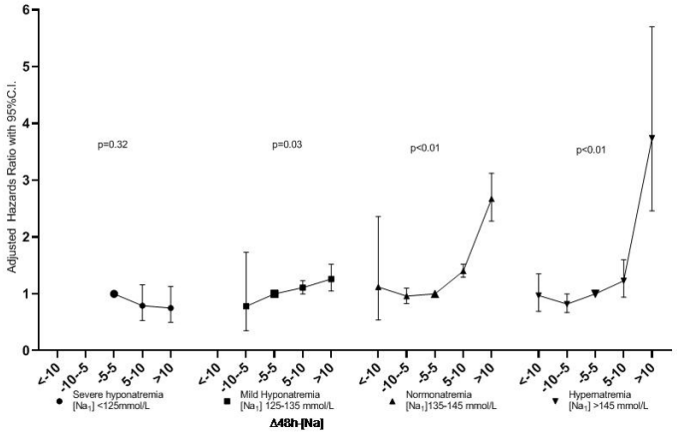


Figure 1. Association between in-hospital mortality and Δ48h-[Na] according to first serum sodium measurement at ICU admission

5459

Manifestation of the Graves' disease after off-pump coronary artery bypass grafting (clinical case)

Paromov K.[1], Kirov M.[1]
[1]1st City Clinical Hospital of E. E. Volosevich - Arkhangelsk (Russia)

Background: Decompensation of endocrine disorders, including thyroid gland diseases, during perioperative period of major surgery is associated with poor outcomes.
Case Report: A 66-year-old female patient was admitted in cardiac surgery for urgent coronary revascularization. Among comorbidities, the patient had arterial hypertension and nodular goiter (controlled with mercazolil 2.5 mg/day with levothyroxine 25 mg/day). Systolic function of the left ventricle was preserved (ejection fraction 67%) with mild mitral and tricuspid regurgitation). After successful OPCAB surgery (3 grafts) the patient was admitted in cardiac ICU. After tracheal extubation in a 4,5 hours, it was diagnosed hyperactive delirium and paroxysm of atrial fibrillation on POD 1 caused hemodynamic instability. At 36 hours after OPCAB the patient was re-intubated due to progression of dyspnoe. Since POD2, she had hyperthermia up to 39 °C with elevation of inflammatory markers (CRP 410 mg/l, PCT 8,1 ng/ml), purulent sputum and right-side infiltration on chest X-ray; wide-spectrum antibiotics were given. Atrial fibrillation was refractory both for amiodarone and cardioversion. On POD 3-4, heart failure has worsened with elevation of NT-proBNP up to 13682 pg/ml, troponin T 950.8 pg/ml with signs of biventricular dysfunction diagnosed with transthoracic echocardiography. After receiving the results of thyroid hormone levels at POD3, hemodynamic deterioration was considered as a consequence of thyroid storm due to Graves' disease decompensation (reduced TSH, increased T3 and T4, antibodies to TSH receptors 20.88 mIU/l). After cancellation of amiodarone and initiation of mercazolil in a combination with steroids, the patient has improved: vasopressor were stopped on POD4, sinus rhythm restored on POD6, she was weaned from respirator on POD 8, cognitive status normalized on POD 11 and she was discharged on POD12.
Discussion: Usually, thyroid gland disorders are associated with gradual deterioration of symptoms, but surgical stress, concomitant medications and nosocomial infection can promote rapid progression of disease and make the diagnosis difficult. Proper suppressive treatment of underlying hyperthyroidism is crucial in prevention of life-threating complications.
Learning points: Heart failure, atrial fibrillation and inflammatory response after cardiac surgery can be caused by thyroid gland disorders that requires additional attention to concomitant diseases and medications.

5827

Pancreatitis treatment with Lipopheresis in Pregnancy and Outcome

Sahin A. S.[1], Kaya E.[1], Unsel M.[1], Yıldız N.[1], Özkan S.[1], Salihoğlu Z.[1]
[1]Istanbul University of Health Sciences, Kanuni Sultan Suleyman Training Research Hospital - Istanbul (Turkey)

Background: Acute pancreatitis in pregnancy is rare, occurring in approximately 1/3000 pregnancies. Significant maternal morbidity can occur including intensive care admission, metabolic disturbances, sepsis, pancreatic necrosis, and hypovolemic shock. Rates of preterm delivery, fetal distress, and demise are increased in pregnancies with pancreatitis.
Case Report: 21-year-old,19 weeks pregnant woman presented to a emergency service with 4 h of abdominal pain that radiates to her back, nausea and vomiting. she doesnt use any medication and cigarettes .she only used folic acid. And she uses vitamin d for 15 weeks. 2 days ago she came to emergency services with Abdominal pain that radiates to her back Nausea. And Vomiting. In biochemistries markers didnt be concluded that lipemic serum and abdominal USG. A radiological and biochemical diagnosis of moderate acute pancreatitis was made. Bloodwork demonstrated prominent lipemic serume. Ketone levels were deemed +3. In abdominal usg : Free fluid was observed around the pancreas. The pancreas wall is edematous and heterogeneous. Appearance is compatible with pancreatitis. There was no known history of diabetes in the patient. She uses only vitamin D and folic asit. And the patient transferred intensive care unit support. The patient was consulted with the internal medicine department. Oral stop and lipophoresis are recommended. Management included aggressive rehydration and pain control, and we started lipophoresis, and we repated that lipophoresis three times. At first her bloodworks were lipemic but after first lipophoresis, Bloodwork demonstrated prominent hypertriglyceridaemia (HTG) of 541 mg/dl.
Discussion: Patients with acute pancreatitis should be treated with analgesia and fluid resuscitation. Severe hypertriglyceride-induced pancreatitis includes similar management. Lipopheresis may be considered in refractory cases. Preventing severe dyslipidemia in gestation can decrease the risk of pancreatitis and improve maternal and neonatal outcomes. Lipopheresis in acute pancreatitis in perinatal outcomes are likely due to improvements in maternal and perinatal care.

4475

Matrix Metalloproteinase-9 Protects Against Sepsis-induced Lung Injury in a Murine Septic Model

Zhang H.[1], Jiang L.[2]
[1]Xinhua Hospital Shanghai Jiaotong University School of Medicine - Shanghai (China), [2]Xinhua Hospital,Shanghai Jiaotong University School of Medicine - Shanghai (China)

Background and Goal of Study: Acute lung injury (ALI) is one of the main complications of sepsis with a mortality rate as high as 45% in ICU patients. Therefore, it is requisite to explore the relevant mechanisms involved in septic lung injury. Matrix metalloproteinase-9, MMP-9 has been reported to be involved in acute lung injury, however, whether MMP-9 protect or exacerbate sepsis-induced lung injury is still controversial. So in our present study, we evaluated the role of MMP-9 and its potential mechanism in sepsis-induced lung injury in a Cecal Ligation and Puncture (CLP) mice model.
Materials and Methods: Male ICR mice(25±5g) were subjected to CLP, MMP-9 small interfering RNA (MMP-9 siRNA) was administrated intratracheally to locally knockdown the expression of MMP-9 in lung tissue to define the role of MMP-9 in sepsis-induced lung injury. Kaplan-Meier survival curves were used to estimate survival rate in mice. Pathologic changes were evaluated via hematoxylin and eosin (H&E) staining, pulmonary edema was estimated by cell count and protein concentration in BAL fluid. Relative mRNA and protein expression were determined by RT-PCR and Western blot analysis.
Results and Discussion: Our results suggested that MMP-9 knockdown exacerbate sepsis-induced lung injury as indicated by decreased survival rate and increased lung injury score and edema following 24h post-CLP. MMP-9 knockdown suppressed the shedding of the receptor for advanced glycation end products (RAGE) and aggravated RAGE-mediated NF-κB signaling pathway.
Conclusion: In summary, MMP-9 knockdown aggravated lung injury and RAGE-mediated inflammatory response in our CLP model. These indicated that MMP-9 may exert protective role in sepsis-induced lung injury and this may attributed to its proteolysis function on RAGE. This is different to other opinions that activation of MMP-9 damaged septic lung injury. Inhibition of MMP-9 as a strategy for limiting ALI in abdominal sepsis should be conserved.

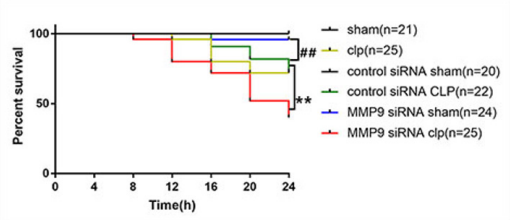


Fig1. Survival curves of mice subjected to CLP with MMP-9 knockdown. ##p<0.01 vs. control siRNA Sham, ** p<0.01 vs. control siRNA CLP

4422

Remote liver ischemic preconditioning protects rats against cerebral ischemia and reperfusion injury

Hu Z.[1], Yang G.[1], Yang Y.[1], Li Y.[1], Liu J.[1]
[1]West China Hospital, Sichuan University - Chengdu (China)

Background and Goal of Study: Remote limb ischemic preconditioning has been shown to have beneficial effects in protecting organs against ischemia and reperfusion (I/R) injury. However, whether brief ischemic preconditioning of vital organ, such as the liver, would exert brain protection against I/R injury is unknown. We therefore investigated the effect of remote liver ischemic preconditioning (RLIPC) on brain tissues suffering from I/R injury in a rat model.
Materials and Methods: Rats were anesthetized with pentobarbital sodium (50 mg/kg ip) and were randomly assigned to a sham group (sham operation), control group (CON) or a remote liver ischemic preconditioning group (RLIPC). Rats except for the sham group received middle cerebral artery occlusion (MCAO) for 1h, followed by 48h of reperfusion. For the RLIPC rats, four cycles of 5 min of liver ischemia(the portal vein, hepatic arterial and venous trunk occlusion) followed by 5 min reperfusions were executed before brain ischemia. After the intervention, brains were collected at 48 h for analysis.
Results and Discussion: RLIPC decreased the volume of the MCAO-evoked infarct region when compared to CON (P<0.001). Meanwhile, RLIPC-treated rats showed significant improvements in neurological function compared with CON (P=0.0013). There was a 44.7% and 26.4% reduction in serum LDH and CK-MB concentration from RLIPC rats compared with that of control ones, suggestive of relatively less cerebral damage in RLIPC-treated rats in response to IR injury. Representative cerebral injury phenotypes, such as oedema, neuronal loss and vacuolization were visualized in brain tissue after I/R injury. However, the degree of brain damage was less severe in RLIPC-treated rats, as less neuronal loss and more intact neurons were detected in the vacuolated spaces. RLIPC treatment ameliorated the cerebral damage and largely recovered the number of Nissl bodies (P<0.001 vs CON). After reperfusion, sufficient TUNEL-positive cells were observed in brains, however, the number of TUNEL-positive cells was significantly reduced in the RLIPC-treated group compared with the CON(P<0.001), suggesting the antiapoptotic activity of liver ischemic preconditioning on the neurons.
Conclusion: Liver ischemic preconditioning effectively protects brain against I/R injury by reducing brain infarct volume, serum LDH and CK-MB concentration, inhibiting apoptosis, and improving neurological function.

4873

Angiotensin-(1-7) protects the intestinal injury after ischemia and reperfusion in rats

Tsao C. M.[1], Tsai H. J.[1], Shih C. C.[2], Wu C. C.[2]
[1]Taipei Veterans General Hospital - Taipei (Taiwan), [2]National Defense Medical Center - Taipei (Taiwan)

Background and Goal of Study: Intestinal ischemia-reperfusion injury can lead to activation of local inflammatory response and changes in several inflammatory mediators, resulting in multiple organ failure and systemic inflammatory response. Previous study revealed that angiotensin (Ang)-(1-7) binds and activates a G protein-coupling receptor: Mas, through which Ang-(1-7) induces vasodilation, anti-inflammatory, and proliferative effects, in general, oppose those mediated by Ang II. Ang-(1-7) can act via both the Mas receptor and the AT2R. In our previous study, we found that Ang-(1-7) could attenuate organ dysfunction, decrease inflammatory cytokines and improve survive in septic rats. In the rat model of intestinal ischemia-reperfusion, this study evaluated the role of Ang-(1-7) in inflammation, oxidative stress and organ injury.
Materials and Methods: After 120 minutes of ischemia of the superior mesenteric artery in male Wistar rats, the reperfusion was carried out for 120 minutes to induce intestinal ischemia-reperfusion injury. The experimental animals were divided into four groups: (i) surgical control (Sham), (ii) Sham and Ang-(1-7) (1 ml/kg intravenous infusion at 30 minutes before surgery), (iii) Ischemia-reperfusion (I/R), and (iv) I/R and Ang-(1-7). During this study, we examined the liver and kidney function index and intestine blood flow. In additional, we measured the survival rate in different groups. After 4-hour study the lung, liver and kidney tissues were harvested to investigate superoxide ion level and pathohistology.
Results and Discussion: Histological findings showed that intestine I/R caused widespread mucosal destruction, loss of villi and infiltration of inflammatory cells, while Ang-(1-7) administration ameliorated intestine injury after intestinal I/R. Ang-(1-7), given before ischemia, attenuated serum creatinine increase after intestine I/R, indicating Ang-(1-7) could improve renal dysfunction induced by intestine I/R. None of the 5 rats infused with Ang-(1-7) were dead 24 hours post-intestinal I/R, while three out of the 5 rats in the I/R group were still alive 24 hours after intestinal I/R, indicating that pre-ischemia treatment of Ang-(1-7) improved the survival rate after intestinal I/R.
Conclusion: These findings suggest that Ang-(1-7) appears to reduce organ damage and even death induced by intestinal ischemia-reperfusion, and may be a potential adjuvant for ischemia-reperfusion injury.

5028

New murine sepsis model for persistent inflammation, immunosupression, and catabolism syndrome

Kwak S.[1], Park S.[1], Jang E.[1], Kim J.[1], Bae H.[1], Dept. of Anesthesiology & Pain Medicine, Chonnam National University Medical School & Hospital
[1]Chonnam National University Medical School & Hospital - Gwangju (South Korea)

Background and Goal of Study: Sepsis, defined as dysregulation of immune and inflammatory responses to infection, can develop refractory shock and multiple organ failure (MOF) leading to early in-hospital death or persistent inflammation, immunosuppression, and catabolism syndrome (PICS) leading to extended recovery periods and multiple complications. The recent development of programs that support earlier diagnosis and intervention with best-practices for sepsis should be increase the portions of PICS. However, these processes of develop to PICS from sepsis are not well-understood.
Materials and Methods: In this study, we utilized cecal ligation and puncture (CLP) method in mice for three steps sepsis models involving SIRS and CARS (CLP only), MOF (lipopolysaccharide (LPS) + CLP), and PICS(LPS + CLP + Antibiotic) models. We examined mortality, the levels of pro- and anti-inflammatory cytokine, mitogen-activated protein kinases (MAPKs), nuclear factor kappa b (NF-κB) expression in lung and immune cell involving neutrophils, T cells, and myeloid derived suppressor cells (MDSCs) recruitment in serum.
Results and Discussion: Mortality were 100% (MOF), 60% (PICS), 20% (SIRS/CARS), and 0% (SHAM). We found that mice develop MOF at day 5 post-CLP surgeries, and pro-inflammatory cytokines were elevated from days 5–10. In the contrast, anti-inflammatory cytokines express highly level after 24hr surgery, and continued to significantly increase from days 5 to 10 in PICS. Furthermore, the recruitment of MDSCs were significantly augmented over time; whereas neutrophils recruitment and T cells functions were elevated at day 5 and decreased at day 10 post-CLP surgeries. We also observed an increase of the mortality of PICS model, approximately 60% of mice had died after 14 days.
Conclusion: Our results contribute to characterization of three sepsis phases, which may support the diagnosis and treatment of sepsis in the future.

6248

Ferroptosis contributes to tissue injury in lung ischemia/reperfusion

Xu Y.[1]
[1]West China Hospital, Sichuan University - Chengdu (China)

Background and goal of study: Ferroptosis, a form of regulated cell death triggered by lipid peroxidation is a therapeutic target in the pathological process of some diseases. The inhibitors of ferroptosis, have been reported to protect against heart, kidney ischemia-reperfusion. However, the role of ferroptosis in lung ischemia/reperfusion (I/R) injury remains unknown. Considering the unique features required for ferroptosis, therefore we investigated whether ferroptosis is present in lung ischemia/reperfusion.
Materials and Methods: To establish the lung ischemia/reperfusion (LIR) model, A left thoracotomy was performed in Male C57BL/6 mice, the left pulmonary hilum was clamped for 60 min, followed by 60 or 120 min. The sham group received thoracotomy. We used (DAB)-enhanced Pearls' staining to detect iron accumulation in lung sections. We determined the expression levels of two key protein involved in ferroptosis, glutathione peroxidase 4 (GPX4) and Acyl-CoA synthetase long-chain family member 4 (ACSL4), by western blotting. Also, transmission electron microscopy (TEM) from lung tissues was examined to confirm the morphological features of ferroptosis.
Results and Discussion: Perls' DAB staining disclosed that mice who received LIR had higher levels of non-heme iron compared to sham group. Accumulation of mitochondria with smaller appearance and increased membrane density was demonstrated in LIR mice, which was barely detected in control mice. Levels of GPX4 were significantly decreased in I/R120min treatment groups compared to the sham group (P<0.05). Both of the I/R 60min and 120min groups showed significantly increased levels of ACSL4, as compared to the sham group (all P<0.05).

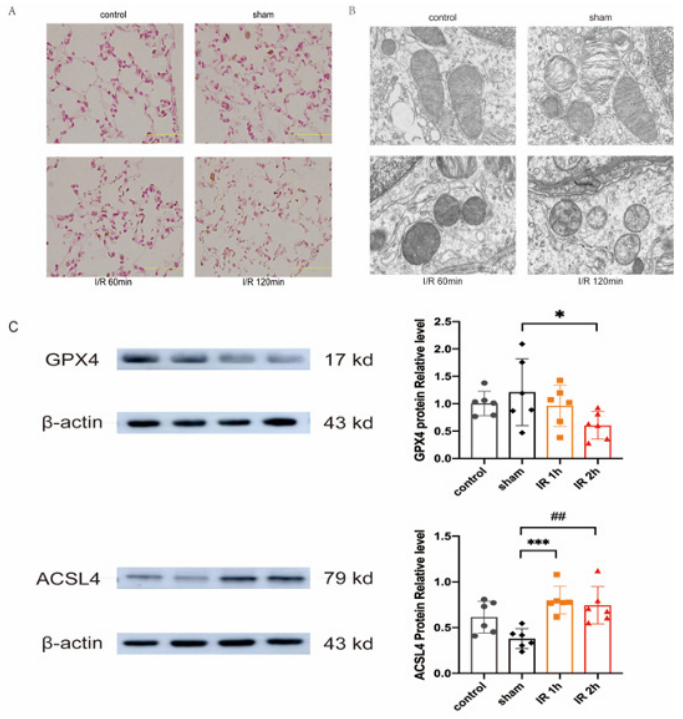


Fig. A Ferric iron deposits were stained with Perls' DAB staining in lung sections. Scale bar = 100 μm. B Representative TEM images of alveolar epithelial cells in normal lung and LIR lung. Scale bars = 500nm. C WB showing expression levels of GPX4,ACSL4 and β-actin in lung homogenates *$P < 0.05$, **$P < 0.01$ by one-way ANOVA followed by Tukey's multiple comparisons test.

Conclusion: Our study demonstrates that ferroptosis is involved in the tissue injury from LIR. These results suggest a potential approach for lung I/R injury prevention.

5116

Effects of remote ischemic preconditioning on erythrocytes in sepsis

Kim Y. H.[1], Lim C. H.[2], Ko E. J.[2]
[1]Hallym University Sacred Heart Hospital - Hwaseong-si (South Korea), [2]Korea University Medical Center - Seoul (South Korea)

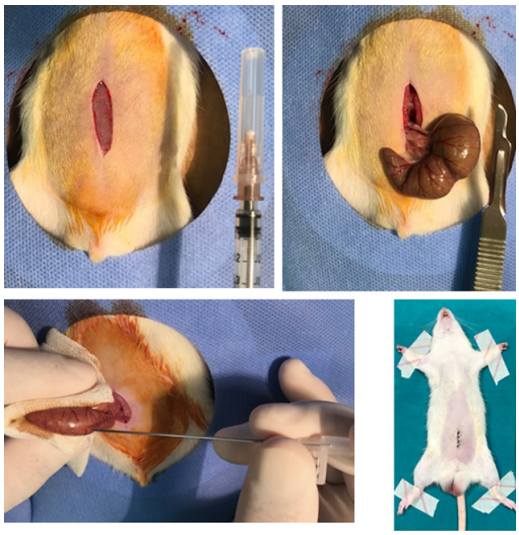
Background and Goal of Study: Impaired tissue perfusion and microcirculation are hallmarks of septic shock. Therefore, preventing RBC rheologic alterations in may be important to help reduce morbidity and mortality from severe sepsis. Previous studies have shown that such remote ischemic preconditioning (RIPC) not only prevents tissue damage due to severe ischemia but also reduces inflammation and mortality due to sepsis. However, the effect of RIPC on the coagulation and elasticity of erythrocytes due to sepsis has not been established. Therefore, this study is to investigate the effect of RIPC on RBC rheologic alterations of erythrocytes in sepsis.
Materials and Methods: We used 30 male Sprague-Dawley rats. Endotoxin-induced sepsis model was created by injecting 20 mg/kg LPS intraperitoneally. RIPC was induced on the right hind legs with a tourniquet in three cycles of 10 min of ischemia and 10 min of reperfusion. And this study is to investigate the effect of RIPC elongation index (EI), aggregation index (AI), and Time to half-maximal aggregation (T1/2) of erythrocytes in sepsis.
Results and Discussion: AI values were significantly greater and the T1/2 values were shorter in the LPS group and the RIPC/LPS group than those in the control group. And, there was no significant difference between those values of the LPS group and the RIPC/LPS group. The EI decreased significantly in the LPS group compared to that in the control group, whereas the EI does not changed significantly in the RIPC/LPS group compared to that in the control group. Previous studies have shown that several proinflammatory cytokines were reduced by RIPC. However, in this study, RIPC has revealed no positive effects on the elasticity and cohesiveness of erythrocytes in sepsis.
Conclusion: The RBC rheologic alterations of erythrocytes due to sepsis is not improved by RIPC.

5605

The Effects of Hydroxyurea on Proinflammatory Cytokine and Tissue Histopathology in Experimental Sepsis Model

Kulturoglu G.[1], Ergil J.[1], Yalcindag A.[1], Özturk E.[1], Kulturoglu M.O.[2]
[1]University Of Health Sciences Diskapi Yildirim Beyazit Training And Research Hospital - Ankara (Turkey), [2]University of Health Sciences Dr Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital - Ankara (Turkey)

Background and Goal of Study: The diagnosis and treatment of sepsis is a costly healthcare service and it is an important disease with high mortality rates. In the pathogenesis of sepsis, which we still cannot provide complete cure, there is increased cytokine release in the acute period and organ damage in the following period. Hydroxyurea has been shown to reduce leukocyte count, decrease inflammatory cytokines, and limit organ inflammation in ischemia-reperfusion models. In this study, we aimed to evaluate leukocyte count, IL1 beta, IL6 and TNF alpha cytokine values and organ inflammatory processes in hydroxyurea treated rats with experimental sepsis model. To our knowledge, this study is the first research that combines sepsis and hydroxyurea.
Materials and Methods: After ethical approval, Sprague-Dawley rats were randomly divided into three groups, control(n=7), sepsis(n=7), hydroxyurea(n=7). Sepsis was created using the cecal ligation and perforation (CLP) method in rats other than control group. Rats in the hydroxyurea group received hydroxyurea (200 mg/kg) intragastrically while control and sepsis groups received sterile distilled water. IL1 β, IL 6 and TNF α levels were measured at 0, 8, and 24 hours post-CLP in all rats. The blood samples were collected during sacrification at 24 hours after CLP and analyzed for the complete blood count, kidney and liver function plasma biomarkers. Tissue speciemens (lung, heart, spleen, kidney and brain) were taken for histopathological examination. Damage rating was performed with the scoring system.
Results and Discussion: It has been shown that cytokine levels(IL1β, IL 6, TNFα), white blood cell counts and tissue damage are increased after sepsis model in rats. It was found that the amount of cytokine levels at 8th hour, white blood cell count and brain tissue damage in hydroxyurea group were decreased significantly compared to sepsis group.
Conclusion: We conclude that early hydroxyurea treatment in rats with sepsis decreases proinflammatory cytokine(IL1β, IL 6, TNFα) levels and thus reduces brain damage.



5993

Cardiac output monitoring in mechanical circulatory support devices: Validation of transpulmonary thermodilution

Burgos Santamaría A.[1], Fernandez-Lopez I.[1], Barranco Benito M.[1], Durán Aparicio M.[1], Del Cañizo J. F.[1], Quintana-Villamandos B.[1]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: Transpulmonary thermodilution is recommended in the treatment of critically ill patients with heart disease. However, so far it has not been validated in patients with mechanical circulatory support devices (MCSDs). The aim of this study was to validate the cardiac output obtained by transpulmonary thermodilution in partial support of the heart with a continuous-flow MCSD in an experimental porcine model.
Materials and Methods: The study was conducted with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial assistance of left ventricle. Cardiac output measurements were made using a PiCCO thermodilution catheter, and the reference method was the pulmonary artery catheter (PAC). Measurements where performed in four different moments of the study: immediately before MCSD was initiated (basal cardiac output), meanwhile partial support was provided, in MCSD associated with hypervolemia status and in MCSD associated with hypovolemia. Bland-Altman plot was used for validation of transpulmonary thermodilution. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain.
Results and Discussion: Comparing continuous thermodilution measurements with bolus cardiac output through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 16% (Bias -0.08) in the basal moment, 27% (Bias -0.04) when partial support with MCSD was provided, 14% (Bias -0.09) in hypervolemia model and 29% (Bias -0.63) in state of hypovolemia.
Conclusion: The results described above show that the transpulmonary thermodilution could be used as reliable method in the measurement of cardiac output in a continuous-flow MCSD for partial support of left ventricle in a porcine model.

4457

Neuromuscular blocking agents in acute respiratory distress syndrome outcomes: A meta-analysis of randomized controlled trials

Chen D.[1], Li Q.[1]
[1]Department of Anesthesiology, West China Hospital, Sichuan University - Chengdu (China)

Background and Goal of Study: Acute respiratory distress syndrome (ARDS) is of high-mortality and treatment options are limited. Neuromuscular blocking agents (NMBAs) in ARDS have been inconclusive about effects on outcomes. The objective of this meta-analysis is to explore the effect of NMBAs in adults with ARDS.
Materials and Methods: Cochrane Library, PubMed, EMBASE, and MEDLINE were searched from inception up to June 30, 2019. Randomized controlled trials (RCTs) that investigated the effects of neuromuscular blocking agents in adults with ARDS were included. Two investigators independently retrieved studies for inclusion and performed data extraction.
Results and Discussion: Five trials involving 1463 patients with moderate-to-severe ARDS were enrolled. NMBAs was associated with a lower intensive care unit (ICU) mortality (RR 0.72 95% CI, 0.57-0.91; P = 0.007), but no statistically significant differences were found between two groups for 28-day mortality (RR 0.76; 95% CI, 0.56-1.04; P = 0.08) and 90-day mortality (RR 0.86; 95% CI, 0.66-1.12; P = 0.25) (Figure 1). NMBAs improved oxygenation at 24, 48, 72 hours after randomization, reduced the risk of barotrauma and pneumothorax, did not prolong ventilator-free days, and did not affect the duration of mechanical ventilation or the risk of ICU acquired weakness.
Conclusion: NMBAs reduced ICU mortality, barotrauma, and pneumothorax, improved oxygenation, did not affect the duration of mechanical ventilation, and did not appear to increase ICU-acquired weakness for ARDS subjects. Considering NMBAs use in ARDS has limited data supporting the practice, we suggested that NMBA should not be used routinely in patients with ARDS, even in severe cases. Conversely, it should be used when physiologically and clinically indicated.

4917

Persistent respiratoy insufficiency in an obese patient with coexistence of intrathoracic lipoma and Morgagni Hernia

Marin Jimenez D.[1], Lopez-Muñoz B.[1], Pardines Rico S.[1], Salas Rezola E.[1]
[1]Hospital General Universitario de Alicante (HGUA) - Alicante (Spain)

Background: Respiratory insufficiency (RI) is a common problem in patients admitted to the Intensive Care Units (ICU), and may be one of the reasons for prolonged stay.1
Case Report: A 34-year-old male admitted to the ICU for acute RI. His medical history was a schizoid mental disorder, grade III obesity, active smoker and a Morgagni hernia detected in 2009. CT scan showed an increase in the hernia sac with complete atelectasis of the right lung. Due to the suspicion that MH was responsible for respiratory failure, the patient underwent laparoscopic surgery. The hernia sac was reduced and the diaphragmatic defect was closed. After two weeks, due to weaning failure, a new CT scan was performed, identifying a right paracardiac image with fat density. The pacient was re-intervene and a mediastinal mass (21x11x11 cm) was found. The pathological report showed adipose tissue, compatible with lipoma. After the resection of the mass the patient presented a satisfactory evolution, with a right weaning in the following 4 days, being able to be discharged from the ICU and to his home a week later.
Discussion: MH is a rare cause of RI, but it can produce an hypoxemic alteration with a restrictive component due to the alteration of diaphragmatic function and the atelectasis produced by the abdominal visera housed inside the thorax. 2 Intrathoracic lipomas are a class of adipose tumors located in deep tissues, of unknown etiology, which usually appear in obese people. They are a very rare cause of RI, as they often are asymptomatic and are diagnosed incidentally in imaging tests3. The only treatment of this two problems are surgical. The patient in this case did not improve until the surgical resection was performed.
References:
1. Fred F. Ferri MD, FACP . Pulmonary and Critical Care . Ferri's Practical Guide: Fast Facts for Patient Care, 11, 340-371
2. Dionísio P, Moreira S, Pinto Basto R, Pinto P. Morgagni Hernia as a Reversible Cause of Hypercapnic Respiratory Failure. Arch Bronconeumol. 2018 May;54(5):288-289
3. Margiotta G, Carlini, L, Carnevali, et al. Giant diaphragmatic lipoma: Two autopsy case reports and review of the literature. J Forensic Sci 2015; 60: 1640– 3.
Learning points: In ICU, we must be continually re-evaluate patients and reconsidered diagnosis if the evolution is not favorable. The coexistence of an intrathoracic lipoma with a Morgagni hernia is an exceptional situation, with no similar cases being published in the last ten years.

5282

Subject-ventilator asynchrony does not increase lung injury in pigs

Wittenstein J.[1], Scharffenberg M.[1], Huhle R.[1], Leiderman M.[1], Koch T.[1], Gama De Abreu M.[1], Pulmonary Engineering Group Dresden
[1]*University Hospital Carl Gustav Carus Dresden - Dresden (Germany)*

Background and Goal of Study: During spontaneous breathing activity (SB) in mechanically ventilated patients with acute respiratory distress syndrome (ARDS) subject-ventilator asynchrony can occur, which has been associated with poor outcome. We hypothesized that asynchrony worsens lung injury.
Materials and Methods: In 21 anesthetized pigs, ARDS was induced by a double hit consisting of saline lung lavage and injurious ventilation. Animals were randomly assigned to one of three groups (n=7/group; 12 h): 1) SB + externally induced asynchrony (Async); 2) SB (Sync) and 3) control (Ctrl, no SB). All animals were ventilated in the pressure assist-control mode (VT=6 ml/kg, PEEP=10 cmH2O, and fraction of inspired oxygen (FIO2)=1.0). Remote control of the mechanical ventilator was used to induce asynchrony externally. Gas exchange, hemodynamics, respiratory variables, and distribution of ventilation (electro impedance tomography) were assessed. Postmortem quantitative histologic analysis, inflammatory markers, wet-to-dry ratio and diaphragmatic muscle fibre thickness were determined.
Results: The Asynchrony Index (AIX) (percentage of missed and double triggered breaths) was higher in the Async-group (AIX: Async: 15.9±5.7, Syn: 1.6±0.9 %; p<0.001). PaO2/FIO2 and oxygen consumption did not differ significantly among groups. P0.1 did not differ significantly between Async and Sync groups, whereas respiratory rate was higher in the Async than in the Ctrl group. The percentage of pendelluft was higher in the Async compared with Sync group, whereas the distribution of ventilation did not differ significantly between SB groups. The gene expression and protein levels of interleukins 6 and 8, as well tumor necrosis factor alpha, amphiregulin, vascular endothelial growth factor, vascular cell adhesion molecule and intercellular adhesion molecule in lung tissue, as well as wet-to-dry ratio did not differ between groups. Mean septal thickness, volume fraction of atelectasis as well as the total surface area of aerated lung did not differ between groups. Diaphragmatic muscle fibre thickness did not differ among the groups.
Conclusion: In this experimental model of ARDS, subject-ventilator asynchrony neither increased lung injury, nor affected diaphragmatic muscle fibre thickness.

5422

High-flow oxygen (HFO) therapy for a case of acute hypoxemic respiratory failure (AHRF) with pulmonary edema and kidney failure

Giaccari L. G.[1], Campana A.[1], Pota V.[1], Passavanti M. B.[1], Aurilio C.[1], Pace M. C.[1]
[1]*University of Campania "L. Vanvitelli" - Napoli (Italy)*

Background: High-flow oxygen (HFO) therapy through a nasal cannula is a technique whereby heated and humidified oxygen is delivered to the nose at high flow rates. Low levels of positive pressure are generated in the upper airways and physiological dead space is decreased. This led to a decrease in the work of breathing improving the survival rate among patients with acute hypoxemic respiratory failure(AHRF).1
Case Report: A 52-year-old smoking man was admitted in “L. Vanvitelli” Hospital (Naples, Italy) for AHRF. He had a medical history of hepatitis C and IDDM. In the suspicion of bacterial pneumonia he received empirical antibiotic and NPPV. Clinical symptoms showed deterioration and he was admitted in ICU. He was apyretic and tachypnoic. Weak respiratory sounds and coarse crackles were heard in right chest.Blood samples showed: WBCs 27.000/µL, Hb 9.1 g/dL, PLTs 295.000/µL, and CRP 23.84 mg/dL. ABG showed: pH 7.35, PCO2 27.8 mmHg, PO2 67.8 mmHg, HCO3 17.1 mmol/l and lactates 32 mg/dl. Viral and bacterial tests were performed.Chest X-ray indicated alveolar interstitial edema and bilateral pleural effusion; CT indicated bilateral ground-glass and consolidative opacities. High Flow Nasal Cannula (HFNC) was setted and empirical antibiotic started. On day 2, patient presented pulmonary edema and kidney failure. Levosimendan infusion (0.05 mcg/kg/min) was started.2 Coltural exams were negative. Progressive improvement of respiratory and general condition was obtained (see Table 1).

Day of ICU	1°	2°	3°
Ventilation	NIV/CPAP 0.5	HFNC 1.0 – 50 l/min	HFNC 0.75 – 50 l/min
P/F	135	115	201
ph	7,35	7,32	7,35
PO2 (mmHg)	67,8	115	151
PCO2 (mmHg)	27,8	31	35,7
HCO3 (mmol/l)	17,1	17	20,4
Lac (mg/dl)	32	20	19
3°	4°	5°	6°
HFNC 0.75 – 50 l/min	HFNC 0.50 – 35 l/min	HFNC 0.35 – 25 l/min	VM 0.5
201	202	230	260
7,35	7,44	7.46	7.55
151	101	80.2	130
35,7	39	43.4	47
20,4	26,5	30.1	41.6
19	24	15	31

After 6 days, patient was discharged from ICU in good conditions.
Discussion: We administrated HFO therapy, which prevented the need for ventilator management.
References:
1. Frat JP et al. High-Flow Oxygen through Nasal Cannula in Acute Hypoxemic Respiratory Failure. N Engl J Med 2015;372:2185-96.
2. Lannemyr L et al. Differential effects of levosimendan and dobutamine on glomerular filtration rate in patients with heart failure and renal impairment: a randomized double-blind controlled trial. J Am Heart Assoc. 2018;7:e008455.
Learning points: HFNC in hypoxemic patients not responding to conventional oxygen therapy or intolerant to an oxygen mask.HFNC to avoid ventilator management.

5873

Efficacy of the de-escalation therapy in patients with sepsis-induced ARDS

Fot E.[1], Khromacheva N.[1], Ushakov A.[1], Kuzkov V.[1], Kirov M.[1], Smetkin A.[1]
[1]*Northern State Medical University - Arkhangelsk (Russia)*

Background and Goal of Study: During the de-escalation stage of therapy, the patients with acute respiratory distress syndrome (ARDS) can require more aggressive fluid removal by means of diuretics or renal replacement therapy (RRT). The aim of our study was to compare the efficacy of de-escalation therapy in patients with sepsis-induced direct and indirect ARDS.
Materials and Methods: Sixty adult patients with sepsis and ARDS, receiving mechanical ventilation ≥24 hours, were enrolled into a prospective study. All patients had invasive hemodynamic monitoring using transpulmonary thermodilution (PiCCO2, Pulsion, Germany). The patients received active de-escalation by means of diuretics or RRT in case of global end-diastolic volume index (GEDVI) > 650 ml/m2 or extravascular lung water index (EVLWI) > 10 ml/kg. The primary goal of de-escalation was the achievement of fluid balance at 48 hrs from 0 to – 3000 ml. In case of GEDVI < 650 ml/m2 or EVLWI < 10 ml/kg, the target fluid balance was in range from 0 to 3000 ml. The measurements included hemodynamics and blood gases. The patients were divided into two groups with pulmonary (direct, n=30) and extrapulmonary (indirect, n=30) ARDS. The statistical analysis was performed using non-parametric tests.
Results and Discussion: We found no baseline changes regarding age, gender or SOFA score in direct and indirect ARDS. Despite active fluid removal, in patients with extrapulmonary ARDS EVLWI did not change significantly to 48 hrs (p=0.08), whereas PaO2/FiO2 increased from 251 (203 - 280) mm Hg at baseline to 260 (200 - 325) mm Hg at 48 hrs (p=0.05). By contrast, in direct ARDS we observed the decrements in EVLWI from 12 (10 – 12) to 11 (8 – 12) ml/kg (p=0.006) and GEDVI from 777 (677 - 934) ml/m2 to 728 (614 - 885) ml/m2 (p=0.04), accompanied by improvement of PaO2/FiO2 from 184 (131 - 207) mm Hg to 246 (183 - 323) mm Hg (p=0.0001). There was no significant differences in target fluid balance during 48 hrs: -2330 (-3923 - ..-4250) ml in extrapulmonary ARDS vs. -2210 (-3200 - ..-9450) ml in pulmonary ARDS (p=0.8). The survival rate and the number of ventilator-free days did not differ between the groups.
Conclusion: In sepsis-induced direct ARDS, active de-escalation therapy is more effective than in patients with indirect ARDS.

5896

Use of high-flow oxygenation during weaning from ventilation of ARDS patient with burns and inhalation injury of respiratory tract

Fot E.[1], Ushakov A.[1], Kirov M.[1]
[1]Northern State Medical University - Arkhangelsk (Russia)

Background: High-flow oxygenation (HFO) through nasal cannula allows the delivery of a moisturized and heated oxygen-air mixture with a fraction of inspiratory oxygen (FiO2) from 21 to 100% and a flow rate of up to 80 l/min. This method has several potential advantages compared with standard inhalation of oxygen and non-invasive ventilation in different settings including weaning from ventilation in acute respiratory distress syndrome (ARDS).
Case Report: A 65-year-old female was admitted to the multidisciplinary ICU of a university hospital on October 14, 2019 with burns of the face, back, and upper extremities with a total area of 40% and inhalation injury of respiratory tract. The patient was diagnosed with moderate ARDS and received mechanical ventilation during 5 days. After stabilization, the patient was weaned from ventilator on October 19, 2019, followed by oxygen inhalation through a standard nasal cannula. In one hour after tracheal extubation, we observed severe hypoxemia requiring urgent reintubation. The bronchoscopy has revealed the obstruction of a right bronchus by thick sputum. The patient received several bronchoscopies, mucolytic therapy, invasive hemodynamic monitoring (PiCCO2) and protective mechanical ventilation until October 24. The burns of face made impossible the use of mask for non-invasive ventilation. Thus, to reduce risk of unsuccessful weaning and improve sputum discharge, during transfer of patient to spontaneous breathing after tracheal extubation we used HFO (Airvo2, Fisher &Paykel, New Zealand) with a flow of 50 l/min and FiO2 80% followed by gradual decrease to 40-50% for maintaining SpO2 within 92-97%. At 24 hrs, extravascular lung water increased from 7 to 10 ml/kg but we maintained HFO 50 l/min and achieved negative fluid balance using diuretics, thus extubation failure was avoided. The patient did not experience any discomfort from the procedure. To 72 hrs, lung water returned to baseline values, PaO2/FiO2 did not decrease below 200 mm Hg, and respiratory rate did not exceed 25 /min, allowing the start of standard oxygen inhalation on October 27. The patient was transferred to the trauma unit on November 1 and discharged from the hospital on November 29 in a satisfactory condition.
Learning points: The use of HFO during weaning from ventilation of ARDS patients with burns and inhalation injury can be a useful tool for prevention of respiratory failure and reintubation.

5061

Water droplets inside the polyurethane cuff at 24 hours after tracheal intubation: A single center, retrospective pilot study

Idei M.[1], Nomura T.[1], Ishikawa J.[1], Sato N.[1], Seino Y.[1], Nakagawa M.[1]
[1]Tokyo Women's University Hospital - Tokyo (Japan)

Background and Goal of Study: The polyurethane (PU) cuff of endotracheal tube (ETT) has been demonstrated to prevent ventilator-associated pneumonia compared with polyvinylchloride (PVC) cuff. However, ETT with PU-cuff has been also reported the water droplets within the cuff, inflation line and/or pilot balloon owing to its thinness and high-water molecule permeability. Droplets could be a serious obstacle to measure the cuff pressure. Nevertheless, there are no studies investigating the frequency and timing of water accumulation in the PU-cuff in the clinical setting. This study conducted to investigate the timing and frequency of water-droplet accumulation in PU-cuffs in the postsurgical patients.
Materials and Methods: This retrospective study was conducted at Tokyo Women's Medical University Hospital (Tokyo, Japan). We enrolled patients admitted to the intensive care unit after surgery, while intubated with PU-cuff ETTs (SealGuard EvacTM, Covidien, Dublin, Ireland) or PVC-cuff ETTs(Lo-ProTM, Covidien, Dublin, Ireland) and were extubated on the following day. Same model mechanical ventilators and humidifiers were used for all patients.
Results and Discussion: Between April 25 and May 27, 2019, ETTs with PU-cuff were used for 10 patients (PU group) and PVC-cuff ETTs were used for 18 patients (PVC group). The median intubation time was 24 h (IQR :18.8–25.5 h) in the PU group, and 25 h (IQR :25–26 h) in the PVC group, respectively. In the PU group, water drop was detected in the cuff, inflation line and pilot balloon of all the extubated ETTs. No water was detected in PVC group. No perforations of the cuffs were observed in any of the ETTs. Our study is the first to investigate the timing and frequency of water-droplet accumulation in PU-cuffs in clinical situations. We found that water droplets had accumulated within all PU-cuffs as early as 24 h after intubation. The water inside the inflation line and/or pilot balloon have been demonstrated to create a difference of 10 cmH2O or more between pressure measured at the pilot balloon and actual cuff pressure. Since the inability to accurately adjust cuff pressure increases the risk of insufficient ventilation due to air leakage and tracheal membrane injury, this phenomenon should be more investigated.
Conclusion: Water droplets were confirmed inside the all PU-cuff as earlier as 24 hours after intubation.Therefore, water droplets inside the PU-cuff should be checked carefully on the cuff pressure management.

4455

Adaptive Support Ventilation versus Pressure Support Ventilation for Weaning Patients after Fast-track Cardiac Surgery: A Randomized Controlled Comparative Trial

Aisa T.[1], Ameen A.[1], Rugaan A.[1], Hussein A.[1], Amin A.[1], Takrouni Y.[1]
[1]King Abdullah Medical City Hospital - Makkah (Saudi Arabia)

Background and objectives: During pilgrimage, more than 2.5 million Muslims gather at the same time in Makkah, Saudi Arabia, which represents a special challenge to our post-cardiac surgery ICU (CSICU) due to the increasing rate of fast-track cardiac surgery cases which in turn, necessitates fast- track weaning from mechanical ventilation, post operatively. Thus, we aimed to compare post-operative adaptive supportive ventilation (ASV) mode to our unit standard protocol of weaning using APVcmv /PSV mode in such group of patients.
Methods: This study is an unblinded, randomized, controlled, parallel arm, comparative study between the two weaning protocols. The primary objective was to compare the duration of post-operative mechanical ventilation using a weaning protocol based on ASV mode with a weaning protocol based on APVcmv/PSV.
Results: Of 115 patients screened for the study, 60 patients have completed it and they were randomly assigned to either ASV or APVcmv/PSV. The median duration of ventilation was statistically significantly shorter in the ASV group (245, [194-332] minutes) than that in the APVcmv/PSV group (340, [222-450] minutes) (P value 0.041). Moreover, manual ventilator adjustments and alarms were lower in ASV group than the other group with statistically significant difference (P value 0.012) while there was no difference in the number of arterial blood gases estimations. Interestingly, the ICU complications were significantly lower in the ASV group (P value 0.035), however, the ICU length of stay, hospital length of stay, and ICU mortality did not show any difference between both groups.Conclusion: ASV reduces ventilation time by 1.6 hours in patients who have undergone fast- track cardiac surgery while reducing the number of manual ventilator adjustments.
Conclusion: ASV reduces ventilation time by 1.6 hours in patients who have undergone fast- track cardiac surgery while reducing the number of manual ventilator adjustments.

5526

Impact of mechanical power on mortality in ARDS patients

Chiumello D.[1], Caccioppola A.[1], Pozzi T.[2], Lusardi A.[1], Consonni D.[3], Coppola S.[1]
[1]San Paolo University Hospital - Milan (Italy), [2]University of Milano, San Paolo Hospital - Milan (Italy), [3]Ospedale Maggiore Policlinico - Milan (Italy)

Background and Goal of Study: In ARDS patients, mechanical ventilation should minimize ventilator induced lung injury. The mechanical power, which is the energy released to the respiratory system according to the applied tidal volume, PEEP, respiratory rate and flow, should reflect the ventilator induced lung injury; however, similar levels of mechanical power applied in different lung size could be associated to different effects. The aim of this study was to assess the role of both mechanical power and transpulmonary mechanical power, normalized to predicted body weight, respiratory system compliance, lung volume and the amount of aerated tissue, on intensive care mortality.
Materials and Methods: Retrospective analysis of ARDS patients, previously enrolled in seven published studies. All patients were sedated, paralyzed and ventilated in volume-controlled mode. Partitioned respiratory mechanics and CT scan quantitative analysis were performed.
Results and Discussion: A total of 222 ARDS patients were included, 88 (40%) died in ICU. Mechanical power was not different between survivors and non-survivors (14.97 [11.51-18.44] vs 15.46 [12.33-21.45] J/min) and did not affected intensive care mortality. The multivariable regression logistic model showed that mechanical power normalized to well inflated tissue (IRR: 2.63 [95% CI: 1.09-6.35] p= 0.030) and mechanical power normalized to respiratory system compliance (IRR 1.78 [95% CI: 1.17-2.71] p=0.007) remained independently associated with intensive care mortality after adjusting for age, SAPS II and ARDS severity. With the same logistic model, transpulmonary mechanical power normalized to well inflated tissue significantly increased intensive care mortality (IRR 2.94 [1.13-7.63] p= 0.026).

Conclusion: In conclusions, mechanical power and transpulmonary mechanical power are associated to the short term outcome in ARDS patients only when normalized on the respiratory system compliance or on the amount of well aerated tissue.

5594

Ventilator associated pneumonia in patients with aneurysmal subarachnoid hemorrhage. Preliminary results from a retrospective study

Petrovic S.[1], Russo E.[2], Gamberini E.[2], Cocciolo F.[2], Palazzo M. A.[2], Agnoletti V.[2]
[1]Alma Mater - Bologna (Italy), [2]Ospeale Bufalini - AVR Romagna - Cesena (Italy)

Background and Goal of Study: Ventilator associated pneumonia (VAP) is a potentially serious complication in patients with aneurysmal subarachnoid hemorrhage (SAH). Systemic signs of infection from VAP may exacerbate secondary brain injury, prolong the length of stay in the ICU and increase morbidity and mortality rates. The main aim of the study was to determine the incidence of VAP among patients with SAH and to ascertain whether the presence of VAP, as well as the duration of antibiotic treatment have an impact on patient mortality.
Materials and Methods: This is a preliminary retrospective cohort study based on data collected from January to October 2019 on 44 patients having SAH. Statistical analysis was performed using the software IBM SPSS 22.0. Mann-Whitney U test and Fisher Test were used to check for statistical significance. The complete study will include a total of four years spanning 2016-2019.
Results and Discussion: The median length of stay in the ICU was 6 (IQR 14.75) days and 9 (20.4%) people died during their stay. None of the patients had aspiration pneumonia. 14 of the 44 patients developed VAP and received antibiotic treatment as a result. The median SAPSII score of our patients was 31.5 (IQR 32.5) and all aneurysms were excluded from circulation using either an endovascular coiling or a surgical clipping. Patients with VAP had longer stays in the ICU than those without VAP (21.143±7.98 vs 4.72±5.45; P<0.001). There was no association between development of VAP and patient mortality (Fisher Test = 0.429). Neither the WFNS score nor the GCS score and presence of VAP were correlated (P=0.157 and P=0.193 respectively). An average of 5 days of antibiotic treatment did not influence mortality of patients with VAP (P=0.6).
Conclusion: Our preliminary data suggests that the 5 day antibiotic treatment could perform just as well as longer antibiotic treatments in terms of patient mortality. However, due to the small sample size more data needs to be collected to confirm our conclusions.
References:
1. Acquarolo A, et al. Antibiotic prophylaxis of early onset pneumonia in critically ill comatose patients. A randomized study. Intensive Care Med 2005;31:510-6.
2. Cui, J.B., et al. Risk factors for early-onset ventilator-associated pneumonia in aneurysmal subarachnoid hemorrhage patients. Brazilian Journal of Medical and Biological Research, 51(7), e6830. Epub May 17, 2018.

6074

Flow controlled ventilation applied in a case of patient with mediastinitis and bilateral pleural empyema

Palaczynski P.[1], Bialka S.[1], Copik M.[1], Misiolek H.[1]
[1]Medical University of Silesia - Zabrze (Poland)

Background: Recently new ventilation mode was proposed as an alternative to existing standard modes-flow controlled ventilation (FCV). (1) Existing scarce evidence may suggest potential use of FCV in many clinical settings. (2)
Case Report: We present the case of a 48 year old patient admitted to the Intensive Care Unit after cervicotomy and bilateral thoracotomy due to mediastinitis and bilateral pleural empyema in the course of tonsillitis and perforation of an abscess to the retropharyngeal space. Prior to the admittance rapid deterioration of cardiopulmonary sufficiency was observed and immediate surgical intervention was needed. Past medical history consisted only of obesity. In the Intensive Care Unit severe multisystem organ failure was observed despite prompt, multiway treatment. Due to low levels of PaO2/FiO2 ratio the use of FCV via decidated respirator and tube in tube technique was proposed. Within the designated time of ventilation increase in pO2 and constant level of pCO2 was observed.
Discussion: Up to date clinical evidence show that FCV may provide adequate and safe ventilation in the operative theater setting. What is more flow controlled expiration, which is constituent of FCV applied to animal models with artificially induced lung injury may improve ventilation and accomplish principles of lung protective ventilation. (3) In the presented case FCV served as an alternative method of ventilation before the onset of more aggressive treatment. Presented results are consistent with existing evidence, however prospective controlled clinical trials are needed to establish the clinical usefulness of this method.
References:
1. Minimisation of dissipated energy in the airways during mechanical ventilation by using constant inspiratory and expiratory flows – Flow-controlled ventilation (FCV). Barnes T, Asseldonk D, Enk D, Medical Hypotheses, Volume 121, 2018, 167-176.
2. Flow-controlled ventilation during ear, nose and throat surgery. A prospective observational study. Schmidt, J et al. European Journal of Anaesthesiology: Volume 36, Issue 5, 2019, 327–334.
3. Flow-controlled expiration: a novel ventilation mode to attenuate experimental porcine lung injury. Goebel, U. et al. British Journal of Anaesthesia, Volume 113, Issue 3, 2018, 474 – 483.
Learning points: Further research and clinical evaluation of potentially beneficial flow controlled ventilation is needed to establish its role as a new method of mechanical ventilation.

6349

Pneumothorax and Cardiac Arrest Pressures Surpass Higher Threshold in Lung Recruitment Maneuvers: An In Vivo ARDS newborn model

Gutiérrez Martínez A.[1], Guilló Moreno V.[2], González Pizarro P.[3], Serrano Zueras C.[1], Romero Berrocal A.[1], García Fernández J.[1]
[1]Hospital Univeritario Puerta de Hierro - Madrid (Spain), [2]Hospital Puerta de Hierro de Majadahonda - Majadahonda (Spain), [3]Hospital Univeritario La Paz - Madrid (Spain)

Background and Goal of Study: Recruitment maneuvers (RM) are beneficial for pediatric patients with ARDS . These consist of a transient and controlled increase of transpulmonary pressure, with the goal of opening alveolar units. RM have been shown to improve oxygenation and reduce the heterogeneity of the distribution of tidal volume (TV) in patients with ARDS. There is no consensus on how RM should be programed, so that the efficacy and safety objetives are met. This is due to the potential adverse events that may occur during the RM. Although the most frequent are self-limited (hypotension, desaturation and changes in heart rhythm), serious adverse events such as pneumothorax and cardiac arrest may occur. The aim of this study is to determine the level of peak inspiratory pressure (PIP), at wich pneumothorax and asystole occur.
Materials and Methods: We designed a prospective, experimental study. We selected 11 Landrace x Large-White piglets, between two and three days old, with a mean weight of 2.54 ± 0.22 kg. Under general anesthesia and tracheal intubation, invasive hemodynamic monitoring and bilateral chest tubes (10 French) were inserted.To develop the reduced compliance neonatal model, bronchio-alveolar washes with 10ml / kg of hot physiological saline, was performed.The ventilation mode was pressure controlled, with a constant driving pressure (15 cmH2O); the PIP was raised at 2-min intervals, with steps of 5 cm H2O until air leak was observed through the chest tubes. The statistical analysis was performed with the STATA 15 program.
Results: Pneumothorax was observed with a PIP of 65.55 ± 9.5 cmH2O. The highest PIP causing pneumothorax was 80 cmH2O, and the lowest was 50 cmH2O. Asystole was produced at PIP 57.77 ± 9.501 cmH2O. The minimum PIP at which we recorded asystole was 50 cmH2O, and the maximum was 80 cmH2O. The Cardiac Output decreases since the PIP 20 cmH2O, being stadistically significant al PIP 25cmH2O, with a decrease of 0,225 ml/min (p 0,054).
Discusion-Conclusion: According to our results, the recruitment maneuver pressures used in the Critical Care Unit or the operating theater are lower than those PIPs producing pneumothorax and asystole, in our in vivo ARSD newborn model. Nevertheless hemodynamic alterations have appeared since the initial stages of PIP. For this reason, every patient under RM should be closely monitored.

6379

Shortening Lung Recruitment Maneuvers, Would Be Effective? An In Vivo ARDS newborn model

Guilló Moreno V.[1], Gutiérrez A.[1], Serrano Zueras C.[1], Romero Berrocal A.[1], Torre Oñate M.[1], García Fernández J.[1]
[1]Hospital Puerta de Hierro de Majadahonda - Majadahonda (Spain)

Background and Goal of Study: MRPs have shown an improvement in tissue oxygenation, increase in alveolar volume and a homogeneous distribution of TV in patients with ARDS. Although the adverse events asociated to RM, have been described as transient and self-limited, their routine use is not recommended; due to uncertainty about its long-term consequences and its possible relationship with an increase in morbidity and mortality.There is no consensus consensus on how RM should be programed, so that minimizes the risk of hemodynamic and barotrauma alterations. The aim of this study is to determine if the shortening of RM is effective in terms of improving ventilatory parameters and tissue oxygenation, in an in vivo ARSD newborn model.
Materials and Methods: We designed a prospective, experimental study. We selected 5 Landrace x Large-White piglets, between two and three days old, with a mean weight of 2.54 ± 0.22 kg. Under general anesthesia and tracheal intubation, invasive hemodynamic monitoring was performed with a pediatric arterial thermodilution catheter. To develop the reduced compliance neonatal model, bronchio-alveolar washes with 10ml/kg of hot physiological saline, was performed. We designed two RM protocols: type 1 and type 2. Both maneuvers PIP is increased 5cmH2O to a maximun of 30cmH2O and PEEP 15cmH2O. The duration of the steps in type 1 was 3 breaths in each step and 5 breaths in the maximum pressure step (19 sec). In type 2 was 5 breaths in each step and 10 breaths in the maximum pressure (34 sec). The statistical analysis was performed with the STATA 15 program.
Results: Increase in Static compliance from basal to after RM was in type 1 + 1.32 cmH2O (p 0.01). And after RM type 2 was + 1.62 cmH2O (p 0.005). Static compliance is higher than Teorical compliance (1cmH2O / kg); difference in RM type 1 was + 0.76cmH2O (p 0,101) and difference in RM type 2 was + 0.92 cmH2O (p 0,018). The PaO2 / FiO2 index improves after RM type 1 the difference is + 268.12 (p 0.001); and in type 2 + 282.16 (p 0.001). We found a decrease in cardiac output after RM TYPE 2 of 0.062 L / min (p 0.049). The remaining hemodinamic variables remained without significant changes.
Discussion-Conclusion: The results obtained allow us to verify the effectiveness of shortening RM protocols in ARSD newborn model. We hipothesize that durantion of RM could be a determinig factor in the development of hemodynamic alterations.

4470

How can we manage the nitric oxide concentration of inhalation therapy with high flow cannula system? - simulator study

Abe K.[1], Kamizato K.[1], Haga A.[1], Taira T.[1], Kakinohana M.[1]
[1]University of the Ryukyus - Okinawa (Japan)

Background and Goal of Study: With Nitric oxide (NO) inhalation therapy, a new option using high-flow nasal cannula (HFNC) system was developed. In inhalation therapy using HFNC, the correlation between the setting concentration and the administrated concentration is unclear. In this study, we investigated the correlation between the setting NO concentration and the measured using a spontaneous breathing simulator with HFNC system.
Materials and Methods: We made a spontaneous breathing simulator. The simulator was made from three components; lung simulator (Training and Test Lung), Hamilton T1 ventilator and Airway Management Trainer model for tracheal intubation. Precision Flow (Vapotherm,Inc, USA) was chosen as the HFNC system. Ainoflow was used for NO administration and measurement. Setting NO concentration (NOset) and measured NO concentration at the pharyngeal (NOmeasured) were recorded. Minute ventilation volume (MV) and HFNC fresh gas flow (FGFHFNC) were set for several conditions. Each measurement was repeated four times, and the average was obtained. The correlation coefficients between NOset and NOmeasured in each setting were calculated using JMP.
Results and Discussion: In the setting of MV 5 L/min and FGFHFNC rates 20 L/min, [NOmeasured] = 0.174 + 0.782 * [NOset] (R2 = 0.999). In the setting of MV 15 L/min and FGFHFNC rates 20 L/min, [NOmeasured] = -0.141 + 0.673 * [NOset] (R2 = 0.996). In the setting of MV 15 L/min and FGFHFNC rates 10 L/min, [NOmeasured] = − 0.371 + 0.596 * [NOset] (R2 = 0.996). There was a high correlation between the NOset and the NOmeasured in each condition. When the MV was increased, the measured NO concentration at pharyngeal was decreased. When NO was administered with HFNC, the pharyngeal NO concentration was lower than the setting concentration. The pharyngeal concentration was directly proportional to the pulmonary inhalation concentration. The difference between measured concentration at pharyngeal and setting concentration was wide in large MV or low FGFHFNC rate.
Conclusion: There are two findings assumed from our simulation about NO inhalation therapy with HFNC. (1) The NO concentration at pharyngeal can maintain with a sufficient HFNC flow rate. (2) The correlation between the NOset and the NOmeasured is well. Therefore, the NO concentration at pharyngeal (pulmonary inhalation NO concentration) can maintain with the setting NO concentration.

5945

Effects of Continuous External Negative Pressure on Respiratory Mechanics and Function in an Experimental Model of Atelectasis

Huhle R.[1], Scharffenberg M.[1], Wittenstein J.[1], Vivona L.[2], Herzog M.[1], Gama De Abreu M.[1]
[1]University Hospital Carl Gustav Carus Dresden - Dresden (Germany), [2]Dept. of Pathophysiology and Transplantation, University of Milan - Milano (Italy)

Background and Goal of Study: Continuous external negative pressure (CENP) can be as effective as positive end-expiratory pressure (PEEP) in recruiting lungs, but without impairing haemodynamics. We tested the hypothesis that CENP, applied regionally to the thorax or abdomen only, increases the caudal end-expiratory trans-pulmonary pressure (TPcaud) depending on the PEEP level.
Materials and Methods: On eight surfactant-depleted mini-pigs, a CENP shell was placed on abdominal and thoracic position. Animals were ventilated using PEEP of 15, 7 and 0 cmH2O. On each PEEP, CENP of -40, -30, -20, -10, and 0 cmH2O were applied (Figure 1A-B). Respiratory variables, lung mechanics and haemodynamics were recorded. Electrical impedance tomography allowed assessment of the centre of aeration. Zero CENP served as reference for comparisons.
Results and Discussion: CENP of -20 cmH2O increased TPcaud during PEEP of 0 (P<0.001) and 7 cmH2O (P<0.001), while CENP of -30 cmH2O increased TPcaud during PEEP of 15 cmH2O (P=0.012) (Figure 1C). CENP of -20 cmH2O reduced the mean airway pressure at zero PEEP (P=0.025). Both elastance (P<0.001) and resistance (P<0.001) of the respiratory system decreased at CENP of -30 and -40 cmH2O at both PEEP of 0 and 7 cmH2O. CENP of -30 cmH2O reduced the applied mechanical power during zero PEEP (P<0.001). CENP of ≤-20 during PEEP≤7 (P<0.001) increased PaO2, respectively. The centre of aeration was shifted dorsally by CENP of 20 cmH2O at PEEP zero and 15 cmH2O, as well as at CENP of -10 cmH2O during PEEP of 7 cmH2O (P<0.001, each). Cardiac output decreased significantly at CENP of -20 cmH2O and all PEEP levels (P<0.001). Effects on TPcaud, elastance and cardiac output were less pronounced in thoracic than in abdominal position.
Conclusion: In mechanically ventilated pigs with atelectasis, CENP combined with zero to moderate PEEP recruited lungs and improved oxygenation, mainly when the shell was placed at the abdomen. CENP ≤ 20 cmH2O impaired haemodynamics, comparable to PEEP.

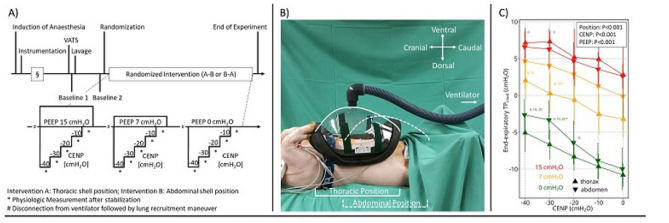


Figure 1: A) Experimental protocol (VATS: Video-assisted thoracoscopy; CENP: Continuous external negative pressure; PEEP: Positive end-expiratory pressure; §: Main study); **B)** CENP shell positions on the animal; **C)** End-expiratory caudal transpulmonary pressure for different CENP and PEEP levels in thoracic and abdominal position (TP_{caud}: Local transpulmonary pressure; CENP: Continuous external negative pressure; PEEP: Positive end-expiratory pressure; Triangles indicate different shell positions (abdomen and thorax); colors represent different PEEP levels; super-posed numbers indicate significance (P<0.05) of the respective CENP level compared with the CENP level of the number; stars indicate difference between both positions).

4358

Development septic arthritis due to B. Fragilis in a critical ill patient

Savir S.[1], Frank D.[2], Kuts R.[1], Zlotnik A.[1], Klein M.[1], Brotfain E.[1]
[1]Soroka Medical Center - Beer-Sheva (Israel), [2]Division of Anesthesia and Critical Care, Soroka Medical Center - Beer Sheva (Israel)

Background: Septic arthritis of native joints is a potentially life-threatening disease [1]. The most frequently isolated pathogens are Gram positive cocci [2, 3]. Bacteroides fragilis is a rare pathogen in joint infections and related to skin or local perineal infections or are secondary to B. fragilis bacteremia from another source, for example from the gastrointestinal tract.
Case Report: A 64-year-old male was admitted with fever. He had a past medical history of paraplegia. The patient suffered a mid-shaft femur fracture 12 months earlier, without dislocations, treated conservatively. CT scan demonstrated avascular necrosis of left hip joint with destruction. Patient was treated with antibiotics including metronidazole. After initial surgical drainage, the patient developed multiple organ failure and septic shock. During this period, intensive supportive management included the administration of crystalloids, vasopressors and broad-spectrum antibiotics. Diagnosis of septic arthritis was confirmed by a positive synovial fluid for B. fragilis. Due to recurrence of multiple intra-articular abscesses a left extended hemipelvectomy was performed. The patient was discharged from the unit 8 weeks after admission.
Discussion: Despite the fact that fractures in a paralyzed limb are relatively rare, such asymptomatic, subclinical fracture of the hip joint might be a potential risk factor for the development of septic arthritis.
References:
1. Papaparaskevas J. et al. Epidemiological characteristics of infections caused by Bacteroides, Prevotella and Fusobacterium species. 2011.
2. Mathews CJ. et al. Bacterial septic arthritis in adults. 2010.
3. Dorsher CW. Anaerobic bacteremia: decreasing rate over a 15-year period. 1991.
Learning points: Septic arthritis due to B. fragilis infection is a life-threatening disease that might be complicated by potential multiple organ failure. Early antibacterial therapy combined with radiological drainages and surgical intervention can lead to significant improvement in the patient's outcome.

4578

Monitoring of intra-abdominal pressure in patients with septic shock

Stojanovic M.[1], Svorcan P.[1], Karamarkovic A.[1], Stevanovic P.[2]
[1]University medical center Zvezdara - Beograd (Serbia), [2]University medical center Dr Dragisa Misovic - Beograd (Serbia)

Background and Goal of Study: A large number of patients with septic shock develop intra-abdominal hypertension (IAH). The mechanism of IAH within sepsis is the existence of common predisposing factors (massive fluid replacement, third space, ileus, splanchnic hypoperfusion, bowel distension) that result in impaired perfusion and accumulation of toxic products. Determining the impact of IAH on the mortality rate of patients with septic shock.
Materials and Methods: The prospective cohort study was conducted on 50 patients who had septic shock. Measurement of intra-abdominal pressure (IAP) via urinary catheter placed in the urinary bladder was performed every 12 hours and monitored until they left the intensive care unit. Based on the measured IAP values, all patients were divided into a group of patients with normal IAP values (n = 15) and with increased values (n = 35). Using APACHE II score, lactate levels, values of mean arterial pressure (MAP), abdominal perfusion pressure (APP), filtration gradient (GF) and diuresis, the obtained values were compared to IAP in both groups of patients.
Results and Discussion: In the first group of patients the mean IAP was 8.3 ± 2.3 mmHg, in the second group of patients the mean IAP was 16.4 ± 4.2 mmHg. There was a highly statistically significant difference in the variables APACHE II score ($p = 0.004$), lactate values ($p = 0.0001$), MAP ($p = 0.0001$), APP ($p = 0.002$), GF ($p = 0.006$) and diuresis ($p = 0.001$) in two studied groups. With the increase in IAP statistically significantly increase was in lactate level ($r = 0.783$, $p = 0.0001$), and decrease in values of MAP ($r = -0.83$, $p = 0.01$), APP ($r = -0.77$, $p = 0.05$), GF ($r = -0.69$, $p = 0.05$) and diuresis ($r = -0.54$, $p = 0.01$). There was a statistically significant correlation between IAP increase and patients death ($r = 0.391$, $p = 0.001$).
Conclusion: Patients with septic shock who develop IAH have a statistically high correlation with organ dysfunction, because the IAH itself can worsen and lead to death. IAH has an impact on the increase in mortality rates in patients with septic shock.

4557

Comparison of diagnostic and prognostic value among Presepsin (sCD14-ST), Procalcitonin (PCT) and Interleukin-6 (IL-6) in the management of Sepsis

Kumar S.[1], Maurya Y. P.[1], Malviya D.[1], Tripathi M.[1]
[1]Dr. Ram Manohar Lohiya Institute Of Medical Sciences - Lucknow (India)

Background and goal of study: Membrane monocyte/macrophage CD-14 (mCD-14) is a co-receptor for endotoxin, & its soluble form is k/a Presepsin or sCD-14 ST cleaved from the monocyte/macrophage-specific mCD-14 receptor complex during systemic infections. In our study we tested the hypothesis that: Presepsin may have better diagnostic & prognostic value amongst PCT & IL-6; Presepsin may correlate with illness severity score (SOFA) and mortality. The aim of this study is to investigate the clinical value of Presepsin in early diagnosis, risk stratification & prognostic evaluation of sepsis in a patient with sepsis/septic shock admitted in ICU & to compare it with the diagnostic & prognostic value of PCT & IL-6.
Material and methods: Total 30 patients were included in this study which met all inclusion criteria. Subjects were divided into two groups (Sepsis and Septic shock) on the basis of clinical diagnosis. Blood samples for biomarkers like Presepsin, PCT & IL-6 measurements were taken at the time of admission/arrival in ICU before administration of first dose of antibiotics at time (T0)/D1 & at 24hrs(T1)/D2, & further at the interval of 24 hours up to 3 days of ICU treatment. SOFA score was determined on D1 through D3. Statistical Analysis: The tests used are Chi-square test, Unpaired t-test/Mann-Whitney U test & Spearman correlation coefficient. The sensitivity, specificity, positive predictive value (PPV) & negative predictive value (NPV) with its 95% confidence interval (CI) was calculated.
Results and discussion: Presepsin was significantly ($p=0.01$) lower in sepsis patients (169.50±34.74 ng/ml) compared to septic shock (291.90±334.67 ng/ml) at Day 3. However, IL-6 was significantly ($p<0.05$) lower in sepsis patients compared to septic shock at all the time periods (D1- 41.20 ±45.80 & 219.11 ±314.95 with p value 0.009, D2- 83.50 ±126.73 & 224.85 ±314.84 with p value 0.03 and on D3- 48.70 ±55.29 & 308.88 ±390.63 pg/ml with p value 0.02) . SOFA was significantly lower in sepsis patients compared to septic shock at Day 2 ($p=0.003$) and Day 3 ($p=0.0001$)).
Conclusion: Value of Presepsin in differentiating sepsis from septic shock is better than PCT but inferior to IL-6. Prognostic value of PCT in predicting mortality is better than IL-6 & Presepsin (sensitivity & specificity of PCT were 66.7% & 50% vs IL-6 61.1% & 66.7% & Presepsin 44.4% & 50%) & PCT also best correlated with disease severity score SOFA.

4629

Efficacy of recombinant thrombomodulin for septic multiple organ failure and Disseminated Intravascular Coagulation: a single centre retrospective cohort study

Ota T.[1], Nakamura Y.[1], Miyamoto M.[1], Komuro T.[2], Kamio T.[1], Koyama H.[1]
[1]Shonan Kamakura General Hospital - Kamakura (Japan), [2]TMG Muneoka Central Hospital - Shiki (Japan)

Background and Goal of study: Recombinant thrombomodulin (rTM) is one of the anticoagulants developed in Japan and is expected to be effective against septic Disseminated Intravascular Coagulation (DIC). The possibility of improving multiple organ failure in sepsis has also been suggested, but these have not been clarified yet. The SOFA score is generally used as an index for evaluating multiple organ failure in sepsis. Recent studies have shown that this rate of change (ΔSOFA) during ICU stay is related to the severity and mortality of patients with sepsis. The aim of our study is to examine whether this administration of rTM improves multiple organ failure in sepsis or septic DIC.
Materials and Methods: A single centre retrospective cohort study. The subjects were sepsis patients who entered ICU from April to October 2017. The primary endpoint was ΔSOFA. The secondary endpoints were DIC incidence and acute DIC score at the time of ICU admission and after 7 days, the change in the DIC score (ΔDIC), 28-day mortality, and in-hospital mortality. Acute DIC score was used as the DIC evaluation. Mann-Whitney U test and $\chi 2$ test was used as statistical evaluation with $p < 0.05$ as the significance level.
Results and Discussion: 95 patients were included in the study period, of which 21 were in the rTM group and 74 were the control group. The ΔSOFA was 2.5 ± 3.3 vs. 2.9 ± 4.8 (p = N.S.). The incidence of DIC was 62% vs. 20% ($p < 0.01$) at ICU admission and 48% vs. 18% ($p < 0.01$) 7days after. The acute DIC score was 4.1 vs. 2.0 ($p < 0.01$) at ICU admission and 3.1 vs. 2.1 ($p < 0.05$) 7days after. There was no significant difference in 28-day mortality (29% vs. 15% (p = N.S.)), and in-hospital mortality (38% vs. 20% (p = N.S.)). Although, there was no significant difference in patient age or SOFA score at ICU admission between the rTM group and control group, but ΔDIC was significantly (1.0±2.4 vs. -0.1±2.0 ($p<0.05$)).
Conclusion: There was no difference in SOFA score and ΔSOFA between rTM group and control group. This study is limited to retrospective study, and stratification of patient backgrounds may give different results. Although there was a difference

in the incidence of DIC at ICU admission, because of the incidence 7days after was reduced and ΔDIC was different, rTM may be expected to be effective as a DIC treatment.

4747

Pneumococcal sepsis with septicemia in a 6 years old child, complicated with Pneumococcal-associated hemolytic uremic syndrome (pHUS): case report

Sazonov V.[1], Streletskaya Y.[2]
[1]Nazarbayev University School of Medicine - Nur-Sultan (Kazakhstan), [2]Children's Hospital of Infectious Diseases - Almaty (Kazakhstan)

Background: Despite the vaccination against pneumococcal infection has been taking place and actively promoted in Kazakhstan as well as worldwide, frequency of the infection remains high among children. One of the rare but severe complications of generalized invasive pneumococcal infection is pHUS.
Case Report: A 6-year-old girl was admitted to the clinic complaining of vomiting, fever and rash. Parents indicated that the disease has started 6 hours ago, when the child's temperature rose to 39˚C. Upon admission, the patient was alert and responsive. On day 2 depression of consciousness to stupor was noted, oxygen saturation dropped to 83%, which is why the child was intubated and placed on mechanical ventilation in SIMV mode. On the same day due to the presence of prolonged anuria, azotemia and edema abdominal catheter for peritoneal dialysis was placed. After the dialysis catheter implantation, the realization and progression of hemorrhagic syndrome with development of anemia was noted. This is why transfusion with FFP as well as packed red blood cells was initiated. On day 3 the results of nasal, CSF and blood cultures came in, from which pneumococcus was identified, also, PCR analysis of the CSF was obtained and result was positive for pneumococcal DNA, which made us to reconsider the diagnosis and change it to generalized form of pneumococcal infection with septicemia, complicated with pHUS. The patient was switched to hemodialysis, which resulted in slight reduction of nitrogenous substances in the blood.Respiratory function was improving, which allowed us to switch to the CPAP mode. 22 days following hospitalization creatinine level was equal to 294mcmol/l and the patient was transferred to the specialized nephrology clinic, where two more hemodialysis sessions were conducted, and she was discharged 2 weeks later with createnine level of 174 mcmol/l (See table 1).
Discussion: Diagnosis of pHUS is based on the association of the clinical triad of HUS with confirmed or suspected S. pneumoniae infection. The clinical course of pHUS is typically more severe, with more frequent need for dialysis and transfusions, and longer hospital stays.
Learning points: Generalized course of pneumococcal infection complicated with pHUS is rare, clinicians should pay particular attention when dealing with immunocompromised and unvaccinated as well as asplenic patients (e.g. after splenectomy).

4967

Incidence and outcome of sepsis and septic shock in patients of a multidisciplinary North-Russian intensive care unit

Lochekhina E.[1], Makoveev S.[2], Vinogradova R.[1], Semenkova T.[1], Ayyaz H.[1], Kirov M.[1]
[1]Northern State Medical University - Arkhangelsk (Russia), [2]City hospital #1, Arkhangelsk, Russian Federation - Arkhangelsk (Russia)

Background and Goal of Study: Sepsis and septic shock are considered to be the leading cause of mortality in critically ill patients. Since a morbidity from sepsis in the intensive care units (ICU) is changing over time, the purpose of our study was to evaluate the incidence, structure and outcomes of sepsis and septic shock according to Sepsis-3 definitions in a Russian ICU.
Materials and Methods: We performed a retrospective analysis of 3103 admissions in the multidisciplinary ICU of a 1000-bed university hospital (the City Hospital #1 of Arkhangelsk, Russia with an uptake area in North Russia covering population of 300.000) during year 2018 and assessed ICU charts of 121 (3.9% from all admissions) adult patients with diagnosis of sepsis. We evaluated age, gender, origin of sepsis, localization of organ dysfunction according to SOFA score, duration of ICU stay, and mortality rate. The data are presented as n (%), M±SD or median (25–75 percentiles).
Results and disccussion: The study population included 62 (51.2%) males and 59 (48.8%) females. The mean age was 66.5±14.7 years, the duration of ICU stay was 4 (1–7,2) days. The most common origins of sepsis were pulmonary and abdominal sources (in 43.8% and 28.9% of patients, respectively), followed by urological, soft tissue, central nervous system, vascular, combined or other infections. Septic shock occurred in 70 (57.9%) of cases, Other sepsis-induced organ dysfunctions with SOFA score ≥2 included kidney injury (57.9%), deterioration of mental state (53.7%), acute respiratory distress syndrome (ARDS) (50.4%), disseminated intravascular coagulation (28.9%), metabolic disorders (26.4%), and hepatic failure (23.1%). The mortality rate was 31.4% in sepsis without septic shock and 65.7% in septic shock. From all non-survivors, 37.1% died during the first 24 hours.
Conclusions: Sepsis occurs in 3.9% of ICU patients with mortality rate increased twice in septic shock. The most common origins of sepsis are pulmonary and abdominal sources. In addition to septic shock, the organ dysfunctions observing in more than half of sepsis patients include kidney injury, deterioration of mental state and ARDS.

5045

Septic shock due to Acute bartholinitis, a case report

Bolón Villaverde A.[1], Park S. H.[1], Caruezo Rodríguez V.[1], Díaz-Vieito Piélagos M.[1], Naveira Castelo A.[1], Taboada Muñiz M.[1]
[1]Complexo Hospitalario Universitario de Santiago de Compostela - Santiago de Compostela (Spain)

Background: Acute Bartholinitis its a local infectious process, a common reason for consultation in ED1. Frequently, it is treated with drainage and PO antibiotics with no complications. We report a case of a healthy female who suffered one of serious complications related to Bartholinitis.
Case Report: A 27 years old female with no other medical history, except for use of IUD as anticonceptive purpose, was sent to ED by the primary care physician for acute Bartholinitis with fever, abdominal distention, hypotension and taquicardia. She already had consulted because of this to the physician 48 hours ago, PO antibiotics and NSAIDs were prescribed but no drainage of the abscess. The clinical statue rapidly deteriorate despite drainage of the abscess in the ED, requiring IV fluid therapy, vasopressors and mechanical ventilation due to acute pulmonary edema associated to her septic condition. Blood work demonstrated leucopenia with left shift, coagulopathy, procalcitonin >100, metabolic acidosis with Hyperlactacidemia. An abdominal and pelvic CT scan with contrast was performed where severe pelvic inflammation and free liquid in the abdominal cavity were present. Because of critical clinical state, empiric treatment with Meropenem, Tigecyclin and Metronidazole was initiated, exploratory laparotomy was performed with no findings; after the surgery she was transferred to ICU, in mechanical ventilation, PaFi 122 mmHG, with noradrenalin at 0.8 mcg/kg/min; SOFA score of 10 points. The ICU evolution was favorable; in next 48 hours she was extubated, noradrenalin suspended, and the blood work up normalized. Positive culture of the abscess demonstrated Prevotella bivia. She was maintained in ICU for 4 days and discharged from the hospital after 12 days.
Discussion: Acute bartholinitis its a local process that curses with severe pain and disconfort but its a rare cause of septic shock. There are a few cases of Bartholinitis related sepsis published in the literature. Bacteriemia can be related with manipulation of the abscess.
Learning points: There was delayed initiation of treatment recommended by the Surviving sepsis camping2 due to underestimated risk of the patient and her disease.
References:
1. Chêne G, Tardieu AS, Nohuz E, Rabischong B, Favard A, Mage G. Gynecol Obstet Fertil. 2006 Jul-Aug;34(7-8):615-8. Epub 2006 Jun 13. French.
2. Rhodes, A., Evans, L.E., Alhazzani, W.et al. Intensive Care Med (2017) 43: 304. https://doi.org/10.1007/s00134-017-4683-6.

5494

Changes in chloride concentration and association of hyperchloraemia with organ function in sepsis and septic shock

Lochekhina E.[1], Vinogradova R.[1], Lychakov A.[1], Makoveev S.[2], Kuzkov V.[1], Kirov M.[1]
[1]Northern State Medical University - Arkhangelsk (Russia), [2]City hospital #1, Arkhangelsk, Russian Federation - Arkhangelsk (Russia)

Background and Goal of Study: Hyperchloraemia is increasingly recognised electrolyte disorder in critically ill as it may increase the attributive risks of acidosis, acute kidney injury, refractory shock and hypotension, as well as mortality. The aim of our study was to assess the changes in chlorides and association of hyperchloraemia with organ dysfunction in sepsis and septic shock.
Materials and Methods: The medical records of 121 patients diagnosed with sepsis have been retrospectively analysed for the changes in chloride concentration and organ functions according to SOFA score over 72 hrs after admission to mixed ICU. Septic shock and sepsis have been defined in accordance with SEPSIS-3 criteria. The cumulative fluid balance was calculated on Day 3 after ICU admission. The 28-day mortality and the length of ICU stay have also been registered.
Results and Discussion: Septic shock was diagnosed in 65 (54%) patients. On ICU admission, chloride concentration has been available in 86% of sepsis patients. Twenty-one (17.4%) of all the patents were excluded from the following analysis due to haemodialysis / haemofiltration that could affect natural changes in chloride and creatinine. Hyperchloraemia at admission (Cl– ≥ 106 mmol/L) was registered in 40% patients with septic shock and in 48% of patients with sepsis without shock. In shock, only the change in Cl– defined as a difference between the last and first available values over 72 hrs but not absolute values of plasma Cl– concentration on admission correlated with parallel changes in SOFA score (rho = 0.49, n = 25, p = 0.01). Changes in Cl– were more prominent in septic shock compared with sepsis without shock: 4 (1–14) and 2 (–2..+5) mmol/L, respectively (p = 0.04). Lactate and creatinine concentrations on admission as well as cumulative fluid balance by 72 hrs were higher in non-survivors (p = 0.002). There was no association of hyperchloraemia with mortality or length of ICU stay.
Conclusion: Hyperchloraemia is a frequent electrolyte disorder observing in almost a half of patients with sepsis. The patients with septic shock demonstrate more prominent increase in chloride concentration. Increased plasma chloride in septic shock is associating with a progress of organ dysfunction.

5522

Sepsis due to Rhodotorula mucilaginosa in an immunocompromised patient- a case report

Dimitrova B.[1], Temelkov A.[1]
[1]UMHAT Aleksandrovska - Sofia (Bulgaria)

Background and Goal of Study: The purpose of this case report is to show a rare case of an immunocompromised patient with pneumonia and sepsis due to Rhodotorula mucilaginosa infection. The incidence of this infection in Europe is 0,5%-2,3%. The patient is a 71 years old male, suffering from LPL. He had underwent several courses of chemotherapy and radiotherapy. He had fever of 40 degrees Centigrade for over one year. The patient was admitted to Hematology Department of UMHAT "Aleksandrovska"- Bulgaria in November 2019, where antibiotic treatment begun. On the 14th day his condition aggravated and he was transfered to ICU with severe sepsis and pneumonia. Microbiological findings from the hemoculture showed growth of the oppurtunistic yeast Rhodotorula mucilaginosa. Despite the treatment and the mechanical ventilation, the patient died on the sicth day of his ICU stay.
Materials and Methods: Microbiology samples were collected from the patient. Hospital staff collected hemoculture, uroculture, swap from the trachea and swap from the patient's throat. The samples were incubated for one week at room temperature.
Results and Discussion: Despite Rhodotorula being previously considered a nonvirulent saprophyte, recent findings show it can cause severe infections and death in immunocompromised patients. The major risk factors are prolonged treatment with antibiotics and corticosteroids, especially in patients with hematologic malignancies. Currently there are no guidelines or definite treatment of this causative agent.
Conclusion: Rhodotorula mucilaginosa is a rare, yet lethal infection in patients with suppressed immune system. This yeast should not be underestimated and when enough cases are collected, we must aim at creating a suitable guideline.

6101

Recurrent pulmonary haemorrhage in patient with septic thrombophlebitis of the jugular vein. A case report

Méndez Martínez E.[1], Sánchez García A. M.[2], Pérez Guerrero J. A.[3], Alonso Tuñón O.[3], Freire Aragón M. D.[3], Egea Guerrero J. J.[3]
[1]Clínica Universidad de Navarra - Pamplona (Spain), [2]Hospital Universitario Virgen de la Victoria - Málaga (Spain), [3]Hospital Universitario Virgen del Rocío - Sevilla (Spain)

Background: Septic thrombophlebitis of the jugular vein or Lemièrre syndrome refers to a venous thrombosis associated with inflammation in the context of a bacteraemia. The main treatment should be addressed primarily at an infectious level. Surgery should be considered, especially when we are faced with a patient who does not respond appropriately to antibiotic treatment or when it is an urgent situation. There is controversy regarding the benefit of anticoagulant treatment.
Case Report: 21-year-old male with a paramandibular cellulitis associated with a dental focus, which requires exodontics and antibiotic treatment with good initial evolution. Within a few days, the patient begins to suffer from fever, trismus, dysphagia, right submandibular swelling, nausea and vomiting. Urgent cervical CT is performed in which a large collection adjacent to the region of the exodontics is observed, which extends caudal to the sterno-clavicular junction and infiltrates the right internal jugular vein, also showing a filling defect in its light suggestive of septic thrombophlebitis. In his lungs, a lesion compatible with septic embolism is observed. It is operated urgently and transferred to the ICU. To prevent the progression of the thrombus and prevent new embolic processes, anticoagulation with unfractionated heparin is initiated, presenting three episodes of surgical bed hemorrhage and hemoptysis. Cervico-thoracic CT is performed, where the persistence of the thrombus and the appearance of multiple bilateral cavitated pulmonary nodules associated with pleural effusion, compatible with septic emboli, are observed. After two new episodes of hemoptysis with clinical repercussion, it was decided that a mechanical thrombectomy and venous ligation and placement would be performed. Anticoagulation is subsequently restarted without new incidents.
Discussion: There is no consensus on the indication of anticoagulant treatment in this pathology. We must bear in mind the existence of the risk of bleeding, but in the face of a greater risk of serious and irreversible lung damage, the attitude to be followed must be individualized. The risk-benefit balance should be weighted according to the patient's clinical situation.
References:
1. Lemièrre síndrome. Walkty A, Embil J. The New England. 2019 Mar.
Learning points: Septic thrombophlebitis is a rare but serious complication. Patient management must be individualized. Anticoagulation should be considered in selected cases.

4632

Selective decontamination of the intestine in neurosurgical patients with subarachnoid haemorrhage in the acute period of cerebral aneurysm rupture

Savvina I.[1], Anna Petrova, Roman Rutkovskiy, Ekaterina Orechova, Sergey Mertsalov, Anna Novikova
[1]Almazov National Medical Research Center - St.Petersburg (Russia)

Background: In patients in the acute period of cerebral aneurysm (CA) rupture SIRS is triggered due to subarachnoid haemorrhage (SAH) stimulating cerebral vasospasm. Therefore such patients from the first hours need neurovegetative blockade (NVB) for neuroprotection. NVB makes the intestinal motility slow down and creates favorable conditions for the translocation of intestinal flora in systemic blood flow, which can initiate the development of infectious complications. Preventive decontamination of the intestine using broad-spectrum antibiotics can reduce the pathogenic bacterial load.
Goal of Study: To reduce the number of infectious complications and sepsis in patients with SAH in the acute period of CA rupture.
Materials and Methods: the prospective control cohort study included 84 (age 49,6±4,8; female-51, male-33) patients in the acute period of CA rupture (Fisher 4, Hunt-Hess 3). The main group - 48 patients, the control group - 36 patients. All patients were treated with NVB (thiopental 1,0-3,0 mg/kg/h or propofol 2,0 mg/kg/h+fentanyl 1,0 mcg/kg/h+dexmedetomidine 0,2 mcg/kg/h), artificial lungs ventilation, an external ventricular drainage. Monitoring included HR,ECG,SpO2,etCO2, invasive BP (PiCCO, IntelliVew800 PHILIPS). Patients of the main group from the 1st day of treatment got Rifaximinum 200 mg every 8 hours or Nifuroxazide 200 mg every 6 hours for 7 days orally through a nasogastric tube. In all patients we analyzed daily CRP, PCT concentration, the occurrence of infectious complications, duration of stay in ICU.

Results and Discussion: in both groups high growth of CRP was observed from the 2nd day from aneurysm rupture with maximum rise at about the 7th day to 560 mg/l in the control group. The CRP level in the main group was about 2,5 times lower compared to the control group. Procalcitonin concentrations were more lower in the main group on the 3d, 5th, 7th and 10th days from the CA rupture (p<0,05). In the main group we did not observe the development of intestinal paresis. In control group 24 patients developed infectious complications including 6 cases of sepsis. No cases of sepsis were observed in the main group. Time in ICU also deffered: the main group 9,0±3,6 days; control group - 18,0±5,3 days.
Conclusion: prophylactic decontamination of the intestine in neurosurgical patients in the acute period of CA rupture allows to reduce the incidence of infectious complications and sepsis.

4605

Tetanus in 3- years old child

Klucka J.[1], Kratochvil M.[1], Stourac P.[1], Kosinova M.[1], Klabusayova E.[1], Homola L.[1]
[1]University Hospital Brno and Faculty of medicine, Masaryk University - Brno (Czech Republic)

Background: Clostridium tetani (G-positive rod-shaped anaerobic bacterium) can be found globally in soil and in gastrointestinal system of several animals (including human). Tetanus is caused by clostridium tetani invasive infection, mainly through the infected/contaminated wound and the most common presentation of the disease is muscle twitches, muscle cramps and (opisthotonos, trismus). Tetanus-associated spasms are severely painful and can compromise the airway patency, that can lead to hypoxaemia and even death. Currently tetanus in developed countries is extremely rare disease due to world-wide vaccination.
Case Report: We present a case of 3-years old child, with the nasal mucosal defect after button battery. The patient was examined by ENT surgeon and the battery was successfully removed. After 14 days, parents reported face grimaces, progressive fatigue and trismus. In two days, the condition further deteriorated, and the child is not able to swallow. Patient was admitted to the hospital with the working diagnose of tetanus (patients is not vaccinated). After admission muscle spasm with opisthotonos was triggered by attempt to drink. Benzodiazepines was administered, EEG and CSF fluid were without pathology. Antitetanic globulin + tetanic vaccination was administered together with antibiotic against clostridium (clindamycin + metronidazole). In four days despite the antitetanic globulin treatment, magnesium and benzodiazepines, because of spasms cumulation and respiratory failure patient was intubated and mechanically ventilated for next 7 days. After extubation the condition was gradually improving, and patient was dismissed from hospital at 34th day.
Discussion: Although tetanus is nowadays extremely rare in developed countries, the incidence of extended disease can have rising tendency due to growing number of not vaccinated patients (vaccination refusal).
Learning points: In the differential diagnosis, it is extremely important to consider the patient´s history of vaccination. Tetanus has mortality up to 50%. It can be treated by antitetanic globulin + vaccination and the supportive therapy (magnesium and benzodiazepine) – to lower the threshold for muscle spasms.

4618

Hemorrhagic fever with renal syndrome and concomitant pulmonary syndrome: Fatal Hantavirüs case in a farmer from Turkey

Öncü K.[1], Küçük A. O.[1], Eroğlu A.[1]
[1]Karadeniz Technical University - Trabzon (Turkey)

Background: There isn't any reported hantavirus case in Turkey until 2009. It's aimed to provide information about clinical findings and follow-up of this rare case in the intensive care unit (ICU).
Case Report: A 57-year-old male farmer admitted to the emergency department with nausea, vomiting, abdominal pain and high fever.Renal function test (RFT) deterioration, thrombocytopenia, PT and PTT prolongation were detected in first examinations. The patient was admitted to the ICU with acute renal failure. His detailed history revealed that there were mice and squirrels in his living environment. In the follow-up, common petechiae developed in his lower extremity. Crimean-Congo Hemorrhagic Fever and leptospirosis were considered in the differential diagnosis with thrombocytopenia, transaminase elevation, RFT deterioration. Hantavirus IgM and IgG were diagnosed by ELISA.During follow-up, it was observed that lung and kidney failure developed and the patient was intubated, mechanical ventilator support was initiated and underwent continued veno-veno voice hemodiafiltration (CVVH) therapy with cytokine absorption. After the addition of liver and lung failure to the patient in hantavirus fever with renal syndrome (HFRS), the clinic progressively worsened and he died at 32nd day of ICU.
Discussion: Hantavirus is a zoonotic infection with several subgroups of RNA in the bunyavirus family. The virus is ejected into the environment with feces and urine of rodents. The disease is caused by the ingestion of virus, by inhalation of the contaminated dust into the environment or by the bite of rodent carrying the virus. It can be seen in a wide spectrum from influenza-like symptoms to lethal organ dysfunctions.Clinical manifestation by this virus, which cannot be certain treated with antiviral treatment, liver, kidney and lung supportive treatment and strict intensive care support are essential. These clinical syndromes may be confused with other infectious or noninfectious diseases. Hanta virus should always be keep in our minds for differential diagnosis.
References:
1. Jiang, Hong et al. “Hantavirus infection: a global zoonotic challenge.” Virologica Sinica vol. 32,1 (2017): 32-43. doi:10.1007/s12250-016-3899-x.
Learning points: clinical manifestation, prognosis and complications of hantavirus infection in intensive care follow-up

4685

Invasive Amebiasis in a spanish Host who has not travelled to endemic Areas

Vicente Orgaz M.[1], Sánchez Zamora P.[1], Orozco Vinasco A.[1], González Velasco R.[1], Ramos De Castro R.[1], Merino Fernández F. J.[1]
[1]Hospital Universitario Severo Ochoa - Madrid (Spain)

Background and Goal of Study: Amebiasis is an endemic parasitic disease in developing countries caused for Entamoeba histolityca. In industrialised zones, is usually seen in migrants and travellers returning from endemic areas. The infection primarily occurs by ingestion of contaminated food or water, but sexual transmission by fecal-oral contact has been described.
Case report: A 39-year-old spanish male with personal history of alcoholism, who had not travelled outside Europe, was admitted to Emergency with fever, abdominal and pleuritic pain, and seven-day diarrhea. He was transferred to the Resuscitation Unit due to septic shock. A CT scan showed a 78 mm liver abscess of in the right lobe. An ultrasound guided drainage was inserted and cultures obtained. In the liver aspirate, E. histolytica was directly visualized, and PCR was positive in different tissues on 3er day. The pleuropulmonary and peritoneal affectation was due to direct extension of liver-abscess. Haematogenous dissemination presented as skin lesions on the chest and face, and multiple intraparenchymal and basal ganglia brain abscesses, which were observed in a cranial CT scan. He received a 10 weeks intravenous (IV) metronidazole therapy, plus 10 days of IV chloroquine and 7 days of oral paromomycin. After completing therapy, the patient was discharged to ward on the 110th lacking neurological damage.
Discussion: This is a rare case of native amebiasis in Spain of unknown aetiology. 90% of primary infections are asymptomatic. Extraintestinal manifestations are present in less than 1%, being amebic liver-abscess the most common. Synchronous intestinal, hepatic, lung, peritoneum, cerebral and cutaneous affectation is unusual. Differential diagnosis of liver abscesses includes pyogenic liver abscess as well. Drainage is indicated if there is a high risk rupture (diameter of ≥ 5 cm and left abscesses) and pleural amebiasis. Metronidazol is the election treatment; in our case absence of travel to endemic countries caused a 3 days delay in beginning proper therapy. Risk factors that contributed to virulence in this case would be young age and alcoholism.
References:
1. Shirley, D et al. A Review of the Global Burden, New Diagnostics, and Current Therapeutics for the Amebiasis. Open Forum Infectious Diseases. (2018); 5(7).
Learning points: In presence of liver abscess, amebiasis must be considered even in patients without travel history.

4741

The USS machine as a vector for infection transmission in critical care: a study of microbiological contamination

Howells P.[1], Bajaj M.[1], Whitehouse T.[1], Veenith T.[1], Garvey M.[1], Torlinski T.[1]
[1]*University Hospitals Birmingham NHS Trust - Birmingham (United Kingdom)*

Background and Goal of Study: Point of care ultrasound has become increasingly common in both anaesthesia and critical care. Frequent use of machines renders them a potential vector for transmission of infection between patients1. This prospective study was undertaken to assess our ultrasound machines (USM) for physical and microbiological contamination.
Materials and Methods: Following institutional review and approval (CARMS-15238) retrospective single-centre cohort study was conducted. As patients were not involved in this study, further ethical approval was not sought. Three rounds of inspection were undertaken on all USM in the ICU, each one month apart. The USM were Philips Sparq Echocardiography (3), Sonosite Nanomaxx (1), S-ICU (1) and S-Nerve (2). Each USM was visually inspected for contamination, then microbiological samples were taken, one swab each from the screen/controls, the probes and the connecting cables. These were cultured and identified in the laboratory. Categorical data were presented as numbers and percentage, and were then analysed using Fisher's exact test, using Graphpad Prism 8.3.0, San Diego, California, USA.
Results and Discussion: The USMs were sampled on three occasions, totalling 19 sampling events (some USMs were away for maintenance during sampling). On 15 occasions, dried gel was found on the probe or screen, 5 had dried and 1 had wet blood, 10 had open gel packets and 4 had used ECG electrodes. Of a total of 57 cultures taken, 46 had positive growth, 45 were bacteria and 4 fungi (some samples positive for both). All bacteria were aerobic spore formers or skin commensals; no high concern species were detected. All the fungi were found on the echocardiography machines' probes and cables. Soiling of a USM was not associated with an altered risk of positive culture ($p>0.05$ for all tests), but the study may be underpowered for these endpoints.
Conclusion: We were reassured no pathogenic organisms were detected on USMs, but clearly there is scope to improve our US machines' cleanliness. We therefore propose to develop processes to improve cleaning (attaching cleaning wipes to machines, allocating USS machine cleaning to designated ICU staff, raising staff awareness) and mandate sterile sheaths for all invasive procedures1.
References:
1. Russotto V, et al, (2015) Bacterial contamination of inanimate surfaces and equipment in the intensive care unit. J Intensive Care, 3: 54.

4966

Disseminated Tuberculosis and Hemophagocytic Syndrome in Critical Care Unit, in a young woman with Inflammatory Bowel disease treated with Infliximab

Varela Durán M.[1], Martínez Pillado M.[1], Said Criado I.[1], Díaz Parada P.[1], Mendoza Pintos M.[1], Carpio López D.[1]
[1]*Complejo Hospitalario Universitario de Pontevedra - Pontevedra (Spain)*

Background and Goal of Study: We present a case of a 27 years old woman with inflamatory bowel disease, admitted into Postsurgical Critical Care, after scheduled splenectomy to study her short course of fever, leukopenia and splenic space occupying lesions and splenomegaly. She has been previously treated with Infliximab due to Colitis and completed correct Tuberculosis Prophylaxis.
Materials and Methods: We reviewed our case in our Electronic Health DataBase IANUS and compared it with other case reports in literature, found in PubMed, with keywords Tuberculosis, Inflammatory disease and Hemophagocytic Limphohistiocytosis.
Results and Discussion: After splenectomy, she needed Intensive Care, due to acute respiratory failure, alveolar-interstitial pulmonary infiltrates, right pleural effusion, shock and fever. Bone marrow aspirate resulted in hemophagocytic lymphohistiocytosis and acute respiratory failure despite correct prior Tuberculosis Prophilaxis.
Conclusion: The importance of this case, is given by association between Hemophagocytic Syndrome and Disseminated Tuberculosis in an inmunosuppresed patient with Infliximab and the outcrop of this infectious disease that must always be considered in the differential diagnosis of fever despite correct prior Prophylaxis. Therefore, is an opportunity to focus on the efficacy of anti-TB chemoprophhylaxis in latent TB infected patients who are receive anti TNF. Multidisciplinary management in the Postsurgical Critical Care is always mandatory to achieve curation.
References:
1. Becker C, Núñez Aragón R, Mateu Pruñonosa, L. Pedro Botet, Montoya ML. Hemophagocytic Syndrome associated with Disseminated Tuberculosis. Med Clin 2011; 137 (September (8): 378-9.
2. Brastianos PK, Swanson JW, Torbeson M, Sperati J, Karakousis PC. Tuberculosis associated haemophagocytic Syndrome. Lancet Infection Dis 2006; 6 (July (7)): 447-54.

5139

Gastric Aspergilloma as a Complication of Virus H1N1 Respiratory Infection

Pabon I.[1], Carlidi G.[1], Porta L.[1], Sammarco R.[1], Viberti I.[1], Della Selva A.[1]
[1]*Ospedale San Lazzaro ASL CN 2 ALBA - Alba (Italy)*

Background: Invasive pulmonary aspergillosis-IPA is typically considered a common disease among severely immunocompromised patients. Few cases of IPA in critical immunocompetent patients have been described.1 We present the case of a previously healthy individual with acute respiratory viral infection, who presented in a secondary phase with gastric aspergillosis.
Case Report: 62-y.o male without any medical history is admitted to the ICU with bilateral and multiple pulmonary consolidation due to influenza virus type A H1NI, septic shock and associated bacteraemia due to streptococcus pyogenes skin infection. At admission we foundARDS and multiple organ failure (DIC, hemodynamic, acute renal failure, liver failure). SAPS II score 53, SOFA score 13. Invasive mechanical ventilation, aggressive antibiotic and antiviral regimen, hemodynamic therapy and enriched immunoglobulins were started. After ten days of admission upon resolution of the respiratory failure, numerous episodes of gastrointestinal bleeding required blood transfusions. The bleeding worsened leading to a total gastrectomy on 20th day and ileal resection on 29th day of admission. The histological diagnosis confirmed in both cases the presence of aspergillomi. Treatment with voriconazole was started and continued for a total of 90 days. He was successfully discharged from our ICU after 30 days.
Discussion: In our case the early aggressive therapy aided the patient in overcoming the initial septic pro inflammatory response. It's probable that in a secondary phase the host defenses were severely compromised facilitating an Aspergillus colonization of upper airways and further haematological diffusion onto the gastrointestinal tract leading to an invasive pulmonary and extrapulmonary infection. After the initial respiratory viral infection he didn't present any new respiratory symptoms that could prompt us to suspect a secondary pulmonary infection, therefore the identification of aspergillus spp on bronchoalveolar lavage was interpreted as colonisation. Antifungal therapy was initiated only after histological diagnosis of Aspergillus spp in the stomach and ileal segment
References:
1. van der Veerdonk FL,Kolwijck E,Lestrade P. Influenza-associated aspergillosis in critically ill patients. AmJ Resp Crit Care Med 2017 196(4):524
Learning points: Algorithms for non-immunocompromised patients are needed. Invasive aspergillosis can present in extrapulmonary settings in absence of respiratory symptoms.

5205

Necrotizing fasciitis in a patient with Eisenmenger Syndrome

Alvar E.[1], Granados A.[1], Rodríguez Roca M. C.[1], Zurita S.[1], Ruiz Cantador J.[1], Reinoso F.[1]
[1]*Hospital Universitario La Paz - Madrid (Spain)*

Background: The triad of congenital systemic-to-pulmonary communication, pulmonary arterial disease, and cyanosis is called Eisenmenger syndrome. Important aspects of management include avoidance of high-risk situations, extreme caution when undertaking noncardiac surgery, and specific attention to hematologic issues. Any surgical procedure is potentially life-threatening in patients with Eisenmenger syndrome and is associated with a high perioperative mortality, especially when emergency surgery is required. Necrotizing fasciitis is an infection of the deep soft tissues that results in progressive destruction of the muscle fascia and overlying subcutaneous fat. Necrotizing infection usually presents over hours or days. Rapid progression to extensive destruction can occur, leading to systemic toxicity, limb loss, and/or death. Therefore, early recognition of necrotizing infection is critical.

Case Report: We present the case of a 51 yo male diagnosticated with non corrected IVC and left pulmonary branch agenesia in Eisenmenger situation. He was cardiologically stable until admission to the hospital after 2 weeks of fever, pain and swelling on his upper limb. Necrotizing fasciitis was suspected and treated surgically and pharmacologically with meropenem, clindamycin and daptomycin. He developped sepsis with haemodynamic, renal and respiratory failure, all of them finally solved. Microbiologically, no causal agent was found. He finally was discharged from the ICU after a week of favorable evolution, followed afterwards by the cardiology and plastic surgery wards.
Discussion: The mean age at death of patients with Eisenmenger physiology has been reported to be 37 years or less, although the individual clinical course is quite variable. Although some patients with Eisenmenger syndrome survive into their 60s and beyond, survival is generally limited. Necrotizing infection is associated with considerable mortality, even with optimal therapy. We present the case of a survivor of both conditions, which is very rare, considering his age and the septic complications he developped.
References:
1. UpToDate: Necrotizing soft tissue infections. UpToDate: Management of Eisenmenger Syndrome.
Learning points: Although both necrotizing fasciitis and Eisenmenger Syndrome have high mortality rates, with adequate care this patient survived and now has been discharged from the hospital and lives his basal life situation.

5339

Preventing icu's infections by electronic flow devices

Ferrara G.[1], Cotoia A.[1], Soriano E.[1], Spinelli A.[1], Izzi A.[1], Cinnella G.[1]
[1]Universita Degli Studi di foggia - Foggia (Italy)

Background and Goal of Study: Preventing healthcare associated infections is important in patients' management and safety, especially in ICU. Bactiguard® devices consist in endotracheal tube, central venous catheter and urinary catheter with a metal alloy coating of gold, silver and palladium. This coating creates a galvanic effect when it comes in contact with fluids preventing microbial adhesion and potential infections.
Materials and Methods: Aim of this study is to evaluate if clinical outcome improves in ICU's patients treated with Bactiguard® devices. 20 patients admitted to ICU requiring endotracheal intubation, central venous catheter and urinary catheter were randomly treated with standard devices (GROUP A) or Bactiguard® devices (GROUP B). Data are presented as media±DS, p-value<0.05 have been considered significant.
Results and Discussion: At ICU entrance, the 2 groups have no difference among them.

	GROUP A (n=10)	GROUP B (n=10)	p-value
SEX (M:F)	9:1	9:1	1
AGE (years)	64.4±12.6	69.7±17	0.44
BMI (kg/m^2)	25.66±8.25	24.43±4.24	0.68
APACHE II SCORE	20.3±5.71	19.6±4.45	0.76
SAPS II SCORE	54.8±11.70	49.7±11.85	0.34

Some differences have been shown at the follow-up.

	ENTRANCE			FOLLOW-UP (14th day)		
	GROUP A	GROUP B	p-value	GROUP A	GROUP B	p-value
White blood cells (n·10^3/µl)	8.51±1.16	7.98±1.90	0.45	21.95±1.27	7.50±1.54	<0.01
Procalcitonin (ng/ml)	0.51±0.49	0.41±0.40	0.64	16.95±0.63	0.24±0.15	0.01
P/F minimum (mmHg)	250.5±109.79	238.5±125.17	0.82	165±33.23	289.2±36.38	0.02
P/F maximum (mmHg)	299.5±106.81	268.8±126.51	0.56	212±14.14	320±85.29	0.04

	GROUP A (10)	GROUP B (10)	p-value
INFECTIONS OCCURRENCE (n, %)	6(60)	2(20)	<0.01
ANTIBIOTIC THERAPY DURATION (days)	10.44±4.69	6.5±2.67	0.05
INVASIVE VENTILATION DURATION (days)	13.5±5.52	7.4±3.65	0.01
SURVIVORS AT 28th DAY (n, %)	3(30)	7(70)	<0.01

Conclusions: These preliminary data show that devices with noble metal alloy coating improve clinical outcome in ICU's patients and their use could be useful in antibiotic stewardship.

5760

Epidemiology of a Candida Auris outbreak in critical care unit in a tertiary hospital

Pascual C.[1], Johannessen M. V.[1], López M.[1], Carmona P.[1], Chiveli M. Á.[1], Argente P.[1]
[1]Hospital Universitario La Fe - Valencia (Spain)

Background and Goal of Study: Candida Auris (CA) is an emerging fungus which causes aggressive infections in critical care setting (ICU). We aim to analyse the differences between patients with CA invasive infection vs CA colonization in 2016-2017 CA outbreak in surgical ICU.
Materials and Methods: Observational retrospective study including patients with a positive culture for CA in surveillance and/or invasive samples. We compared demographic data, length of hospital and ICU stay (LOS), hospital mortality and specific risk factors between patients with colonization vs invasive CA infections documented in blood, CSF, peritoneal fluid and catheter tip positive samples. T student and Chi square test were applied.
Results and Discussion: 105 patients were included. 58.1% tested positive for CA surveillance samples without documented invasiveness. 41,9% developed invasive infection: 46,5% positive blood cultures, 20,9% positive catheter tip cultures and 32,6% with 2 or more positive cultures in different locations. 73.3% patients had positive surveillance cultures for two or more candida spp (including CA, C. Albicans and C. non-Albicans). There were no statistically significant differences in age, gender and Apache II between colonized vs invasive infection patients: 63.44 vs 57.93 years old (p 0.094); 67.2% vs 63.6% men (p 0,7); mean Apache II 20.53 vs 21.11 (p 0.65), respectively. Patients colonized vs CA invasive infection admitted for trauma were 11.5 vs 31.8%, cardiovascular surgery 36.1 vs 29.5%, thoracic surgery 19.7 vs 2.3%, abdominal surgery 9.8 vs 15.9% and solid organ transplantat 13.1 vs 9.1% respectively (p 0.041). We observed a statistically significant difference in ICU and Hospital LOS: 21.3 vs 37.02 days (p 0,0002) and 42.4 vs 59.89 days (p 0.03), but no statistically significant difference in mortality during hospital stay: 42.6 vs 50% (p 0.454) in colonized vs invasive infection patients respectively. There were no statistically significant differences in risk factors between groups (DM, COPD, immunosuppression, cirrhosis, neoplastic disease, central venous catheter, parenteral nutrition, RRT, ECMO, mechanical ventilation >48h, and previous abdominal surgery). Candida-Score was significantly higher in the infected group: 2.34 vs 2.89 (p 0.023).
Conclusion: There is a high proportion of invasiveness in colonized patients for CA which correlates with worse morbidity and longer LOS but not higher mortality.

5780

Causative agents in patients with suspected bacteraemia - prospective study

Bandic Pavlovic D.[1], Zah Bogovic T.[2], Martinovic Z.[3], Tonkovic D.[1], Mihaljevic S.[1], Bedenic B.[1]
[1]University Hospital Zagreb - Zagreb (Croatia),
[2]General Hospital Klagenfurt - Klagenfurt (Austria),
[3]Ministry of Labour and Pension System - Zagreb (Croatia)

Background and Goal of Study: Blood samples were collected and routine blood cultures (BC) were ordered from the patients with suspected sepsis, to evaluate the prevalence of different causative agents/positive BC in patients with suspected bacteraemia, were taken in the frames of the FAPIC project.
Materials and Methods: A prospective cohort study was set up at five ICU and three other wards at the University Hospital Centre Zagreb and University Hospital Centre Merkur in Zagreb, Croatia. Patients with suspected bacteraemia, for whom routine BC were ordered, were included in a cohort. Inclusion criteria were: age above 18 and suspected bacteraemia. Following data was collected: demography, outcome, sepsis parameters, laboratory data (blood cell count, kidney and liver function), time of BC collection and arrival in laboratory, time to positivity, identification, antibiotic susceptibility results and final communication with clinician. Data were analysed using students-t test (continuous) or with non-parametric tests in case of the non-normal data.
Results and Discussion: In total, 229 patients were included between 21st January and 03rd October 2017. 158 (69%) patients were male. The mean age of patients was 61.5 years. True bacteraemia (contamination excluded) was found in 55 patients (24%). Haemoglobin content and the systolic blood pressure values were significantly lower in patients with positive BC than in those with negative BC (p=0.004 and p=0.002 respectively). Serum lactate levels and urea content were significantly higher in patients with positive BC compared to patients with negative BC (p=0.024 and p=0,002 respectively). The most frequently isolated pathogens were: Pseudomonas aeruginosa (12 patients), Staphylococcus epidermidis (11 patients) Escherichia coli (6 patients), Enterococcus faecium (6 patients) and Klebsiella pneumoniae (5 patients). Six isolates were multidrug-resistant according to Magiorakos et al: two VRE, two ESBL, one MRSA and one colistin-resistant K.

pneumoniae. Median time from collection to laboratory arrival was 131 minutes. Median time to blood cultures being flagged positive was one day.
Conclusion: The study revealed high percentage of positive blood cultures (24%) and high rate of multiresistant strains among positive BC.

4522

Should an early hospital discharge strategy be implemented following a successful primary PCI for acute ST elevation myocardial infarction?

Hakim R.[1], Koren O.[1], Mahamid M.[1], Rozner E.[1], Rudin M.[1], Turgeman Y.[1]
[1]Emek Medical Center - Afula (Israel)

Background: Early hospital discharge following ST elevation myocardial infarction and primary PCI is reasonable after 72 hours for selective low risk patients. Yet, these recommendations, which were mainly based on data from fibrinolytic era, are not widely implemented. We present single center experience regarding efficacy and safety of early hospital discharge.
Method: We conducted a retrospective study based on data from 2014 to 2015. The patients were classified into three groups based on the duration of hospitalization; within 48 h, 48–72 h, and >72 h. The primary endpoints were all-cause mortality and major cardiovascular events (MACE) within 30 days and 1 year. Secondary endpoint was acute kidney injury.
Results: 178 patients were included; 60 patient (33.7%) were discharged within 48 hours, 75 patients (42.1%) discharge after 72 hours, and 43 patient (24.2%) discharged between 48 and 72 h. Patients discharged >72 h were significantly older ($p < .001$), had extensive myocardial damage ($p < 0.001$) and a significant reduction in left ventricular systolic function ($p < 0.02$). Most common catheterization approach in this group was the femoral artery ($p < 0.02$). No statistically significant difference observed between the three group regarding primary and secondary end points.
Conclusion: Early hospital discharge, within 48 to 72 hours after successful primary PCI for Acute STEMI was not associated with a higher rate of all-cause mortality or MACE up to one year after discharge for selected patients. In an era where the incidence of periprocedural and mechanical complications are low an early hospital discharge strategy should be widely and routinely implemented.

4720

Use of clevidipine for hypertension treatment in postpartum patients with preeclampsia: A case series study

Romero Téllez J. D.[1], Castel Gonzalez B.[1], Pérez Solaz A.[1], Limón Granja Á.[1]
[1]Hospital Universitario La Fe - Valencia (Spain)

Background and Goal of Study: Preeclampsia and other hypertensive disorders of pregnancy are associated with an increased risk of maternal and perinatal morbidity and mortality. Current guidelines recommend using labetalol, hydralazine, and nifedipine as first-line treatment but in our experience high doses or combinations of multiple drugs are needed to achieve the blood pressure (BP) goals. Clevidipine is a calcium channel antagonist that has a rapid onset and offset of action and reduces BP via decreasing arteriolar resistance without affecting venous capacitance vessels [1]. The use of clevidipine hasn't been investigated in pregnancy and postpartum patients and it's considered "off-label" according to the Spanish Agency of Medication and Healthcare Products (AEMPS). Our study aims to describe the use of clevidipine for the management of hypertension in postpartum patients diagnosed with severe preeclampsia.
Materials and Methods: Retrospective, observational study. We revised the electronic health record of 5 patients diagnosed with severe preeclampsia admitted at the surgical ICU after cesarean section, none of these patients wanted to breastfed and were treated before with labetalol. Clevidipine infusion were started at admission and it was titrated to achieve blood pressure goals. We collected and analyzed data regarding age, comorbidities, BP at the admission, days of stay at the ICU, time needed to achieve BP control, total dose of clevidipine and adverse effects.
Results and Discussion: Mean age was 33.8 years, 40% of patients had gestational diabetes, 60% were diagnosed with HELLP syndrome, one patient had eclampsia and another one pre-gestational hypertension. The average MAP at ICU admission was 107 mmHg. The patients stayed at the ICU for a mean of 3.8 days, and the time needed to achieve complete BP control was on average 3 days. Clevidipine mean total dose was 90 mg. Main adverse effects were headache (40%), mild hypotension in one case and one patient developed rebound hypertension after discontinuation of clevidipine infusion.
Conclusion: Our results showed that clevidipine can be an effective treatment for postpartum hypertension because of the favorable pharmacokinetic profile, easy titration and few adverse effects.
References:
1. Keating G. Clevidipine: A Review of Its Use for Managing Blood Pressure in Perioperative and Intensive Care Settings. Drugs. 2014;74(16):1947-1960.

4906

Stroke volume variation predicts fluid responsiveness in patients with implanted IABP after cardiac surgery, believe it or not

Enev R.[1], Abedinov F.[1], Neda B.[1], Nachev G.[1]
[1]Umbal St. Ekaterina - Sofia (Bulgaria)

Background and Goal of Study: There is a vast body of scientific evidence confirming validity of dynamic hemodynamic indices (such as stroke volume variation - SVV) as predictors of fluid responsiveness in patients receiving mechanical ventilation. Patients with implanted intraaortic balloon pump (IABP) have always been excluded from this concept under the belief that pump artifacts in the invasive arterial pressure trace influence the accuracy of SVV, which is true. The presented study aims to test whether SVV is a valid predictor of fluid responsiveness in that patient population provided that IABP is switched to standby mode for a brief period.
Materials and Methods: We present a prospective study with 30 patients included. All patients met specific inclusion criteria for the validity of SVV and clinical or laboratory signs of tissue hypoperfusion. IABP was implanted intraoperatively on the lead surgeon's request. After completion of elective or emergent cardiac surgical procedure patients were admitted to ICU for optimization and monitoring. Standard monitoring was applied and a pulmonary artery catheter was inserted in all patients. The following algorithm was applied immediately after admission to ICU: 1. IABP was switched to standby mode for one minute. 2. SVV was estimated using the Edwards Vigileo monitor and FloTrac system. 3. IABP was returned to 1:1 mode. 4. Cardiac output was measured using pulmonary artery thermodilution. 5. Fluid bolus consisting of 6 ml/kg colloid solution was applied for 10 minutes. 6. Cardiac output was measured again. Fluid responders were defined as patients with a 10% or bigger increase in cardiac output after fluid challenge. Statistical analysis was performed using IBM SPSS. A ROC curve was generated for SVV and a positive response to fluid challenge.
Results and Discussion: SVV threshold of 8.5% was estimated using Yoden's index of the maximum value of (Se+Sp-1). SVV above 8.5% showed sensitivity of 95% (95% CI 85 - 100%) and specificity of 82% (95% CI 72 - 92%) for a positive response to fluid challenge. The area under the ROC curve was estimated to 91% (95% CI 81 - 100%, p=0.0002).
Conclusion: SVV is a valid predictor of fluid responsiveness under the specific circumstances applied in the study. Our findings suggest that clinicians should keep dynamic hemodynamic indices in their armamentarium when resuscitating patients with IABP.

4922

Out of hospital cardiac arrest PCI protocol

Al-Ani T.[1], Rattray A.[1]
[1]Hairmyres Hospital - East Kilbride (United Kingdom)

Background and Goal of Study: Our hospital is the primary percutaneous coronary intervention (PCI) centre caring for more than 1 million people living in the west of Scotland. Human, environment and equipment factors make the cath lab unsafe area for the initial resuscitation of out of hospital cardiac arrest (OHCA) patients due to ST elevation myocardial infarction (STEMI) who achieve return of spontaneous circulation (ROSC). Equally, unnecessary delays in the transfer of these patients to the cath lab and in initiation of protective physiological strategies for the post cardiac arrest syndrome can affect outcomes. We introduced a standardised OHCA PCI protocol to overcome these problems.
Materials and Methods: Thirty-two ventilated patients admitted to our ICU from the cath lab after having had PCI post OHCA due to STEMI between November 2018-November 2019. We looked into patient transfer time from ROSC to the start of PCI, initial resuscitation clinical area and the documented initiation of physiological protective strategies for the post cardiac arrest syndrome prior to PCI. Results and Discussion: The mean transfer time from ROSC to PCI was 4h 37m versus 2h 34m for patients who were admitted via A&E to the cath lab versus

directly to the cath lab, respectively. Twenty (62.5%) versus 12 (37.5%) patients had their initial resuscitation in A&E versus the cath lab, respectively. Thirteen (65%) out of these 20 A&E patients had unnecessary delays due to unnecessary interventions for example CT scans, blood tests, central line etc. before transfer to the cath lab, while 9 (75%) out of these 12 cath lab patients required intubation and ventilation in the cath lab. Only 2 (6.25%) patients had documented initiation of physiological protective strategies for the post cardiac arrest syndrome prior to PCI.
Conclusion: Our OHCA PCI protocol transfers patient either directly or via A&E to the cath lab and avoids initial resuscitation in the cath lab. It initiates physiological protective strategies for the post cardiac arrest syndrome and avoids unnecessary delays prior to PCI.

5800

Perioperative acute coronary syndrome after bariatric surgery: Case report

Escontrela B.[1], Acevedo I.[2], Sainz I.[3], Martinez A.[3], Ismael Acevedo Bambaren. Iñaki Sainz Mandiola. Alberto Martinez Ruiz.
[1]Cruces University Hospital - Barakaldo (Spain),
[2]Hospital Universitario Ramón y Cajal - Madrid (Spain),
[3]Hospital Universitario de Cruces - Barakaldo (Spain)

Background: The incidence of cardiac complications after bariatric surgery is very low. We present a case of acute coronary syndrome after bariatric surgery.
Case Report: A 48-year-old women with history of hypertension, diabetes and morbid obesity (BMI 46) was scheduled for bariatric surgery. 24 hours of postoperative course was uneventful. 48 hours after surgery she was readmitted to ICU for severe hypoxemia requiring mechanical ventilation. CT scan showing pulmonary edema. Echocardiogram showed a septo-apical hypokinesia with normal LVEF. EKG showed a diffuse depression of ST without changes to basal preoperative EKG. 72 hours after surgery the patient present an acute episode of severe hypoxemia associated with hemodynamic deterioration with hypotension and EKG changes with a diffuse depression of ST of 3 a 4 mm. Coronariography showed an acute severe occlusion of the main left trunk successfully treated with a farmaco-active coating stent. Double anti-platelet intravenous treatment and inotropes for cardiogenic shock in the following days were required. Weaning of mechanical ventilation was long and difficult requiring tracheostomy. The patient was progressively improving so we transferred to hospitalization floor and she was discharged to home without significant problems.
Discussion: Cardiac complications are very infrequent according evidence1. This could be paradoxical since morbid obese patient has a higher cardiovascular risk. The atypical evolution of our case should be outlined since the complications of misdiagnosis could be catastrophic. Additionally the prolonged weaning of mechanical ventilation requiring tracheostomy in a patient with double anti-platelet treatment pose a challenge to stop this medications before the recommended times according to evidence to perform this procedure with less bleeding risk.
References:
1. Poelemeijer, Y., Liem, R., Våge, V., Mala, T., Sundbom, M., Ottosson, J., Nienhuijs, S. Perioperative Outcomes of Primary Bariatric Surgery in North-Western Europe: a Pooled Multinational Registry Analysis. Obesity Surgery (2018)28:3916–3922.
Learning points: Our case emphasizes the importance of a higher clinical suspicious in these patients even when preoperative evaluation. Although this complication is infrequent it should be taken on mind even when the preoperative evaluation not show specific signs of coronary disease requiring further diagnosis and treatment before surgery.

6009

Ventricular assist devices: two solutions for the same disease. The importance of individualized treatments

Fernandez-Lopez I.[1], Utrilla Cid N.[2], Correa Barrera J. J.[3], Burgos Santamaría A.[4], Garrido Sánchez A.[4], Quintana-Villamandos B.[4]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain), [2]Complejo Hospitalario Torrecardenas - Almeria (Spain), [3]Hospital Universitario Severo Ochoa - Madrid (Spain), [4]Hospital General Universitario Gregorio Marañon - Madrid (Spain)

Background: Myocarditis is a myocardial inflammation due to infectious, systemic, autoimmune processes or sometimes of uncertain etiology. It can be oligosymptomatic or rapidly develops refractory heart failure requiring inotropic, vasoactive and eventually mechanical circulatory support.
Case Report: We present two cases of fulminant myocarditis in young patients; both needing circulatory assistance as bridge therapy to recovery/transplantation. Case 1:39 year-old-woman consulted for dyspnea and flu-like symptoms. She presented in-hospital cardiac arrest. Given the situation of cardiogenic shock, peripheral veno-arterial extracorporeal membrane (ECMO VA) and aortic counterpulsation balloon (BCAo) were inserted. After the findings of transesophageal echocardiography, BCIAo was replaced by an Impella. Histopathological diagnosis of myocarditis was made. Given the poor outcome and the appearance of arrhythmic storm, a central ECMO VA was implanted. An attempt to remove ECMO was made, but left ventricular (LV) dysfunction was still seen, so it was replaced by a left Levitronix device. Finally the LV recovered its function and assistance could be withdrawn. Case 2:42-year-old man consulted with worsening of his functional capacity. He presented electrocardiographic findings of myocarditis with a high arrhythmogenic load. Echocardiography shown LV failure and clinically he presented important congestion, so diuretic perfusion and BCIAo were started. An increase in arrhythmic episodes was observed, so a transient pacemaker was implanted. Due to severe LV dysfunction, he was included in the transplant waiting list. Left Levitronix was inserted as a bridge to transplant, recieving transplant with good clinical progress.
Discussion: Acute myocarditis presents a high mortality rate. Medical treatment, in many cases, is not enough; and the advance in circulatory assistance sistems meant a new option for these patients. Individualizing treatments and decisions for each case can become a great challenge.
References:
1. Garzon Rodriguez,J.D., Obando-Lopez,C., Giraldo-Grueso,M., Sandoval-Reyes, N., Camacho,J. and P.Umaña,,J. Mechanical circulatory support as bridge therapy for heart transplant:case series report.BMC Res Notes (2018)11:430.
Learning points: Acute myocarditis is associated with high mortality due to the rapid developement of heart failure. Temporary mechanical circulatory support has been shown to improve survival in these patients.

4461

Bilirubin - Possible prognostic mortality marker in patients with VA-ECMO

Roth S.[1], Bunte S.[1], Lurati Buse G.[1], Aubin H.[1], Walz R.[1], Huhn R.[1]
[1]University Hospital Duesseldorf - Duesseldorf (Germany)

Background and Goal of Study: Veno-arterial extracorporeal membrane oxygenation (VA-ECMO) is an effective rescue therapy in patients with cardiogenic shock or after sudden cardiac arrest. The use of VA-ECMO is increasing, but mortality rates are still high and it is unclear whether mortality risk can be predicted. In this retrospective cohort study we investigated the association between liver function and mortality in patients undergoing VA-ECMO therapy.
Materials and Methods: The present study is a retrospective single center cohort study approved by the Ethics Committee of the Heinrich Heine University Duesseldorf (Reference Number 5141R). Included were adult patients over 18 years who received ECLS therapy between 2011 and 2018. For quantification of liver function Bilirubin was analysed at predefined time points (day 0, 5, 10, 15). The primary endpoint was all-cause in-hospital mortality. The association between Bilirubin and mortality was examined by receiver operating characteristic curve (ROC) and the area under the curve (AUC) as well as univariate and multivariable cox regression. In a sensitivity analysis, patients with shock-liver (defined as GOT > 10 x cutoff (=35 U/l)) were excluded.
Results and Discussion: A total of 438 patients received ECLS therapy during the observation period. Due to missing values, 140 patients had to be excluded so that 298 patients remained for statistical analysis. Mortality rate was 42.6% (n=127). The AUC for Bilirubin on day 5 was 0.72 [95% confidence interval (CI): 0.66-0.78]. Youden-Index showed a cutoff for Bilirubin on day 5 of 2.23 mg/dl with a sensitivity of 0.70. Cox regression with multivariable adjustment revealed a significant association between Bilirubin on day 5 and mortality with a hazard ratio (HR) of 2.24 [95% CI: 1.53-3.29]. In the sensitivity analysis without shock liver patients this association was still significant (HR 2.08 [95% CI: 1.33-3.26].
Conclusion: Based on the results of the current study, an increase in serum Bilirubin level on day 5 of VA-ECMO therapy correlates independently with mortality regardless of the presence of shock liver. Thus, Bilirubin might serve as a prognostic marker in these patients.

6330

Case of electrotrauma to the rescuer during CPR from implantable cardioverter-defibrillator

Karavaev A.[1]
[1]Pokrov City Hospital - Saint-Petersburg (Russia)

Background: With the widespread use of implantable cardioverter-defibrillators (ICD) these days, it is of great importance to the rescuer to be aware of dangers associated with such devices. Although the devices are being modernized and new modes of defibrillation are invented [1], electrotrauma from implantable devices remains a threat to healthcare providers [2].
Case Report: A 76-year old patient was admitted to the ICU with asystole. Advanced life-support resuscitation was initiated immediately. During chest compressions in latex protective glasses tingling sensations became apparent. Subcutaneous device was detected in the left subclavian area. It became obvious that the patient had ICD and mechanical movement of the chest wall during compressions initiated defibrillation. Electroenergy was transferred to the rescuers causing tingling sensations. Despite that, chest compressions were resumed but the patient failed to restore viable rhythm.
Discussion: Defibrillation energy can be life-threatening to personnel. Shock can be delivered to the rescuer not only through chest compressions but also during central venous catheterization when advancing needle or a guidewire contact with a lead of ICD [3]. However, there are anecdotal reports on such cases and current resuscitation guidelines do not cover this exact issue in detail. Nevertheless, it is wise to detect ICDs during emergency resuscitation as soon as possible and to deal with it professionally, i.e. to cover it with a magnet during the whole period of resuscitation.
References:
1. Barash DM, Raymond RP, Tan Q, Silver AE. A new defibrillator mode to reduce chest compression interruptions for health care professionals and lay rescuers: a pilot study in manikins. Prehosp Emerg Care. 2011;15(1):88-97. doi:10.3109/10903127.2010.531375.
2. Stockwell B, Bellis G, Morton G, Chung K, Merton WL, Andrews N, Smith GB. Electrical injury during “hands on” defibrillation-A potential risk of internal cardioverter defibrillators? Resuscitation. 2009;80(7):832-834. doi:10.1016/j.resuscitation.2009.04.010.
3. Siniorakis E, Hardavella G, Arvanitakis S, Roulia G, Voutas P, Karidis C. Accidental shock to rescuer from an implantable cardioverter defibrillator. Resuscitation. 2009;80(3):293-294. doi:10.1016/j.resuscitation.2008.10.032.
Learning points: Always check for ICD in a cardiac arrest patient and turn it off with a magnet in order to protect yourself from electrocution.

6004

Myocardial dysfunction, Sepsis, MOF; May the patients have Broken Heart Sy in ICU?

Stojanovic Stipic S.[1], Pivac V.[2], Peris F.[1], Carev M.[1], Karanovic N.[1], Bjelić D.[3]
[1]Department of Anaesthesiology and Intensive Care, University Hospital Split - Split (Croatia), [2]Department of Cardiology, University Hospital Split - Split (Croatia), [3]University Hospital Split - Split (Croatia)

Background: Myocardial dysfunction is one of the main predictors of poor outcome in septic patients (mortality 70%). Sepsis induced myocardial dysfunction can lead to reduced ejection fraction and consequently a weakened response to reanimation procedures, including fluid resuscitation and catecholamine administration.
Case Report: This case report details the case of a 33-year-old male without cardiovascular risk factors. He was admitted unconscious, normotensive, with agonal breathing and tachycardia. Shortly after admission to the ICU, the patient became hemodynamically unstable after which noradrenaline and vasopressin were administered, followed by a central venous access, pulmonary artery catheterisation and V-A ECMO was started. Immediately after beginning ECMO the patient became asystolic and cardiopulmonary reanimation was performed (cardiac massage, defibrillation, administration of adrenaline and atropine, external pacing). Due to continuing MOF, CVVHDF with blood purification was started. A Transthoracic echocardiogram showed normal dimensions of the left chamber and ascending aorta, with a global reduction in left ventricular systolic function (EFLV Simpson 19-20%) and significant diastolic dysfunction. Moderate mitral and tricuspid regurgitation was present, with indirect signs of a mild increase in pulmonary vascular pressure (RVSP 41.69 mmHg). Estimated cardiac index (CI) was notably decreased at 1.35 L/min. Laboratory investigations showed a significant rise in NTproBNP-a (8964 - 17058 pg/ml) and a decrease of hs-troponin (1274-157ng/L). 24 hours after admission, the patient's pupils were fixed and dilated and subsequent cerebral angiography confirmed brain death.
Discussion: In terms of the absence of typical clinical, electrocardiographic features and laboratory parameters, which would indicate acute coronary syndrome (ACS), the cause of fulminant echocardiographic changes remains unanswered. Takotsubo cardiomyopathy, also called broken-heart syndrome, has been recently implicated as possible cause of rapidly developing myocardial dysfunction in ICUs. It is cardiac syndrome that involves dramatic left ventricular apical akinesis and often mimics ACS . Unfortunately, it is very challenging to diagnose it in ICU patients.
Learning points: Cardiac pathology associated with septic shock may lead to a very poor prognosis, therefore, timely diagnosis combined with aggressive therapy is of crucial importance in reversing myocardial dysfunction.

6153

Case of fulminant develop septic shock after perforative gangrenous appendicitis in child

Atanasova A.[1], Andonova R.[1]
[1]UMHATEM "N.I.Pirogov" - Sofia (Bulgaria)

Background: Acute appendicitis is one of the most common causes of abdominal pain and is the most frequent condition leading to emergent abdominal surgery in children. Gram-negative bacteremia is major health problem, causing one-half of cases of lethal septic shock.
Case Report: A 15-year-old boy who underwent surgery for perforated gangrenous appendicitis complicated with peritonitis.Complicated postoperative period with nausea, vomiting and fever. An abdominal scan was performed on 5th day and an intra-abdominal abscess was detected. Relaparotomy - abscess and drainage evacuation. Two hours after the surgery there was an arterial bleeding from the drains. Urgent re-operation detected hemoperitoneum and diffuse bleeding from all wound surfaces, no source of bleeding was identified. The boy was presented to our clinic intubated FiO2-60%, icteric skin and visible mucous membranes, HR 150/min, BP 80/60. Anuria, naso-gastric tube- haematin, drains-hemorrhagic. Laboratory tests revealed extremely high inflammation rates, hepatic failure, uremia, extremely high cardiac enzymes and DIC syndrom. CVLs were inserted immediately in the OR in v.jugularis interna sinistra and v.femoralis dextra under US control. The patient was put on antibiotic treatment, catecholamine support (Dopamine 10mcg/kg/min, Noradrenalin 0,5mcg/kg/min, Dobutamine 15mcg/kg/min, Adrenaline and Milrinone) and urgent hemodialysis was performed. Echocardiography showed a structurally normal heart, with no signs of acute myocardial infarction, pulmonary embolism or myocarditis.The next hours extremely increased of cardiac enzymes, persistent severe hypotension and tachycardia with high catecholamines needs, renal and hepatic failure, anuria and haemorrhagic syndrome persistence. Despite resuscitation, exitus letalis was registrated.
Discussion: An extremely fast-growing infection was presented by E.coli infection with hepatorenal syndrome and advanced DIC syndrome. Early diagnosis and recognition of the infection is crucial to the outcome of the disease.
References:
1. Brierley J, Carcillo JA et al. Clinical practice parameters for hemodynamic support of pediatric and neonatal septic shock: 2007 Crit Care Med. 2009;37:666–88.
Learning points: Recognition and adequate response at the earliest moment of the development of the shock state is the most essential condition for the patient to survive. But even in rutine operations we should think and for aggressive bacterial strains of E.coli.

6195

Usefulness of systematic blood culture under veno-arterial ECMO

de Roux Q.[1], Renaudier M.[1], Bougouin W.[2], Decousser J. W.[1], Langeron O.[1], Mongardon N.[1]
[1]CHU Henri Mondor - Creteil (France), [2]Hôpital Prive Jacques Cartier - Massy (France)

Background and Goal of Study: Infectious complications are frequent on Veno-Arterial ExtraCorporeal Membrane Oxygenation (VA-ECMO), but their diagnosis is challenging. Performing systematic blood culture (BC) may detect early poorly symptomatic bloodstream infections (BSI). We investigated the interest of systematic BC to detect BSI on VA-ECMO.
Materials and Methods: All adult patients requiring VA-ECMO, surviving more than 24 hours, were included (01/2013-01/2017). Our protocol includes daily BC in patients on VA-ECMO, from insertion up to 5 days after withdrawal. BC performed between 4 and 7 a.m. were defined as systematic BC; others BC were considered as “on-demand”. All positive BC were considered as BSI, except for contaminant pathogens which required at least two positive BC in 48 hours to be classified as BSI. Multivariable logistic regression was performed to identify risk factors of BSI.

Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology; median age 58 [48-69] years and SAPS II 54 [38-70]), 2163 BC were performed (1162 systematic BC and 984 on-demand BC); 192 (9%) were positive, including 68 with contaminants. Regarding systematic BC, 52 (4%) revealed BSI; meanwhile, 72 (7%) "on-demand" BC revealed BSI. Performing systematic BC was negatively associated with diagnosing BSI (OR 0.55, 95%CI[0.4;0.8], p=0.002). Regarding systematic BC, independent risk factors for BSI diagnosis were: ECMO for graft failure (OR 2.4, 95%CI[1.2;4.9], p=0.013), sampling under antimicrobial therapy or renal replacement therapy (OR 2.2, 95%CI[1.1;4.3], p=0.029 and OR 2.1, 95%CI[1.1;3.8], p=0.008, respectively). On the 68 BC with contaminants, 10 (15%) led to inappropriate antimicrobial therapy, i.e. 7% of the whole cohort of patients on VA-ECMO.
Conclusion: Despite risk of contamination and inappropriate antimicrobial therapy, BC often detect poorly symptomatic BSI. On-demand BC are more useful than systematic BC. This argues for a reasonable approach of BC prescription on VA-ECMO.

6207

Genetic predisposition for bacterial infection in cirrhotic patients

Kuandykov T.[1], Mutagirov V.[1]
[1]National Scientific Centre of Surgery - Almaty (Kazakhstan)

Background and Goal of Study: Patients with liver cirrhosis have an increased incidence of infections that are a major cause of morbidity and mortality. About 30% of inpatient cases of cirrhotic patients suffer an infection. Some studies, recently, showed association between altered toll-like receptors 2 and 4 and susceptibility to bacterial infections. But there are small amount of such studies in cirrhotic patients. The aim of this study was to analyze the relationship between the presence of TLR2 rs4696480/AT, TLR4 rs4986791/CT and TLR4 rs4986790/AG polymorphisms and the incidence of bacterial infections in cirrhotic patients of Kazakh population.
Materials and Methods: After the Local Ethic Committee approval we prospectively studied 90 and retrospectively 30 adult patients of Kazakh population with liver cirrhosis. We studied incidence of bacterial infections, site and etiology of infection, presence of TLR2 rs4696480/AT, TLR4 rs4986791/CT and TLR4 rs4986790/AG polymorphisms.
Results: 57 out of 120 examined patients had presented bacterial infections, which is 47.5%. 5(8.7%) patients were hospitalized with or due to an infectious complication. 52 patients (43.3%) presented in-hospital infections. In 39(32.5%) cases such complications occurred after an invasive procedure. 90 prospectively studied patients underwent genetic screening for TLR2 and TLR4 polymorphisms. We revealed normal genotype in 47(52.2%) patients, and pathological genotype in 43(47.8%) patients. In those 43 patients with pathological genotype, 42 had presented bacterial infections (Tab1). We have found the pathological genotype TLR2 rs4696480 in 38.3%, genotype TLR4 rs4986791 in 11.1% and genotype TLR4 rs4986790 in 7.8% of studied cases.

Group/Genotype	Normal	Pathological	Total
No infection	37(97.4%)	1(2.6%)*	38(42.2%)
With infection	10(19.2%)	42(80.8%)*	52(57.8%)*
* = p<0,05 between groups			

Tab1. TLR2 and TLR4 genotype in the studied sample of patients with liver cirrhosis.

6225

Bloodstream infection on veno-arterial ECMO

de Roux Q.[1], Renaudier M.[1], Bougouin W.[2], Decousser J. W.[1], Langeron O.[1], Mongardon N.[1]
[1]CHU Henri Mondor - Creteil (France), [2]Hôpital Prive Jacques Cartier - Massy (France)

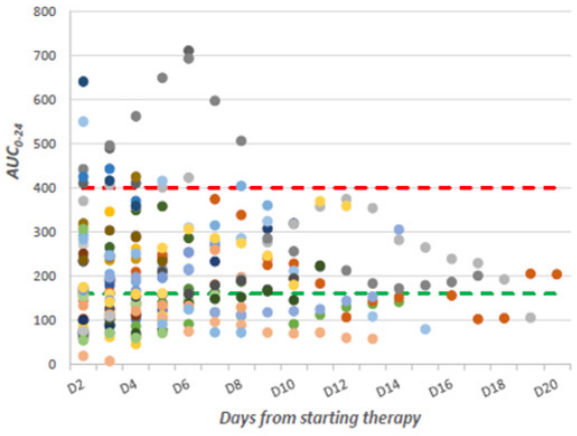
Background and Goal of Study: Bloodstream infections (BSI) are often reported on Veno-Arterial ExtraCorporeal Membrane Oxygenation (VA-ECMO). However, previous studies were heterogeneous, mixing venous-venous and VA-ECMO, adults and children. Our objective was to study the incidence and profile of BSI in an adult population of VA-ECMO.
Materials and Methods: All adult patients requiring VA-ECMO, surviving more than 24 hours, were included (01/2013-01/2017). Routine blood culture (BC) was performed daily up to five days after ECMO withdrawal, and also at the physician's discretion. All positive BC were considered as BSI, except for contaminant pathogens which required at least two positive BC in 48 hours to be classified as BSI.
Results and Discussion: On the 150 VA-ECMO included (65 after cardiac surgery and 85 for medical etiology), i.e. 1422 VA-ECMO days, 2163 BC were performed. Median age of patients was 58 [48-69] years and SAPS II was 54 [38-70]. Duration of VA-ECMO support was 7 [5-13] days. One hundred and ninety-two BC were positive, including 68 contaminants. BSI episode rate was of 43 cases/1.000 days of ECMO support. From implantation up to five days after withdrawal, BSI occurred in 50 patients, with 53% in the first week and 20% after withdrawal. Pathogens were: Klebsiella pneumoniae (n=8), Gram negative non-fermentative bacilli (n=7), Escherichia coli (n=7), Enterobacter cloacae (n=6), Candida spp (n=5), Enterococcus spp (n=5), Streptococcus spp (n=4), coagulase-negative Staphylococci (n=2), Proteus mirabilis (n=2), Gram positive bacteria (n=1), Staphylococcus aureus (n =1) and other enterobacteria (n=15). Forty percent of BSI was primary, i.e. not associated with another active infection. Mortality rate did not differ between patients with or without BSI (60 vs. 54%, respectively, p=0.49).
Conclusion: The incidence of BSI is high. The number of potential contaminants raises the question of the cost/effectiveness and timing of BC sampling, in particular those systematically collected.

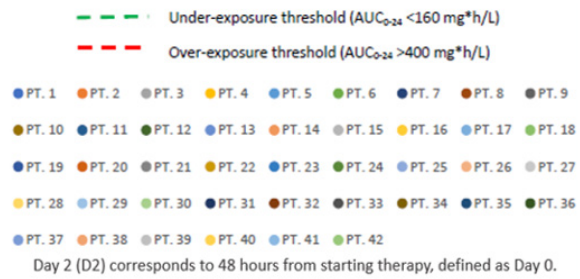
5883

Optimizing linezolid administration in critically ill patients: is continuous infusion enough?

Stufano M.[1], Fanizza T.[1], Mura Ondok M. J.[1], Di Serio F.[2], Dalfino L.[1], Grasso S.[1]
[1]Anesthesia and Intensive Care Unit, Dept. of Emergency and Organ Transplantation, University of Bari - Bari (Italy), [2]Clinical Pathology Unit, University-Hospital Policlinico - Bari (Italy)

Background and Goal of Study: Linezolid standard administration leads to a high serum levels variability and frequent under-exposure in ICU. Continuous infusion (CI) showed an in vivo bactericidal activity in animal models and could improve therapeutic target attainment (TTA) in severely ill patients, as showed in ICU patients with sepsis or ventilator-associated pneumonia. The aim of our study was to investigate the TTA rate with linezolid CI in ICU patients with all degrees of organ dysfunction.
Materials and methods: ICU patients receiving linezolid by CI (600mg LD in 1 hour, then 1200mg/day) for at least 48 hours were included. Drug concentrations (CSS) were measured at least once daily, after 48 hours from starting therapy, at steady-state, using a validated immunoassay method (ARK™). TTA was defined as AUC0-24>160mg*h/L, corresponding to an AUC/MIC>80 for MIC of 2mg/L, as for almost all S. aureus in our setting. The relationship between linezolid AUC0-24 and interfering variables was evaluated by Spearman's correlation. Independent predictors of under-exposure (AUC0-24<160) were investigated by Stepwise regression.
Results and Discussion: 42 ICU patients with pneumonia receiving linezolid CI were enrolled. From 591 determinations of linezolid CSS, 250 AUC0-24 were calculated, showing a high variability in drug exposure (CSS range 0.3- 30, median 8.5 mg/L; AUC0-24 range 7-710, median 183 mg*h/L). AUCs per patient per day are presented in Figure 1. Only 21 (50%) patients reached the target at 48 hours and in only 13 (31%) patients it was maintained for the whole therapy duration. AUC0-24 was correlated with creatinine clearance (CrCl, rS -0.65, p<0.0001) and lactate levels (rS 0.55, p<0.0001). TTA rate was 48% (n.121). Under-exposure rate was 43% (n.107), associated with higher CrCl, lower SOFA score and lactate levels, higher BMI, ARDS, need for vv-ECMO (p<0.05). Lactate levels, creatinine clearance and BMI independently predicted under-exposure (p≤0.005).
Conclusions: In ICU, CI of fixed dose of linezolid results in a still high inter-patient and inter-sample variability and TDM-guided dosing algorithms are urgently needed to optimize drug exposure.





5904

Characterization of Ceftobiprole's cerebrospinal fluid penetration in patients with External Ventricular Drainage

Castaldello M.[1], Filisina C.[2], Malla M.[1], Piva S.[3], Rasulo F.[1], D'Avolio A.[4]
[1]Università degli Studi di Brescia - Brescia (Italy), [2]Università degli Studi di Brescia - Brescia (Italy), [3]Università degli Studi di Brescia Spedali Civili di Brescia - Brescia (Italy), [4]Università degli Studi di Torino - Torino (Italy)

Background and Goal of Study: Healthcare-associated meningitis (HAM) is associated with significant morbidity and mortality. HAM treatment is challenging because of antibiotics resistance and the difficulty to achieve a therapeutic dose of antibiotics in the CNS. Ceftobiprole is a novel broad-spectrum cephalosporin with excellent activity against multi-drug resistant (MDR) pathogens. Since ceftobiprole is bactericidal, well-tolerated and it has anti-biofilm activity, it could be useful in case of HAM. Nowadays there are no human studies concerning the penetration and the efficacy of ceftobiprole in the cerebrospinal fluid (CSF). The present study aims to fill these gaps in the literature.
Materials and Methods: We enrolled 5 patients with and implanted EVD who received Ceftobiprole for other reasons than HAM, in a single-center pilot study. Exclusion criteria were: patients < 18, cephalosporine allergy, end-stage renal insufficiency, BMI>30, pregnancy and end-stage diseases. We have measured the ceftobiprole concentration in 8 blood samples and 11 CSF samples from each patient (95 samples in total), as described at www.coqualab.it. We calculate the maximum serum (Cmax-s) and CSF concentration (Cmax-csf) and the percentage of CSF penetration of ceftobiprole, after the third infusion of Ceftobiprole (500mg e.v. every 8hr).
Results and Discussion: The mean Cmax-s was 12.02 mg/L, reached after 2hr from drug infusion, whereas the mean Cmax-csf was 0.6 mg/L. In Figure 1 the mean concentrations (and the relative standard deviations) of serum and CSF ceftobiprole concentration for each time point are represented. The mean Ceftobiprole CSF penetration was 15.3%.
Conclusion: For the first time we studied the CSF ceftobiprole's penetration in humans, founding a mean value of 15.3%. Although we cannot conclude anything about the Ceftobiprole CSF efficacy, its meningeal penetration is in line with other cephalosporines and it is higher than Vancomycin, posing the base for a possible role of Ceftobiprole in HAM treatment.

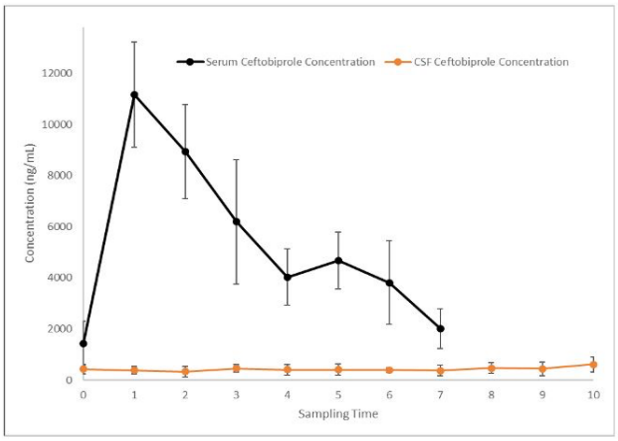


Figure 1: Mean serum and CSF ceftobiprole concentration in the five patients studied, with the relative standard deviation. It is possible to note either the lower CSF concentration (15.3%) and the lower variability of CSF concentration. T0: steady-state, before ceftobiprole administration, at the third dose; T1-T10 are respectively at 2-2.5-3-4-4.5-5-6-8-10-12 hours after ceftobiprole administration.

6148

Community-acquired peritonitis caused by pseudomonas aeruginosa and enterococcus spp. not covered by standard empirical therapy: a retrospective study

Zattera L.[1], Benítez-Cano A.[1], Ramos I.[1], Al-Lach A.[1], Nuñez M.[1], Garcia C. A.[1]
[1]Hospital Del Mar - Barcelona (Spain)

Background and Goal of Study: Role and prevalence of Entecoccus spp (ES) and P. aeruginosa (PA) isolation in intraoperative specimens in secondary community-acquired peritonitis (C-IIA) still remains unclear, and literature recommendations about its empirical antibiotic coverage is still uncertain. Our goal was to define not covering these pathogens with standard empirical therapy for C-IIA does affect postoperative outcomes.
Materials and Methods: We retrospectively collected data from all inpatients with community-acquired severe peritonitis (defined by intraoperative surgical criteria) from january 2014 to september 2019 in our surgical intensive care unit. Among them, all patients with presence of ES and PA in microbiological intraoperative cultures were divided in two groups according to the adequacy of the initial antimicrobial coverage. General data collected were, sex (mean and standard deviation, T student test), surgical severity (localized diffuse, fecaloid), ASA status (percentage, chi-square test). Our main outcomes were the need for re-intervention or abscess drainage, presence of postoperative acute kidney injury, postoperative vasopressor therapy (NA o PVT) or ventilator support (invasive or non invasive mechanical ventilation) calculated in univariate and a multivariate analysis with logistic regression.
Results and Discussion: We screened 161 patients. A total of 298 microbiological isolates (1.83 per patient) were founded. PA or ES were isolated in 31,6% of cases, for a total of 51 patients. Among these cases, mean age was 55.9 years, 52% were womens, 82.4% were diffuse peritonitis, 23.5% were ASA III-IV, and 80% of patients were not covered with correct ATB. For needs of re-intervention/drainage, no difference were founded for correct ATB coverage except for ASA status, and the OR for correct ATB coverage was 0.94 (CI 0.17;4.15, p=1.000). About the presence of NA infusion, VS or AKI, again no difference were founded in univariate analysis except for ASA status and age, and the OR for ATB coverage was 1.80 (CI 0.44;7.12, p=0.48).
Conclusion: With the limitations of the study (single-center, retrospective, small sample size), it seems that the non-coverage of PA and ES is not associated with worse postoperative outcomes, and empirical ATB choice should consider patient-related risk factor in agreement with current consensus.

5956

In-hospital mortality predictors after secondary intraabdominal peritonitis

Aguado Sanchez S.[1], Díaz Gómez T. V.[1], Benitez Cano A.[1], Ramos Delgado I.[1], Amoros Ruiz D.[1], Garcia Bernedo C. A.[1]
[1]Parc de Salut Mar - Barcelona (Spain)

Background and Goal of Study: Urgent abdominal surgery (UAS) for secondary peritonitis has a high risk of mortality especially in elderly people1.The main objective of the study is to identify mortality and morbidity associated factors.
Materials and Methods: This was a retrospective study from January 2016 to September 2019 including patients who underwent UAS for complicated peritonitis at our institution. The following variables were identified: gender, age, American Society of Anesthesiologist classification (ASA), type of infection, infection source, surgical classification for complicated peritonitis and adequacy of empirical antibiotic treatment. The primary outcome of the study was in-hospital mortality. Secondary outcome was postoperative morbidity, we describe morbidity as major complications and length of stay. Statistical tests used: Chi-square test and t-test. Risk factors for mortality and morbidity were identified using multivariate regression analysis. Model discrimination was evaluated using the area under the Receiver Operator Characteristics curve (AUC).
Results and Discussion: 314 patients were registered, 62% men, median age was 65 years, 45% ASA III-IV class, 37% nosocomial, 44% non appendicular-biliary source, empirical antibiotic adequacy was 76%. Mortality risk factors were: male sex (OR:4.35), age over 75 years (OR:4.32) and gastrointestinal location (OR:6.04).The AUC was 0.8 (95%, CI 0.72.-0.88). Vasoactive and mechanical ventilation support was significantly related to: male sex (OR:2.5 and 2.6), age over 75 years(OR:10.3 and 6.6), nosocomial origin infection (OR:4.5 and 3.2), non appendicular-biliary source (OR:11.2 and 6.1), fecal type (OR:6.4 and 9), ASA III (OR:3.7 and 4.1), ASA IV (OR:11.6 and 12.3).The AUC was 0.91 for vasoactive support and 0.9 for mechanical ventilation.Kidney failure was significantly related to: age over 75 years (OR:14), non appendicular-biliary source (OR: 5.9), fecal type (OR:3.6), ASA III

(OR:2.6). The AUC was 0.85.
Conclusion: A risk score could be made with the mortality and morbidity risk factors found, for therapeutical decissions, even though they should be validated in a prospective study.
References:
1. Eguaras Córdoba I, Herrera Cabezón J, Sánchez Acedo P, Galbete Jiménez A, Guillén Grima F. Ther urgent surgery elderly mortality risk score: a simple mortality socre. Rev Esp Enferm Dig. 2019 Sep; 111(9):677-682.
Acknowledgements: Gemma Vilagut S for statistical support.

5772

Rare case of acute disseminated encephalomyelitis due to intrauterine infected device

Bologa C.[1], Berbec M.[1], Ungureanu R.[1], Grintescu I. M.[1], Cobilinschi C.[1], Tiglis M.[1]
[1]Emergency Hospital Floreasca, Bucharest - Bucharest (Romania)

Background: Acute disseminated encephalomyelitis (ADEM) is an immune-mediated inflammatory demyelinating central nervous system disorder triggered by an infection or recent vaccination. Usually the neurological dysfunction develops few weeks following an acute infection.
Case Report: We present the case of a 49-year-old female admitted in our intensive care unit with septic shock and multiple organ dysfunction syndrome, sustained by an impressive inflammatory response. The patient presented disseminated bacteraemia in the context of a 16 years old contaminated intrauterine device which has been removed 5 days before the admission. Under broad-spectrum antimicrobial therapy and intensive care management the multiple organ dysfunction dissolved including the septic encephalopathy. Due to the persistent neurological dysfunction (quadriplegia and encephalopathy) and negative cerebral CT scan and lumbar puncture, the magnetic resonance imaging (MRI) revealed multiple demyelinating lesions in the profound white matter, basal nuclei and the cerebellar hemispheres, consistent with the diagnosis of acute disseminated encephalomyelitis. The treatment imposed high dose corticosteroids and sustained physical therapy. After 60 days the control cerebral MRI revealed an important reduction in number and size of lesions along with clinical improvement of sensitive and motor functions. At discharge, after 90 days, her neurological exam has significantly improved with remaining left hemiplegia.
Discussion: This case of ADEM is a rare finding in middle-aged adult related to septic shock and bacteraemia. Possible mechanism may include either molecular mimicry or direct inflammatory damage to myelinated neurones. Only few cases of ADEM were reported in children post viral infection or vaccination, but paucity data exists regarding clinical course and prognosis in adult patients.

4348

Pneumomediastinum caused by mediastinal misplacement of a Central Venous Catheter

Rockholt M.[1], Boström L.[1], Thorarinsdottir H.[1]
[1]SUS Lund University Hospital - Lund (Sweden)

Background: Central venous catheters (CVCs) are routinely placed in the ICU. Associated extravascular complications such as mediastinal perforation is an extremely rare complication and reports on management are scarce. Early diagnosis is key and multidisciplinary involvement is frequently required for catheter removal
Case Report: A 30 year old man was admitted to the ICU after a multi-trauma. Trauma CT-scan showed a misplaced CVC causing pneumomediastinum. CVC removal was performed in the OR, equipped for interventional radiology and thoracic surgery with preparations for an emergency thoracotomy in case of mediastinal bleeding. Platelet count, INR and APTT were normalized before removal. The CVC was successfully removed in a step-wise manner, using x-ray with contrast guidance.

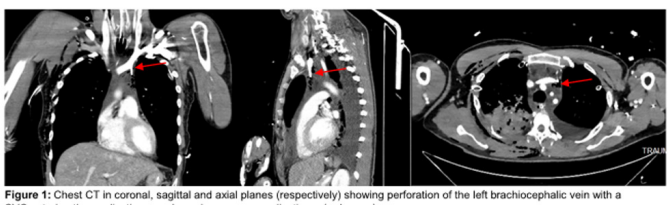


Figure 1: Chest CT in coronal, sagittal and axial planes (respectively) showing perforation of the left brachiocephalic vein with a CVC entering the mediastinum and causing pneumomediastinum (red arrow).

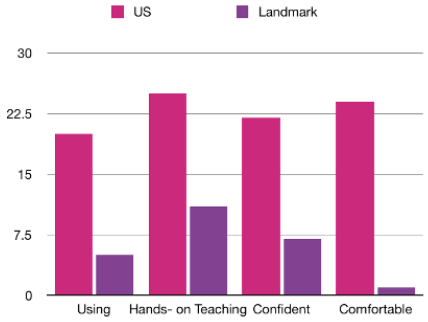
Discussion: Mediastinal CVC malpositioning can cause pneumomediastinum and mediastinal hemorrhage – conditions which can lead to shock. If CRBSI occurs, the condition may be further complicated by mediastinitis and sepsis. Vessel perforation risk is increased when excessive force is applied while advancing the guidewire, dilator or catheter. Malpositioning is more common in the subclavian approach with left sided procedures due to vessel angulations. Because of the risk of intrathoracic hemorrhage when extracting the CVC, thoracic surgeons should be involved since surgical management is the preferred method of choice. An endovascular approach can also be considered – which is why we recommend involving interventional radiologists for a multidisciplinary discussion and plan.
References:
1. Eisen LA et al. Mechanical Complications of Central Venous Catheters. J Intensive Care Med. 2006;21:40-46.
Learning points: Ultrasound guided CVC placement is recommended with guidewire visualization in real-time before placing the CVC. This can reduce the risk of mechanical complications. Avoid excessive force when advancing the guidewire. Radiologic assessment of CVC positioning is recommended before usage. If pneumomediastinum is present and CVC malpositioning is confirmed, stop fluid administration and make a thorough plan before catheter removal. Any coagulopathy should be corrected before CVC removal.

4395

Does US-guided central vein catheterization decrease landmark catheterization competency?

Plechysta Y.[1]
[1]Medical center Dobrobut - Kyiv (Ukraine)

Materials and Methods: US using becomes a worldwide tendency in anesthesia and ICU. It definitely decreases the rate of completion during CVC. But does it decrease the competency in landmark CVC competency? It is a cross-sectional survey-based study to figure out if doctors that use US-guided CVC feel confident with the landmark CVC approach. Q survey has been sent to the doctors with experience of more than 7 years in landmark CVC, familiar with US-guided CVC approach for more than 1 year and perform more than 25 CVC per year. 55 doctors took a survey and 25 met all criteria for inclusion.
Results and Discussion: More than 50 percent prefer to perform US-guided CVC and stop to use the landmark approach. After 2-4 months using US-guided doctors stopped using the landmark approach at all in most of the cases and have never been used it again because they did not feel confident with it anymore. 85 % of 25 doctors teach residents both approaches but hands-on CVC teaching performs only with US using. Also, doctors (73.6%) pointed out that even they have used landmarks they could perform it from the first attempt.



Conclusion: We need do to find a way of combining both approaches without loss of confidence and competence in using and teaching both of them.

4585

Multivariate analysis of factors associated with the first-pass success of the blind method for post-pyloric feeding tube placement: a retrospective study

Tanaka H.[1], Yokose M.[1], Kurisawa K.[1], Mihara T.[1], Takaki S.[1], Goto T.[1]
[1]Yokohama City University Hospital - Yokohama (Japan)

Background and Goal of study: Enteral nutrition using the post-pyloric enteral feeding tube (EFT) has a low risk of aspiration, reflux, or gastrointestinal intolerance; however, the placement of the tube using the blind method can be difficult. Assist devices such as fluoroscopy or endoscopy are useful but may not be applicable in patients with hemodynamic instability or severe respiratory failure. This study aimed to explore the factors associated with the first-pass success of the blind placement of the post-pyloric EFT in critically ill patients.
Materials and Methods: Characteristics of patients, physical and radiograph findings, laboratory data, and drugs used were obtained retrospectively from the medical records of adult patients who underwent post-pyloric EFT placement at the intensive care unit of Yokohama City University Hospital from January 1, 2012 to December 31, 2018. Variables with a P value <0.2 in the univariate analysis and variables expected to be involved in the first-pass success rate based on the clinical perspective were defined as the independent variables. Thus, variables for the multivariate regression analysis included age, sex, height, fluid balance from baseline, number of sedative agents, body position, use of cardiac assist devices, use of intestinal peristalsis promotors, presence/absence of intestinal peristaltic movement, post cardiovascular surgery, use of renal replacement therapy, serum albumin level, and position of the greater curvature of the stomach caudal to the level L1-L2 estimated by the abdominal radiography. Primary outcome was defined as the first-pass success for blind placement.
Results: The data obtained from 442 patients were retrospectively analysed. The median (IQR) age and SOFA (sequential organ failure assessment) score were 68 (57-86) years and 10 (7-13), respectively. The success rate of the first attempt at insertion was 42.8% (N=189). The logistic regression analysis demonstrated that the position of the greater curvature of the stomach with respect to L1-L2 was the only predictor for successful placement (odds ratio for first-pass success; 0.62, 95% CI; 0.40-0.95).
Conclusions: The position of the greater curvature of the stomach caudal to L1-L2 may be associated with lower success rate of the blind placement of the post-pyloric EFT in critically ill patients.

5288

Establishing sustainable and regular focused critical care echocardiography training in a developing world Intensive Care Unit

Harrington J.[1], Hall D.[1], Wang T. Y.[1], Murali M.[1], Mwansa S.[1], Hung J.[2]
[1]University Teaching Hospital, Lusaka - Lusaka (Zambia), [2]Liverpool Heart and Chest Hospital - Liverpool (United Kingdom)

Background: Achieving effective critical care in low and middle-income countries is a global health goal, which includes the provision of effective point of care ultrasound [1]. We sought to establish Zambia's first focused critical care echocardiography training programme in a 16-bedded ICU at University Teaching Hospital, Lusaka.
Materials and Methods: The syllabus and accreditation pathway were adapted from the UK Intensive Care Society, adjusted for local disease patterns. The echo protocol used parasternal, apical and subcostal windows to assess for ventricular dilatation and dysfunction, effusions, and hypovolaemia. Zambian doctors received an intensive one-day FICE course (the first in Zambia), followed by mentored scanning through weekly workshops. Teaching was delivered by visiting fellows who are accredited in echocardiography.
Results: 28 Zambian doctors who work with critically ill patients were enrolled. Feedback indicated high satisfaction with the course. On a 5 point Likert scale (1 = disagree, 5 = agree) participants found skills learnt on the course relevant to clinical practice (median response 5, range 4-5); when asked if echo is a useful adjunct to patient assessment in critical care, median response was 5 (range 4-5). 89% of attendants wanted to formally accredit in echo, but barriers included a lack of supervised scanning time and lack of mentors. Course feedback was used to guide ongoing training; 8 workshops were held over a 10 week period with a total of 16 attendants. Following the workshops, attendants felt more confident to use echo in clinical practice to guide management decisions (median response was 5, range 3-5) and more confident to diagnose pathologies that would otherwise go undetected (median response also 5, range 4-5). Qualitative feedback was also used to guide ongoing training.
Conclusion: Clinician motivation to gain competence at critical care echo is high in an environment with limited availability of diagnostic services. Establishing a training programme through didactic course delivery and frequent skill practice has proven to be feasible and well received, with a focus on sustainability and skill maintenance. Ongoing challenges are centered around provision of accreditation and local leadership.
References:
1. Becker, D. M et al. (2016). The use of portable ultrasound devices in low- and middle-income countries: a systematic review of the literature. Tropical Medicine & International Health, 21(3), 294–311.

5310

Is there any correlation between respiratory variation ratios of internal jugular vein and inferior vena cava?

Melek A.[1], Yalcin A.[1], Gelir I. K.[2], Kılıcaslan B.[1], Pamuk A. G.[1], Akinci S. B.[1]
[1]Hacettepe University Hospital - Ankara (Turkey), [2]Yunus Emre State Hospital - Eskisehir (Turkey)

Background and Goal of Study: Diameter and respiratory variation ratio (RVR) of inferior vena cava (IVC) can be determined by ultrasonography (USG) for assessment of fluid responsiveness in critically ill patients. Internal jugular vein (IJV) RVR has been a new parameter for hemodynamic evaluation.[1] Aim of this study was to investigate the correlation between RVRs of IJV and IVC before and after passive leg raise (PLR) as well as the variability between USG measurements of different physicians.
Materials and Methods: After ethical committee approval, 44 mechanically ventilated, critically ill patients were enrolled into the study. We measured IJV diameter with USG in the short axis. IVC was visualized in the subxiphoid long axis. All measurements were done separately by three physicians with different USG experience levels. Measurements of IVC and IJV were done both in supine position and after PLR. Then distensibility (D) and collapsibility (C) indices were calculated. Spearman correlation test was used for correlation analysis.
Results and Discussion: The mean±SD, APACHE II and SOFA scores were 24±8 and 8±4, respectively. There were strong correlations between the physicians in all measurements ($p<0.005$). There wasn't any significant correlation between D and C indices of IVC and IJV in patients in supine position except the moderate correlation in the subgroup of patients with PEEP≤5 cmH2O and strong correlation in patients on diuretics ($p<0.05$). There were moderate correlations between D and C indices of IVC and IJV after PLR in patients without vasopressors use and strong correlations in patients on vasodilators ($p<0.05$). There was no correlation in other groups after PLR.
Conclusion: The RVRs of IJV and IVC doesn't correlate routinely in critically ill patients. The D and C indices of IJV and IVC correlate better when PEEP is low or when there is increased intravascular volume as in patients requiring diuretics or as after PLR and when there is no vasoconstriction as in patients without vasopressors or with vasodilators. There is high correlation between physicians in measurements of diameters and related calculations of both IVC and IJV.
References:
1. Parikh, R., et al., Use of ultrasound-measured internal jugular vein collapsibility index to determine static intracardiac pressures in patients with presumed pulmonary hypertension. Annals of intensive care, 2019. 9(1): p. 124.

5521

Validation of pulmonary artery catheter for continuous cardiac output measurement in left ventricular assist devices

Durán-Aparicio M.[1], Fernandez-Lopez I.[1], Muñoz Jimenez Á.[1], Benito Anguita E.[1], Ramos Riesgo T.[1], Quintana-Villamandos B.[1]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: Left ventricular assist devices (LVADs) are a promising therapeutic aid for patients with advanced cardiac failure. Patients with LVAD need to follow a narrow haemodynamic supervision, being the pulmonary artery catheter (PAC) the reference method in the measurement of cardiac output (CO). In the last few years have emerged new methods for cardiac output monitoring such as the measure of continuous cardiac output (CCO) through PAC. Nevertheless, this method has not been yet validated in patients with LVAD. The aim of this study was to validate the CCO obtained with PAC in the continuous flow LVAD in partial assistance in an experimental porcine model.
Materials and Methods: The study was performed with six healthy minipigs. Under general anesthesia a Biomedicus 540 centrifugal pump was implanted in the minipigs undergoing continuous-flow support for partial left ventricular assistance. Cardiac output measurements were made simultaneously with PAC, continuous

cardiac output and bolus-based CO in four different moments of the study: immediately before entering into the LVAD (basal cardiac output), meanwhile the LVAD, in a hypervolemia status and finally in a model of hypovolemia. Bland-Altman method was used for validation of the CCO. All procedures were approved by the Ethics Committee of Hospital General Universitario Gregorio Marañon, Madrid, Spain.
Results and Discussion: Comparing CCO with bolus-based CO through the PAC, the Bland-Altman analysis demonstrated a percentage of error of 11% (Bias -0.47) in the basal moment, 22% (Bias -0.43) in the LVAD moment, 3% (Bias -0.02) in the hypervolemia status, and 21% (Bias -0.38) in the hypovolemia model.
Conclusion: The results described above show that the CCO measured through PAC could be used as reliable method in determination of cardiac output in continuous flow LVADs in partial assistance in a porcine model.

5922

A central venous catheter showing arterial waveform but venous blood gas picture: - Where is the tip?

Chau K. C.[1], Ng S. Y.[2], Leong S.[2], Choke E.[2], Ong B. C.[3]
[1]Sengkang General Hospital - Singapore (Singapore), [2]Singapore General Hospital - Singapore (Singapore), [3]Sengkang Genral Hospital - Singapore (Singapore)

Background: A 68 year-old patient who previously underwent laparotomy, limited right hemicolectomy with ileocolic anastomosis for small bowel obstruction again presented with obstructive symptoms. Diagnosis was confirmed with gastrografin studies. The decision was made for exploratory laparotomy. A central venous catheter was inserted in view of pre-existing cardiovascular diseases and a high likelihood of enteral nutrition post-operatively.
Case Study: The CVC was inserted pre-operatively under ultrasound guidance. The left internal jugular vein was chosen after an unsuccessful attempt over the right. Intraoperatively, the CVC pressure transduced via the distal port remained in the 10-18mmHg range. Post-operatively in ICU, a routine chest x-ray showed the CVC tip was in close proximity of the left carotid artery. Blood sampled from the distal port revealed a venous picture. However, now when the CVC distal port was transduced, it showed an arterial waveform with a mean pressure of 113. The conundrum of the exact location of the cvc tip had many implications.1. If arterial, the use of this cvc must cease immediately. Depending on its location, we must modify the strategy and the venue to remove this CVC. Sufficient vascular surgery support must be available on-site if the tip is intra-arterial.2, 3. Interventional radiologist suggested accessing the left brachiocephalic vein via the groin, inserting a wire into the cvc and withdrawing the cvc gradually, while checking for extravasation under angiography. If bleeding is evident, to achieve control with balloon tamponade. Urgent CT scan showed the CVC tip was breaching venous wall, but residing within fat, abutting the aortic arch. This explained why the blood gas showed venous results, but the transducer mimics an arterial waveform. CT angiogram showed the tip lying beyond the left brachiocephalic vein with no extravasation. Slight luminal irregularity consistent with perforation. The CVC was removed uneventfully, with a delayed venogram demonstrating lack of extravasation.
Discussion: The interesting amalgam of a venous blood gas with an arterial waveform transduced presented a unique challenge to work-up the exact position of the CVC. It involved the efforts of a multi-disciplinary team to design a strategy to delineate the anatomy and placement and its subsequent removal, with a good back-up plan should an inadvertent arterial puncture has occurred.

5955

Evaluation of ventriculo-arterial decoupling in human sepsis and effect of vasoactive agents: an observational study

Mirabella L.[1], Errico G.[1], Caporusso R. R.[1], Ugliola D.[1], Tullo L.[1], Cinnella G.[1]
[1]University of Foggia - Foggia (Italy)

Background and Goal of Study: Septic shock is a subset of sepsis with circulatory and cellular/metabolic dysfunction associated with a higher risk of mortality. Septic shock affects both heart and circulation, causing dysfunction in their interaction. One approach to detect this interaction is to examine ventriculoarterial coupling(E/A), which is defined by the ratio of arterial elastance(Ea) to left ventricular end-systolic elastance(Ees). In this study, we investigate time-course of E/A, Mean Arterial Pressure(MAP), Cardiac Index(CI) and Ejection Fraction(EF) in a cohort of patients admitted to ICUs who presented septic shock in order to optimize cardiovascular function leading the therapy with inotropes (Levosimendan, Dobutamine) and vasopressor agents (Norepinephrine).
Materials and Methods: We measured routine hemodynamics using Pulse contour method and transthoracic echocardiograms from baseline (T0), every day at the same time for 7 days.Parameters were calculated using data gathered from the echocardiographic examination included EF, Preejection time and Systolic time. Ventricular Elastance(Ees) was estimated by using the method of Chen. Arterial Elastance(Ea) was calculated as 0.9×(systolic arterial pressure/SV), and the Ea/Ees ratio was then calculated. Ea/Ees ratio<1,2 is considered normal value of E/A. In patients with Ea/Ees ratio>1,20 and MAP>65mmhg Levosimendan was administered(1).
Results and Discussion: 25 patients were enrolled, all the patients were uncoupled. Following the E/A monitoring, in 16 patients Levosimendan was administrated and in 9 patients not. All the patients improved their hemodynamics(E/A, MAP, CI, EF). In the group A(Levosimendan), patients improved their Ea/Ees ratio before patients in Group B(not Levosimendan) in fact they had an Ea/Ees ratio 1,09±0,23(median 1,16) vs 1,20±0,04(median 1,2) on the 5th day(p value=0,05). Patients in Group A need also lower dose of Norepinephrine.
Conclusion: Monitoring the E/A could be an important tool to evaluate hemodynamic conditions in septic shock patients as a supplement to standard monitoring. We could say that Levosimendan improves Ea/Ees ratio and so the cardiovascular efficiency. These patients need also lower dose of Norepinephrine that could worsen their outcome.
References:
1. Chen et al."Levosimendan as a new force in the treatment of sepsis-induced cardiomyopathy: mechanism and clinical application" J.Int.Med.Res.p1817–1828,2019.

6022

Level of agreement between cardiac output measurements using femoral or jugular catheter in a porcine model of hemorrhagic shock. Preliminary results

Fernandez-Lopez I.[1], García S.[1], Rodriguez L.[1], Varela O.[1], Melone A.[1], Zaballos M.[1]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: Cardiac output (CO) monitoring is an increasingly useful tool for manage surgical patients at high risk of hemorrhage or hemodynamic instability. Transpulmonary thermodilution (TPTD) is a rapid, safe and easy-to-install method. Typically, superior vena cava (SVC) access has been used to the thermodilution, however under certain circumstances, SVC access might not be feasible and femoral vein has to be used. Our aim was to compare the influence of the venous catheter site thermodilution site on TPTD in a porcine model of hemorrhagic shock.
Materials and Methods: Nine minipigs were anesthetized, instrumentalized and mechanically ventilated. A VolumeViewTM femoral arterial catheter was inserted. All animals were instrumented with identical Jugular (J) and femoral (F) catheter used for cold indicator injections and for central venous (CV) pressure monitoring. TPTD measurements were made through the catheter using a random crossover design at baseline and after inducing a controlled hemorrhage (CH) to decrease mean arterial pressure around 45 mmHg. We compared TPTD derived parameters via J access with F access at baseline (B) and during CH. Each TPTD measurement represents the mean of three consecutive TPTD indicator injections of 15 ml of 0.9% cold saline made with a mean time interval of time interval of 5 min. Statistics: Bland-Altman test for repeated measurements.
Results and Discussion: A total of 27 measurements were available for comparisons. There was no significant difference in cardiac index (CI) under both conditions. Femoral global end-diastolic volume index (GEDVI) was significantly higher in both conditions. (Δ 17% at B & Δ 29% at CH), as opposed to global ejection fraction (GEF) (Δ -14% at B & Δ -16% at CH). The Bland-Altman tests (bias, confidence interval and % error) were IC-B (-0.046, -0.40 to 0.31 ml.min.m2, 12.58%), IC-CH (-0.07, -0.36 to 0.22 ml.min.m2, 14.9%); GEDVI-B (-71.04, -181.0 to 38.8 ml.m2, 26.64%), GEDVI-CH (-89.3, -156.6 to -22.0 ml.m2, 22%); GEF-B (4.08, -2.9 to 11%, 24.3%) and GEF-CH (3.71, 0.01 to 7.41, 18.9%).
Conclusion: Femoral access for indicator injection results in altered values provided by the VolumeView™ system, particularly for GEDVI, and during controlled hemorrhage. However, in this preliminary study, the percentage of error was below the clinically acceptable threshold value of 30%.

6216

Electrolyte-based calculation of fluid shifts after a sodium chloride challenge in uncontrolled diabetes

Zdolsek J.[1], Svensson R.[2], Malm M.[3], Hahn R.[4]
[1]University Hospital Linköping, Sweden - Linkoping (Sweden), [2]Department of Anaesthesiology and Intensive Care, Vrinnevi Hospital - Norrköping (Sweden), [3]Swedish Defence Research Agency - Linköping (Sweden), [4]Research Unit, Södertälje Hospital, Södertälje, and Karolinska Institutet at Danderyds Hospital (KIDS) - Stockholm (Sweden)

Background and Goal of Study: Early treatment of uncontrolled diabetes involves large shifts of body fluid volumes that are difficult to monitor, but entail a risk of hemodynamic instability. There is need for a simple bedside test that can be used to guide the fluid therapy.
Materials and Methods: The plasma and urinary concentrations of sodium and chloride were measured 30 min after a 30-min infusion of 0.9% saline on two consecutive days in 14 patients with uncontrolled diabetes (mean age 50 years). Using a mass balance equation, the size of the extracellular fluid space (ECF) and translocation of fluid to the intracellular fluid (ICF) were estimated. Insulin was not given during the first experiment.
Results and Discussion: The infused fluid volume distributed almost equally between urine, ECF, and ICF (mean 35%, 31%, and 33%, respectively) with considerable variation between patients and days. A decrease of the ECF volume occurred when more than half of the administered saline had been excreted 30 min after the infusion ended. Conversely, a large urinary excretion implied a greater expansion of the ICF volume. The decrease in plasma glucose during the first 3 hours was explained solely by osmotic diuresis Very low ECF volumes before the infusions (< 9 L) was associated with biochemical evidence of the hyperosmolar syndrome, while patients with acidosis had normal ECF volumes (approximately 14 L).
Conclusion: One third of a saline infusion was allocated to the ICF even when insulin was not given. Only the patients with non-ketotic diabetes were depleted of ECF volume.
References:
1. Levine SN, Sanson TH (1989) Treatment of hyperglycaemic hyperosmolar non-ketotic syndrome. Drugs 38:462-472.
2. Hahn RG, Drobin D (2003) Rapid water and slow sodium excretion of Ringer´s solution dehydrates cells. Anesth Analg 97:1590-1594.
3. Zdolsek J, Lisander B, Hahn RG (2005) Measuring the size of the extracellular space using bromide, iohexol and sodium dilution. Anest Analg 101:1770-1777.
Acknowledgements: The authors are grateful to the staff of the ICU at the Vrinnevi Hospital in Norrköping, Sweden, for assistance during the data collection.

4595

Total hepatectomy and liver transplantation as a two-stage procedure: our experience

Palamidessi J.[1], Lacaba A.[1], Arespacochaga G.[1], Carmona M.[1], Albajar A.[1], García J.[1]
[1]Hospital Puerta de Hierro Majadahonda - Madrid (Spain)

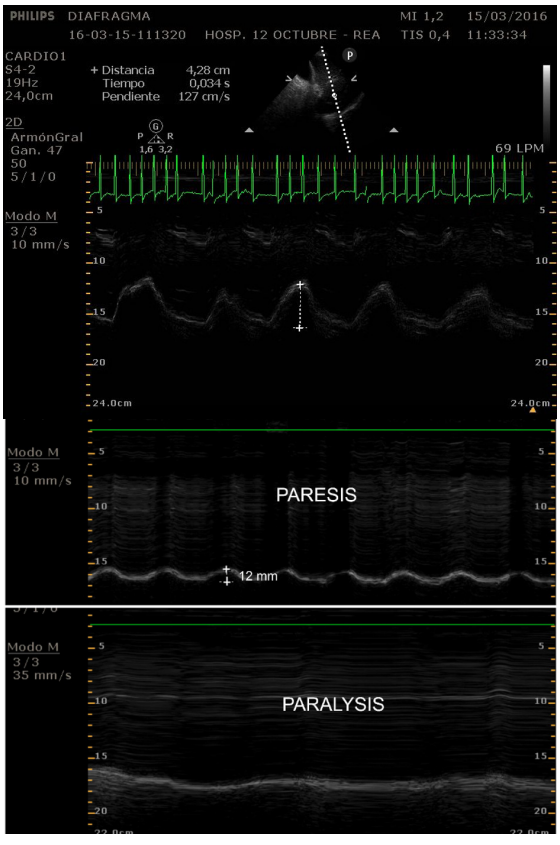
Background: Total hepatectomy and portocaval shunt, with an anhepatic phase, may be beneficial compared to maintaining a necrotic liver on-site. This "two-stage hepatectomy" may be a bridge therapy until the patient is transplanted again. We report our experience with total hepatectomy and portocaval shunt followed by a liver transplantation.
Case Report: Case 1: 68-year-old man who received a liver transplant. He developed primary graft dysfunction manifested by a great fragility of the liver with uncontrollable bleeding so was decided to perform the organ explant and a portocaval shunt. The patient was 15 hours in an anhepatic phase during wich he developed severe hemodynamic instability and an ARDS. After the retransplation the patient continued with a bad clinical situation and not improvement of the liver function. A thrombosis of the hepatic artery was observed. After saving this complication, the patient improved his situation, but acute renal failure developed and required HDFVVC sessions. The patient was released from the ICU after 46 days. Case 2: 54-year-old woman who received a liver transplant. She developed an inmediate graft dysfunction so she was reoperated. An ectatic liver graft was observed due to an obstruction of the venous anastomosis that could not be solved so an hepatectomy and portocava shunt was performed. The patient remained 9 hours in an anhepatic phase. During that time, she developed minimum hemodynamic instability and a moderate ARDS. After the retransplant, the patient improved in all aspects except the renal function that required renal replacement. The patient was released from the ICU after 21 days.
Discussion: Patients with fulminant liver failure or primary graft dysfunction can develop what is known as "toxic liver syndrome". Its mortality is close to 100%. The main objective of total hepatectomy is the stabilization of the hemodynamic and metabolic situation. If total hepatectomy is considered, the decision must be made before the patient has already developed an irreversible multi-organ dysfunction.
References:
1. Ringe B, Lübbe N, Kuse E, Frei U, Pichlmayr R. Total hepatectomy and liver transplantation as two-stage procedure. Ann Surg.1993 Jul;218(1):3-9.
Learning points: It is not known for sure what is the maximum survival time in anhepatic phase. Proper management and optimization during the anhepatic phase is essential to ensure survival and is also related to the results after re-transplantation.

4701

Diaphragmatic paresis after lung transplantation diagnosed by ultrasound

Garcia Alvarez R.[1], Armelles E.[1], Gonzalez-Cofrade M.[1], Lopez Lopez E.[1], Murcia Sánchez E.[1], Cortés Guerrero M.[1]
[1]Hospital Universitario 12 Octubre - Madrid (Spain)

Background and Goal of Study: Diaphragmatic paresis after lung transplantation is an often underdiagnosed complication, its incidence varies between 3- 30%. It is associated with longer intensive care unit stay and significant adverse outcomes (tracheobronchitis, pneumonia, tracheostomy,…).Ultrasound can be used to determine diaphragm excursion, which may help to identify patients with diaphragm dysfunction.
Materials and Methods: A 3.5-5 MHz probe is placed between the midclavicular and anterior axillary lines, in the subcostal area; B-mode is first used to find the best approach to see the cyclic movement of the diaphragm dome and after we use M-mode to measure the diaphragm excursion (E) and predict successful extubation or not.
Results and Discussion: The normal excursion is over 25 mm; it is defined diaphragmatic dysfunction by an excursion value between 11-24 mm for either hemidiaphragm and paralysis when E<11 mm; these last patients have longer weaning time and higher frequency of reintubation. We present three figures: normal right hemidiaphragm movement (figure 1) and images (figure 2) from two differents patients after lung transplantation with right paresis (up side) and right paralysis (down side).
Conclusion: Ultrasound evaluation of the diaphragm movement is simple, non-invasive and readily available at the bedside. There are variables like diaphragm thickness that we do not use it because we think it has variability and not reliable.
References:
1. Ramírez-Estrada S, Riera J et al. Effects of diaphragmatic paresis following lung transplantation. Intensive Care Med Exp 2015;3 (Suppl 1): A894



4754

Gastrointestinal complications in lung transplantation

Perosanz Silvo C.[1], García Álvarez R.[1], López López E.[1]
[1]Hospital Universitario 12 de Octubre - Madrid (Spain)

Background and Goal of Study: Gastrointestinal complications are common after lung transplantation and are associated with an increased risk of mortality and morbidity. However, there are few studies that focus on these types of complications. The aim of the study is to describe and analyze gastrointestinal complications that occur after lung transplantation in a third level hospital.
Material and Methods: A prospective observational study was designed that included all lung transplant patients between October 2008 and October 2018. The incidence of gastrointestinal complications, their treatment and mortality were collected. Severe digestive or biliary tract complication was identified as one of the motives that leads to decreased survival or the need for invasive treatment. This does not include infectious causes.
Results and discussion: A total of 251 patients underwent lung transplantation during an observation period of 10 years. There were 16 (6.4%) gastrointestinal complications. The median age was 54 years (range 15-70). Serious complications included: intestinal perforation, acute/hemorrhagic cholecystitis, hemorrhage, intestinal ileus, intestinal pneumatosis. Other complications were: intestinal ileus, diarrhea, clostridium, hyperbilirubinemia, cholestasis + diarrhea, ileus + diarrhea. Most complications were early in 11 cases (68.75%). Surgical treatment was required in 8 cases (50%). Ten (62.5%) patients died owing to gastrointestinal complications. A multivariate analysis of the variables which may influence the development of this complication was carried out, finding as risk factor the indication of lung transplant for idiopathic pulmonary fibrosis with pulmonary arterial hypertension ($p<0.05$) and having required continuous renal replacement therapy (CRRT) ($p<0.05$).
Conclusions: The development of gastrointestinal complications is frequent after lung transplantation. Early recognition is necessary to avoid delays in treatment and with it, its high mortality, finding some prognostic predictor for the development of this comorbidity: the indication of idiopathic pulmonary fibrosis transplantation with pulmonary hypertension and having required continuous renal replacement therapy in the postoperative period.

4823

Life sustaining treatment to facilitate organ donation; In whose best interest?

Evans N.[1], Konda N.[1], Cerniauskiene V.[2], Garg A.[2]
[1]University of Birmingham - Birmingham (United Kingdom),
[2]Walsall Healthcare NHS Trust - Walsall (United Kingdom)

Background: Our case highlights the ethics underlying life-sustaining treatments to facilitate organ donation, and where a line should be drawn such that interventions delivered still constitute the patient's best interests.
Case Report: The patient was a 56-year-old male, who sustained a cardiac arrest resulting in a state of irreversible cerebral hypoxia. In ICU, he had a Do Not Attempt Cardiopulmonary Resuscitation in place and a plan of Organ Donation after Circulatory Death (DCD). Following sudden deterioration into ventricular tachycardia, amiodarone and vasopressors were given to provide more time to ensure organ viability for DCD. Despite life-prolonging treatments, the period of instability deemed him unsuitable for donation.
Discussion: Most organ donations come from brainstem dead patients, however such donation is decreasing worldwide. Therefore, medical professionals are considering ethical methods of increasing the DCD donor pool. In this case it was decided to initiate amiodarone and vasopressors as life-sustaining treatment for the sole purpose of organ donation. UK Legal Guidance states the maintenance of life-sustaining treatments is ethical if there is no harm or distress caused to the patient or family. However, the Consensus Statement on DCD from the British Transplant Society and Intensive Care Society consider the appropriateness of initiating new treatments such as inotropes to be unclear. As the patient was on the organ donor register it could be argued that treatment decisions were ethical, as they were in his best interest1. The UK is transitioning to an 'Opt-Out' policy for organ donation in 2020 to tackle deficits in eligible donors. This will add further ambiguity to the ethical dilemma because it will no longer be appropriate to presume that the patient has consciously chosen to be on the organ donation register. Consequently life-sustaining treatments may not be in their best interest.
References:
1. NHSBT. Donation after Circulatory Death. https://www.odt.nhs.uk/deceased-donation/best-practice-guidance/donation-after-circulatory-death/.
Learning points: Although life-sustaining treatment for the sole purpose of organ donation can increase the organ donor pool, it is highly contentious. Existing guidelines do not provide a clear framework to guide clinical decision-making. Therefore, decisions should be made on case-by-case basis, with future policies such as the UK 2020 'Opt-Out' policy likely to augment decisional complexities.

5129

Risk factors for delayed progression toward brain death in brain injured patients: an observational retrospective cohort study

Coinus L.[1], Gregoire H.[1], Richard S.[1], Luc A.[1], Audibert G.[1]
[1]Chru Nancy Brabois - Vandoeuvre Les Nancu (France)

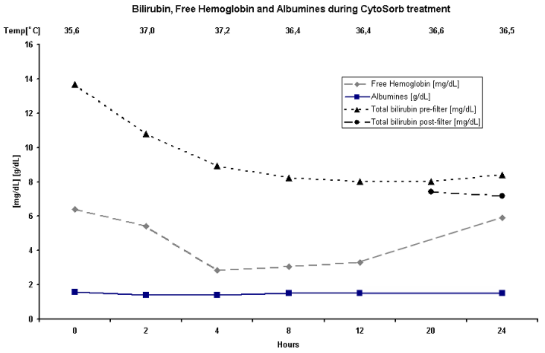
Background and Goal of Study: Delay between brain injury and brain death (BD) is an unpredictable variable but also an important one to decide whether to pursue intensive care in comatose patients who are potential organ donors. The objective of this study is to determine the factors associated with the delay between brain injury and BD, with a particular focus on the predictive factors of late BD.
Materials and Methods: This multicenter observational retrospective cohort study was conducted based on the "coma data base" of PRELOR, the regional network for organ procurement in Lorraine, France, an area with a population of 2.4 million people. All comatose patients admitted between January 1, 2015 and December 31, 2016 who had a possible evolution toward BD were included in the study. Demographic, clinical and paraclinical characteristics, the etiology of brain injury, past medical history and evolution toward either survival, brain death or another cause of death were recorded. Comparative bivariate and multivariate statistical analysis was performed.
Results and Discussion: Among 1553 brain-injured patients analyzed, 272 evolved toward BD. Median delay before BD was 2 days. Etiology ($p<0,0001$), initial systolic blood pressure (SBP)($p=0,0164$) and loss of pupil light ($p=0,0002$) or corneal reflex ($p=0,0043$) at admission had a significative impact on BD delay. For 25% of these patients, BD occurred after 4 days (so called "late BD"). Male sex, anoxia or ischemic stroke, initial SBP below 150mmHg, and responsive pupils at admission were associated with late BD.
Conclusion: In brain-injured patients, the median delay before BD was 2 days but the 75th percentile reached 4 days. Male sex, ischemic stroke or anoxia, initial SBP below 150mmHg and responsive pupils at admission were associated with late BD. In these patients, intensive care should be continued, so as not to miss potential organ donors.

4375

In vivo kinetics of free haemoglobin, bilirubin and albumin during hemadsorption therapy with CytoSorb – case presentation

Szczukocka M.[1], Kutnik P.[1], Sysiak-Sławecka J.[1], Piwowarczyk P.[1], Borys M.[1], Czuczwar M.[1]
[1]Medical University in Lublin - Lublin (Poland)

Background: In ICU settings, hyperbilirubinemia is an independent factor of patient morbidity and mortality. Extracorporeal therapies can lead to hemolytic erythrocyte disruption, release of free haemoglobin and hyperbilirubinemia. CytoSorb was recently approved for reduction of elevated bilirubin levels. Relationship between kinetics of bilirubin and free haemoglobin removal during CytoSorb remains elusive.
Case Report: 52-year-old patient was admitted to tertiary hospital after initiation of V-V ECMO due to ARDS. Patient's circulation was supported with infusion of norepinephrine and renal failure was treated with continuous veno-venous hemodialysis. Despite management of anticoagulation with daily doses of 0,4 ml subcutaneous nadroparin only, bleeding diathesis was observed from cannulation sites, oral and nasal cavity. Patient required multiple transfusions of blood products (24 units of PRBC, five units of FFP). At 10th day of Ecmo therapy total bilirubin level significantly increased reaching a peak at 13,98 mg/dl. We installed CytoSorb filter in series into the patient's renal replacement therapy circuit and set blood flow at 100ml/min. We measured the total bilirubin, free haemoglobin, and albumin serum levels at the start and after 2, 4, 8, 12, 20 and 24 hours. There was a correlation between total bilirubin level and free haemoglobin decrease in the first 8 hours. Subsequently, total bilirubin remained stable while free haemoglobin level was increasing. Albumin level remained stable during therapy. At 20 and 24 hours, we still found difference in the total bilirubin serum levels between pre and post-filter samples (figure 1). When CytoSorb therapy was ended total bilirubin level was decreased to 2,39 mg/dl and remained stable. After 24 days of ECMO support and continuous renal replacement therapy patient died.
Discussion: This is the first in vivo observation of kinetics of free haemoglobin, bilirubin and albumin during hemadsorbtion with CytoSorb.
Learning points: Ability of CytoSorb to adsorb free haemoglobin is limited after 8 hours of the therapy. CytoSorb can be saturated with bilirubin earlier than after 24 hours of the therapy.



5758

Hypernatremia and increased urinary output in brain-dead cardiac donors and recipient survival after heart transplantation

Nagy Á.[1], Eke C.[1], Szabó A.[1], Szécsi B.[2], Gál J.[3], Székely A.[3]
[1]Semmelweis University, School of PhD studies - Budapest (Hungary), [2]Semmelweis University, Faculty of Medicine - Budapest (Hungary), [3]Semmelweis University, Department of Anesthesiology and Intesive Therapy - Budapest (Hungary)

Background and Goal of Study: Management of cardiac donors has an important role in the overall outcome. Several endocrinologic changes might occur during the management period. Posterior pituitary gland dysfunction can lead to central diabetes insipidus, which characterized by impaired hemodynamics. Hypernatremia and increased urinary output (IUO) are representing two of the main symptoms. We aimed to evaluate the relationship between the occurrence of hypernatremia and increased urinary output together and mortality after heart transplantation (HTX).
Materials and Methods: We conducted a retrospective, observational study among cardiac donors and recipients for HTX between January 2012 and September 2018 at the Heart and Vascular Centre, Semmelweis University. Basic demographic variables were collected for donors and recipients. Hypernatremia (>145 mmol/L), IUO (>2.5 ml/kg/h), vasopressin and desmopressin treatment were retrieved from donors. The United Network for Organ Sharing (UNOS) score was calculated for both. Our outcomes of interest were 30-day, 1-year and 2-year mortality of the recipients. We used SPSS to perform our statistical analysis. Multivariable Cox regression analyses were applied.
Results and Discussion: We included 297 HTX in our final analyses. The median age of donors was 41 years (IQR25-75: 32.-49) for recipients it was 54 years (IQR25-75: 45-59). Total ischemic time was 198 minutes (IQR25-75: 161-240), gender mismatch was given in 47 cases (15.8%), 104 donors (35.0%) had hypernatremia and IUO, 202 donors (68.0%) received vasopressin or desmopressin treatment. Thirty-day, 1-year, and 2-year mortality were 10.8%, 18.9%, and 20.5%, respectively. Multivariable Cox regression analyses revealed no significant difference between patients with or without hypernatremia and IUO in 30-day mortality (OR: 1.17; 95% CI: 0.56-2.42; p=0.677), 1-year mortality (OR: 1.30; 95% CI: 0.76-2.23; p=0.344) and 2-year mortality (OR: 1.21; 95% CI: 0.72-2.04; p=0.466). We adjusted our multivariate models for the UNOS summary score and for vasopressin and desmopressin treatment of the donors.
Conclusion: Hypernatremia and IUO of cardiac donors showed no relationship with increased mortality at different time points after HTX. Hypernatremia and IUO together are might not defining the donors with posterior pituitary dysfunction precisely besides current treatment regimes.

6033

Hemolytic-Uremic Syndrome associated with tacrolimus in lung transplantation

Armelles E.[1], Gonzalez-Cofrade M.[1], Lopez E.[1], Garcia R.[1]
[1]Hospital Universitario 12 de Octubre - Madrid (Spain)

Background: Hemolytic-Uremic Syndrome (HUS) is characterized by renal failure, thrombocytopenia and hemolytic anemia, whose pathogenic etiology is the endothelial damage caused by dysregulated activation of the alternative complement pathway.
Case Report: After 300 lung transplantations (LT) in our hospital in eleven years, we present the first three recognised cases of HUS associated with tacrolimus occurred in our intensive care unit during 2019. Case 1: a 61 year-old woman with chronic renal failure, bilateral LT in 2016 due to chronic obstructive pulmonary disease (COPD) and she is admitted with convulsions. Case 2: a 55 year-old woman with bilateral LT due to fibroelastosis. Case 3: a 64 year-old man with bilateral LT due to COPD. Each patient developed hemolytic anemia, thrombocytopenia and acute renal failure requiring continuous dialysis in the last two cases. Thrombotic thrombocytopenic purpura was considered in case 1 because of neurological symptoms, but ADAMTS13 test was negative. None of the patients had any intestinal symptoms, so typical HUS was ruled out. The differential diagnosis was focused on causes of aHUS, with tacrolimus as the most probable cause. Eculizumab (an IgG2 humanized monoclonal antibody that blocks C5, preventing membrane attack complex formation), was started in each case at a dose of 900 mg/week. Without discontinuing tacrolimus, all patients showed clinical and laboratory improvement (table 1). Two of the cases continue with this treatment, while the third one died of multiorgan failure during the first month.

	Basal Hb (g/dL)	HUS Hb (g/dL)	1 month Hb (g/dL)	Schistocytes (per field)	Basal Cr (mg/dl)	HUS Cr (mg/dl)	1 month Cr (mg/dl)	Basal LDH (U/L)	HUS LDH (U/L)	1 month LDH (U/L)
CASE 1	10.5	6.9	10.3	4	2.45	3.96	2.04	248	1398	223
CASE 2	13.4	8	11	2	0.67	7.1	2.86	225	521	325
CASE 3	12.8	7.7	/	3	0.90	1.38	/	155	1597	/

TABLE 1: Hb: haemoglobin; Cr: creatinine; 1 month: 1 month after treatment

Discussion: There are few published cases of aHUS in LT. It is probably an underdiagnosed entity due to the complexity of diagnosis and because the time of transplant is independent of the syndrome's inception. The treatment of aHUS due to tacrolimus has been changing in the past years: initially discontinuing tacrolimus, then plasmapheresis, and most recently treatment with eculizumab.
Learning points: aHUS should be considered in patients who are on tacrolimus and present with renal failure and anemia with an unknown cause. We consider vital to continue tacrolimus as the best immunosuppressant option for LT.

6159

Liver transplantation in case of Budd-Chiari syndrome. Case report

Ezugbaia B.[1], Avetisian V.[1], Sholin I.[1]
[1]Regional Clinical Hospital No.1 By Name Professor S.V. Ochapovsky - Krasnodar (Russia)

Background: Budd Chiari Syndrome was first described in 1845 by George Budd, who described the classic triad of symptoms: abdominal pain, hepatomegaly, and ascites. Budd Chiari syndrome is described as a violation of the venous outflow from the liver.
Case Report: Female I., 35 years old, was admitted to the emergency department with complaints of acute pain in the right iliac region, epigastrium, nausea and malaise. Blood pressure 80 \ 65 mmHg., heart rate=100 bpm. On CT- liver is enlarged, unevenly low accumulates contrast agent in both phases. In the venous phase - contrast is not of satisfactory quality, it is impossible to exclude defects in contrast distal subsegmental branches of the portal vein. Hepatosplenomegaly, hydroperitoneum, retroperitoneal lymphadenopathy. In order to exclude the acute abdomen, it was decided to perform diagnostic laparoscopy. Intraoperatively in all parts of the abdominal cavity serous transparent effusion volume of about 700-800ml. The liver is increased in size, the edge is rounded, parenchyma bright bardic color. Diagnosed: Budd-Chiari syndrome type II, hepatic vein thrombosis, thrombophilia is genetically determined on taking oral contraceptives. Assigned to anticoagulation therapy subcutaneous injection of Arixtra 7.5 mg per day immediately. Hepatic replacement therapy was started. Taking into account the clinic of tense ascites, an increase in intra-abdominal pressure, in the right hypogastrium under ultrasound control, an abdominal puncture was performed by a catheter (2 mm in diameter) for prolonged evacuation of ascites. A transparent serous liquid was obtained in the volume of 1 liter per day, for the next 4 days. By 10 days of stay in the ICU, the patient's condition is severe, hepatic insufficiency, hepatic encephalopathy increases, two procedures of extracorporeal support of liver function were performed by the Prometheus. By 14 days, the patient progresses hepatic encephalopathy, coagulopathy, hypoalbuminemia, it was decided to put on

the waiting list for liver transplantation. On day 21, orthotopic liver transplantation was performed. The postoperative period was stable, the patient was discharged for 36 days, in satisfactory condition.
Discussion: Budd-Chiari syndrome is a rare but formidable condition leading to acute liver failure, which is a direct indication for orthotopic liver transplantation.

6242

Fulminant hepaptic failure secondary to bariatric surgery. A case report

Lara Jiménez A.[1], Méndez Martínez E.[1], Rubio Baines Í.[1], Mendoza Sorrondegui J.[1], Cara Gilabert C.[1], Monedero Rodríguez P.[1]
[1]Clinica Universidad de Navarra - Pamplona (Spain)

Background: It has become apparent that some patients who undergo bariatric surgery, over time they have led to fulminant hepatic failure(FHF) that have resulted in the need for an liver transplant and the reversal of the malabsorptive component. Case Report: 44 year-old patient who presented with jaundice and hepatitis, which had developed in the last week. As the only relevant prior procedure, I would highlight the Gastro-Ileal Bypass performed in June of 2018, which. Once admitted to the emergency room, there was an increase in liver enzymes, accompanied by changes in coagulation tests. During their admission, they remained stable until they began to show signs of worsening liver function and hepatic encephalopathy compatible with a FHF,for which they were admitted to the ICU and put on the transplant list. She underwent a liver transplant, accompanied by the reconstruction of their previous gastric bypass. The surgery took place without any major complications. Due to a good evaluation, the patient was discharged. In subsequent revisions the patient notes an improvement of their overall state to this day.
Discussion: It is seen how the malabsorptive component of these techniques can provoke a deterioration in liver function by mechanisms that are still relatively unknown. At the moment, there are several different theories postulated on the mechanism of liver damage. It stresses bacterial overgrowth, that cause damage to the intestinal mucosa in the excluded zone, favoring the bacterial translocation. It has been observed that the protein deficiency could increase the lipid deposits in the liver, as well as produce an increased release of inflammatory mediators. Some authors consider the simultaneous reversal of the malabsorptive component necessary in patients who undergo a liver transplant. We do not know if the patient has a non-diagnosed steatohepatitis that was aggravated by the bariatric procedure or if that procedure through different mediators was the primary cause of this issue. There is no doubt that there is a relation ,between bariatric procedures and the liver damage associated.
Learning points: A better comprehension of the mechanisms of liver function disturbance, secondary to bariatric surgery, is needed in order to be able to introduce pertinent preventative measure.
References:
1. Rodríguez Silva,C.et al.(2019). Insuficiencia hepática aguda secundaria a cirugía bariátrica: una indicación de trasplante hepático.

4939

Potential benefits of renal replacement therapy in combination with haemoadsorption in patients with acute pancreatitis

Popescu M.[1], Scarlatescu E.[1], Stefan M.[1], Tudoroiu M.[1], Marcu A.[1], Tomescu D.[1]
[1]Fundeni Clinical Institute - Bucharest (Romania)

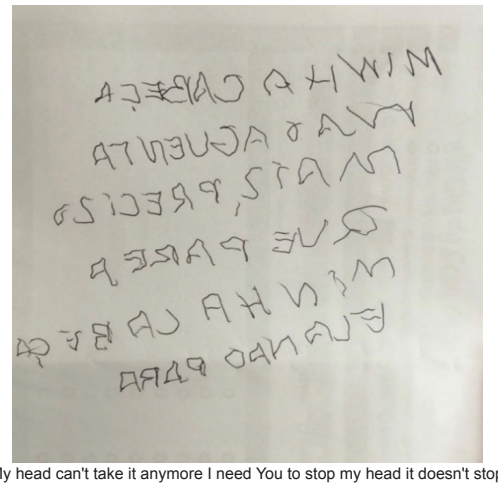
Background and Goal of Study: Severe acute pancreatitis (SAP) represents a life-threatening disease associated with multiple system organ failure and increased mortality if intensive care measures are not applied promptly. The aim of this study was to assess the clinical and paraclinical effects of hemoadsorption in patients with SAP.
Materials and Methods: Seventeen consecutive patients with SAP admitted to the intensive care unit (ICU) of Fundeni Clinical Institute were included in the present study. Continuous veno-venous hemofiltration in combination with hemoadsorption was applied in three 24-hours consecutive sessions after ICU admission. Number of organ dysfunctions and SIRS criteria were recorded at ICU admission. The following data were recorded before and after the 3 hemoadsorption therapies: Glasgow coma scale, PaO2/FiO2, creatinine, 24-hours urine output, bilirubin, leucocyte and platelet count, heart rate, mean arterial pressure and vasopressor support, C-reactive protein and procalcitonine. SOFA score was calculated before and after the therapy. ICU length of stay and 28-days outcome was noted.
Results and Discussion: The mean age in the study group was 54±14 years. At admission the median number of SIRS criteria was 3 [1,4] with a median number of 3 [1,4] organ dysfunctions. The use of hemoadsorption was associated with a significant increase in mean arterial pressure (from 75±8 mmHg to 80±7 mmHg, p=0.03), a decrease in creatinine levels (from 2.23±2.1 mg/dL to 1.22±0.6 mg/dL, p=0.01), leucocyte count (15284±6971 /uL to 9852±3365 / uL, p=0.04) and procalcitonine (from 9.7±3.5 ng/mL to 2.1±2.7 ng/mL, p=0.05). We also noted a non-significant decrease in SOFA score from 5.6±3.3 to 4.0±3.3 (p=0.79). 28-days survival was 58.8% (n=10). Factors associated with a worse outcome were: initial SOFA score (p=0.05), low pH (p=0.05), leucocyte count (p=0.02), renal dysfunction (p=0.03), low Glasgow coma scale (p=0.02) and high C-reactive protein (p=0.05).
Conclusion: Hemoadsorption is associated with improved hemodynamics and decrease in inflammatory markers in patients with SAP. These results may offer a new therapeutic option in modulating inflammation in patients with SAP and should be further assessed in a randomized control trial.

4863

Mirror writing in the emergency room: an unusual case of epilepsy

Freitas L. S.[1], Torrão C.[2], Valdoleiros S. R.[2], Laranjinha I.[2], Chaves J.[2], Antunes R.[2]
[1]Unicamp - Campinas (Brazil),
[2]Centro Hospitalar do Porto - Porto (Portugal)

Background: Mirror writing is the script which runs in the opposite direction to normal, with individual letters also reversed, nearly always undertaken with the left hand. It can be seen in healthy individuals or associated with various focal lesions that most commonly involve the left hemisphere. However, it has not yet been described in people with epilepsy.
Case Report: 42-year-old right-handed female patient, with non-lesional left frontal epilepsy diagnosed at age 18, currently on topiramate 200mg bid, lacosamide 200mg bid and levetiracetam 1500mg bid. She had multiple previous hospitalizations due to refractory disease requiring coma induction and presented to our emergency with another episode of focal seizures (right upper limb) with secondary generalization. Infectious and metabolic causes of decompensation were excluded. Despite the administration of diazepam 40mg IV and levetiracetam 1500mg IV, the seizures continued. Between seizures, the patient presented with an episode of mirror writing (Fig 1) with left hand. Anesthetic induction and deep sedation were required to manage refractory convulsive status epilepticus, monitored with bispectral index. In the ICU, under deep sedation with propofol perfusion, electroencephalography study showed no paroxysmal activity. Relatives reported mirror writing after previous seizures. She has no memory of that and is unable to write like that out of seizures.



"My head can't take it anymore I need You to stop my head it doesn't stop"

Discussion: Unaware mirror writing was present in this right-handed patient with refractory epilepsy affecting the right upper limb. Stroke patients with right-sided paresis can rarely present with spontaneous and mirror writing during early attempts of writing with the left hand. We hypothesize that our patient, while feeling impaired to write with her right hand during seizures, attempts to do so with her left hand, and mirror writing occurs.
References:
1. Doi: 10.1136/jnnp.2006.094870.
Learning points: To the best of our knowledge, this is the first case of mirror writing reported in a patient with epilepsy. Physicians should be aware of this condition, which may be underreported.

4913

Varicella-zoster encephalitis or acyclovir neurotoxicity: that is the question

Garcia Alvarez R.[1], Navarro Casado R.[1], López Medrano F.[1], López López E.[1], Armelles E.[1], Gonzalez-Cofrade M.[1]
[1]Hospital Universitario 12 Octubre - Madrid (Spain)

Background: Clinically differentiating varicella-zoster virus(VZV) encephalopathy from acyclovir neurotoxicity is very challenging. Zoster encephalopathy should improve with acyclovir, while aciclovir toxicity will get worse if the medication is continued.
Case Report: A 56-year-old woman admitted to the intensive care unit after left nephrectomy because a renal abscess and with septic shock; she had the von Hippel-Lindau disease and right nephrectomy before, therefore she was anephric and continuous venovenous hemodiafiltration was started. One week later, when clinical situation was improving, she was diagnosed an ophthalmic herpes zoster and placed on intravenous acyclovir 300 mg every 8 hours. The next day she reported confusion, dysphasia and visual hallucinations and finally she was found unconscious with Glasgow coma scale 9. Computed tomography (CT) and magnetic resonance imaging (MRI)of the head were normal. Urgent lumbar puncture was managed also. We continued aciclovir with the diagnosis of VZ encephalopathy. After one week of treatment, neurological situation did not improve so we decided to discontinue acyclovir and the recovery of consciousness and normal neurological situation were in 36 hours.
Discussion: It has been proved possible dissemination of VZV from a root to the central nervous system. Treatment of VZV encephalitis is with intravenous acyclovir Neurotoxicity is a not common side effect of acyclovir. This is seen often in patients with renal impairment. Some authors have described visual hallucinations and dysphasia as unique features of acyclovir toxicity. As opposed to zoster encephalitis, acyclovir toxicity is associated with normal cerebral spine fluid findings and normal CT scan and MRI findings. Withdrawal of acyclovir often leads to resolution of neurological symptoms in 48–72 h. In our patient, we finally decided to discontinue aciclovir because she did not improve clinically with acyclovir; the clinical signs were suggestive of toxicity (visual hallucinations, confusion and subsequent coma) and her images studies were normal.
Learning points: Differentiating acyclovir neurotoxicity from zoster encephalitis can be challenging and management of the two conditions is diametrically opposite. Acyclovir neurotoxicity is seen more often in conjunction with renal dysfunction and with visual hallucinations and disphasia.

5460

Neuroleptic malignant syndrome in a patient with chronic alcoholism: a case report

Fervienza A.[1], Del Río M. E.[1], Ibáñez C.[1], López-Baamonde M.[1], Jacas A.[1], Ferrando C.[1]
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background: Neuroleptic Malignant Syndrome (NMS) is a rare medical emergency associated with the use of antipsychotic drugs. Its etiology remains uncertain, although the hypothesis of a generalized blockade of dopamine receptors has a wide acceptation. In terms of clinical presentation, fever, dysautonomia, fluctuating level of consciousness and rigidity are its most typical signs. The diagnosis is ruled out by exclusion. Despite its potential mortality, the prognosis has improved in the last years, which reflects an earlier diagnosis and intervention.
Case Report: A 79-year-old woman with chronic alcoholism as the main background of interest, presented to the emergency department under the diagnosis of a pertrochanteric fracture. She was operated on the day of admission with an intramedullary nail under spinal anesthesia without complications. Once in the hospitalization unit, she was given intramuscular haloperidol (5mg) to treat an episode of agitation. Few hours later she presented respiratory insufficiency, somnolence, diaphoresis and generalized rigidity, with normal blood pressure and 37ºC temperature which raised until 42ºC in the next 4 hours. Blood test revealed metabolic acidosis, hyperlactacidemia and CK and transaminases elevation. Imaging tests discarded a pulmonary or cardiac cause. Meningitis secondary to neuroaxial anesthesia and NMS were the remaining main differential diagnosis. Due to a hemostatic disorder, a lumbar puncture to rule out meningitis could not be performed. Ultimately, empiric treatment with dantrolene 1m/kg was initiated with immediate both clinical and analytical improvement. Two weeks later the patient was discharged home with no medical sequelae.
Discussion: The use of antipsychotics is a common practice for the management of delirium in post-operated patients. These drugs, even at low doses, may cause serious complications, of which NMS is one of the most feared. Patients presenting any known predisposing factors such as chronic substance abuse are at higher risk1. A high degree of suspicion for early diagnosis and treatment are paramount to improve their prognosis.
References:
1. Adnet P et al. Neuroleptic malignant syndrome. Br J Anaesth 2000; 85:129.
Learning points: NMS is a rare but potentially lethal entity related to the use of antipsychotics. People with predisposing factors such as chronic substance abuse are at higher risk of presenting NMS. Early diagnosis and treatment are both essential to improve its prognosis

5464

Use of IgM-enriched immunoglobulin preparation as adjuvant therapy in E. Coli meningoencefalitis

Pota V.[1], De Nardis L.[1], Sansone P.[1], Passavanti M. B.[1], Aurilio C.[1], Pace M. C.[1]
[1]University og Campania "L. Vanvitelli" - Napoli (Italy)

Background: Gram-negative bacteria are an uncommon etiology of spontaneous community-acquired adult meningitis and meningoencephalitis. We describe the case of a 48-year-old woman with meningoencephalitis, with a marked alteration of consciousness on admission, and septic shock secondary to pyelonephritis caused by Escherichia Coli, treated with targeted antimicrobial therapy and immunoglobulin IgM-enriched (Penatglobin) preparation as adjuvant therapy.
Case Report: A 48-year-old woman (weighing 60 kg) was transferred from the Emergency Room (ER) to the Intensive Care Unit (ICU) of University of Campania “L. Vanvitelli ” for suspected pyelonephritis with systemic impairment, fever, (sepsis) and altered mental state (coma). The hemodynamic parameters monitored with Vigileo® showed: Cardiac Output (CO) 2.1 liters/minute (normal range 4.0-8.0 L/minute), Systemic Vascular Resistance (SVR) 350 dynes second/cm5 (normal range 800 -1200 dynes second/cm5)(MAP 53 mmHg). Early fluid resuscitation began with a bolus of 30 ml/kg of crystalloid into three hour, and Norepinephrine infusion began at the rate of 0.2 mcg /kg/min. Empirical antibiotic therapy with Ceftazole/Tazobactam (1g / 0.5g every 8 hours), Meropenem (1g every 8 hours) and Aciclovir (250mg) was administered. Dexamethasone was added as adjuvant therapy (10 mg qid for 4 days). Procalcitonin (PCT) 61 ng/ml (normal range <0.5), C-Reactive Protein (CPR) 17.5 mg/dl (normal range <0.5). Furthermore, blood PCR analysis resulted positive for E. Coli. It was decided to introduce an IgM-enriched intravenous immunoglobulin (IVIG) preparation (Pentaglobin®) at the dose of 250 ml/kg per day for 5 days. After 24 hours of therapy, the patient had an improvement in blood chemistry and hemodynamic parameters. 96 hours after Pentagoblin® introduction, there was an evident improvement in the patient's clinical condition. GCS scored raised to 10 (E3, V1T, M6). The patient was also able to be extubated, breathing spontaneously; blood chemistry values were: CPR 5.18 mg/dl, PCT 1.2 ng/ml, lactate 1.2 mmol/l. Hemodynamic values were: CO 5.4 l/min, SVR 1200 dynes second/cm5, MAP 90 mmHg.
Discussion: Despite the conflicting data on the use of immunoglobulins in septic shock, we obtained an improvement of her clinical conditions.
References: Kakoullis L et all. The use of IgM-enriched immunoglobulin in adult patients with sepsis. J Crit Care. 2018 Oct;47:30-35.

5706

Role of dexmedetomidine in the treatment of delirium in critically ill patients: A systematic review and meta-analysis

Liu X.[1], Xiong J.[2], Wang D.[2], Wu S.[3], Cui P.[3], Tang Y.[2]
[1]The Affiliated Hospital of Guizhou Medical University - Guiyang (China), [2]Affiliated Hospital of Guizhou Medical University - Guiyang (China), [3]First Affiliated Hospital of Zhejiang University School of Medicine - Hangzhou (China)

Background and Goal of Study: Dexmedetomidine has been found to prevent delirium in critically ill patients; however, whether it could treat delirium in these patients is uncertain. Therefore, this meta-analysis aimed to assure the efficacy and safety of dexmedetomidine in adult critically ill patients with delirium.
Materials and Methods: Randomized controlled trials and observational studies based on the use of dexmedetomidine in adult critically ill patients with delirium were retrieved from PubMed, Embase, Web of Science, the Cochrane Library, and clinicaltrials.gov until January 27, 2019.
Results and Discussion: A total of 861 patients in 13 studies met the selection criteria. The results revealed that dexmedetomidine was associated with a lower point-prevalence of delirium after treatment [odds ratio (OR), 0.31; 95% confidence interval (CI), 0.15, 0.65; P = 0.002], but a slightly higher incidence of bradycardia (OR, 2.91; 95% CI, 0.93, 9.04; P = 0.07) compared with placebo and other drugs.

No statistical differences were found in the incidence of hypotension or arrhythmia; the length of intubation, intensive care unit (ICU) or in-hospital mortality; or the length of ICU or hospital stay between dexmedetomidine and placebo and other drug regimens.
Conclusion: Dexmedetomidine might promote the resolution of delirium but increase bradycardia in critically ill patients with delirium. This trial was registered in PROSPERO (CRD42018107797).
Acknowledgements: This study was supported by the National Science Foundation of China (Grant Nos. 81701958 and 81960357), the Key Special Project "Active Health and Scientific and Technological Response to Ageing" of the National Key R&D Program (2018YFC2001904), the Special Fund of Wu Jieping Medical Foundation for Clinical Scientific Research (320.67 50. 18001); and the Doctoral Start-Up Fund of the Affiliated Hospital of Guizhou Medical University (I-2017-06).

5727

Predictive factors of disability at 6 months after spontaneous intracerebral hemorrhage in icu patients

Thiriet C.[1], Colnat-Coulbois S.[1], Audibert G.[1]
[1]CHRU Nancy - Nancy (France)

Background and Goal of Study: Spontaneous intra cerebral hemorrhage (SICH) has a very high mortality and morbidity rate. The aim of this study was to evaluate functional outcome at 6 month after admission in ICU and to identify predictive factors of severe disability.
Materials and Methods: We performed an observational prospective monocentric study, in a surgical ICU. Every patient admitted for SICH was included from November 2016 to November 2018. Clinical and radiological data were obtained from electronic medical records. Functional outcome was estimated using the modified Rankin Scale (mRS) at 6 months after ICH. Results were expressed in median and interquartile range.
Results and Discussion: Eighty six patients were included (mean age 66 years, 55.8% males). Medical history of hypertension was found in 62% of this population. Coagulation abnormalities were detected in 52% Glasgow Coma Scale (GCS) before endotracheal intubation was 6 [4-8]. Signs of intracranial hypertension on admission were recorded in 60.5% patients. Hematoma volume was 60 [25-83] ml. Intracerebral hemorrhage Grading Scale (ICH-GS) was 11 [10-12]. Most patients (51.2%) underwent urgent neurosurgical procedure. Global mortality rate was 62.8% of which more than half patients died within the first 48 hours from admission. Survival rate at 6 months was 32.6% (28 patients): mRS at 6 months was 4 [3-5], with mRS≤3 in 44.4% and mRS> 3 in 55.6% of the survivors. The only independent predictive factor of severe disability was the occurrence of sepsis during ICU hospitalization (p=0.012).
Conclusion: SICH in ICU patients is associated with very high mortality rate. Survivors have a high risk of severe disability at 6 months after admission. Sepsis seems to worsen functional outcome. In this setting, sepsis should be aggressively treated to limit secondary brain inflammation.

6331

The seasonal effects on delirium in critically ill surgical patients: a retrospective analysis

Rivas E.[1], Qiu Y.[2], Leung S.[2], Turan A.[2]
[1]Hospital Clinic of Barcelona - Barcelona (Spain), [2]Outcomes Research and General Anesthesiology - Cleveland (United States)

Background and Goal of Study: Postoperative delirium is common in hospitalized patients, with a reported prevalence of 11% up to 80% in critically ill patients. Recently, it was shown that seasonality in cognitive function exists, and that cognitive performance may have a more dysfunctional pattern during winter. We, therefore, intend to test whether the seasonal variation is associated with the occurrence of delirium and length of stay (LOS) in critically ill non-cardiac surgical populations.
Materials and Methods: We conducted a retrospective analysis of adult patients recovering from non-cardiac surgery at Cleveland Clinic, between March 2013 and March 2018 who remained at least 48 hours in the surgical intensive care unit. The delirium was evaluated daily using CAM-ICU. The incidence is summarized by season and compared using chi-square test for the overall pattern of seasonal differences. A logistic regression model was used to assess the association between delirium and seasons, adjusted for the potential confounding variables.
Results and Discussion: In total, 2300 patients admitted to SICU after non-cardiac surgeries were included in our study. In total, 1108 (48%) of them had postoperative delirium. The incidence of delirium was 49% in spring, 48% in summer, 46% in fall and 50% in winter, which was not significantly different over four seasons (Chi-square p-value=0.69). After adjusting for potential confounding variables, seasonal variation was not associated with the odds of delirium either (joint test p-value=0.81). Furthermore, we identified the subtypes of delirium among 1104 patients with available RASS assessment and they were not significantly different across four seasons (Fisher exact test P = 0.059). The median length of hospital stay was 12 days (IQR = [8, 19]) overall. We found a marginally significant difference in LOS across four seasons without adjustment (Kruskal-Wallis P = 0.024) and after adjusting potential confounders (P = 0.018). The LOS during summer was 12% longer (95% CI: 1.04, 1.21; P = 0.002) than in winter.
Conclusion: In adult critically ill surgical patients, the incidence and type of delirium do not differ per season. Delirium surveillance and prevention measures should be comparable maintained in all seasons. Prolonged length of stay on summer should be investigated.

4641

Prolonged pharmacoresistant dystonia of a child successfully solved by deep brain stimulation

Motkova L.[1], Klucka J.[1], Stourac P.[1], Dominik P.[1], Kratocvhil M.[1], Balintova Z.[1]
[1]University Hospital Brno and Faculty of medicine, Masaryk University - Brno (Czech Republic)

Background: Dystonias are referred to as involuntary permanent contractions of muscles or muscle groups that bring limbs or other body parts to twisting tonic contractions of varying intensity and abnormal and involuntary positions. This condition is more frequent in children and the etiology is heterogenous. Currently there is no causative therapy of dystonia and the pharmacotherapy is based on benzodiazepines, neuroleptics and antiepileptics, however wiht only minimal effect on disease presentation. This case report presents a child patient suffering from a secondary form of dystonia in which all conservative forms of treatment have been exhausted without effect.
Case Report: A 12-year-old patient, successfully treated long-term with baclofen and diazepam for dystonic manifestations of extrapyramidal form of cerebral palsy, was admitted to PICU for acutely worsening generalized dystonia due to an ongoing gastrointestinal infection. Only transient control of dystonia manifestation was achieved with high dose sedatives and antiepileptics (midazolam 5μg/kg/min + valproate 2mg/kg/h), with serious side effects of treatment. Deep brain stimulation (DBS) was indicated after failure to wean the pharmacotherapy to acceptable level (15th day after admission). The condition was further complicated by hospital-acquired pneumonia, with the need for intubation and mechanical ventilation (20th day). For presumed prolonged ICU stay, surgical tracheostomy was performed (33rd day) and after circumspect consideration involving the uncertain outcome patient underwent deep brain stimulation electrode implantation (39th day). Neurosurgical procedure including postoperative course proceeded without complications. The stimulation was started on the 5th postoperative day and the stimulation energy was progressively increasing through one month with the positive effect on dystonia symptoms. Gradually, sedative medication was completely discontinued. Patient was dismissed to home care on 76th day with only minor local dystonia symptoms.
Discussion: Deep brain stimulation can be one of the possible treatments of patients with status dystonicus.
Learning points: Status dystonicus is most severe and life-threatening form of dystonia presentation. The treatment options are limited to sedatives, neuroleptics and antiepileptics. DBS can be considered as one of the possible “off-label” treatment option in patients with pharmaco-resistant status dystonicus.

6114

Development of focal neurological deficit associated with the intake of ergotics in a patient with vasospasm criteria. A case report

Méndez Martínez E.[1], Sánchez García A. M.[2], Pérez Guerrero J. A.[3], Alonso Tuñón O.[3], Freire Aragón M. D.[3], Egea Guerrero J. J.[3]
[1]Clínica Universidad de Navarra - Pamplona (Spain), [2]Hospital Universitario Virgen de la Victoria - Málaga (Spain), [3]Hospital Universitario Virgen del Rocío - Sevilla (Spain)

Background: Ergotics are a group of drugs used, among other indications, for the treatment of acute migraine headache. This group has a cerebral arterial vasoconstrictor effect. It is important to know the toxicity of these drugs, although it is not usual. An overdose or pharmacological interaction can cause hypertension, tachycardia, thrombosis or cerebral vascular vasospasm. Vasospasm is the most frequent complication of aneurysmal subarachnoid hemorrhage (SAH). It is important to identify risk factors or possible precipitants related to vasospasm in patients with SAH, to establish preventive measures or start treatment as early as possible.
Case Report: 48-year-old woman who has grade IV subarachnoid hemorrhage of the Fisher scale. A diagnostic and therapeutic arteriography is performed on admission, with endovascular embolization of a right middle cerebral artery aneurysm (MCA). During her stay in the ward, the patient keeps suffering from headaches, for which a transcranial Doppler is requested, where there is an objective increase in velocities in right MCA but without figures compatible with vasospasm. A wait-and-see approach is taken, the evolution being favorable. On the 4th day post-embolization, the headache persists and the patient takes her usual medication for migraine (Ergotic), and the pain abates. Hours later, she starts suffering form headaches again, with associated neurological focus in the upper left limb with loss of strength and paraesthesia, which diminishes naturally. A new transcranial Doppler is performed and a pattern compatible with vasospasm is observed, so she is transferred to the ICU. After drug withdrawal and support with triple H therapy, neurological focus dissapeared.
Discussion: There is evidence that Ergotics are associated with an increased risk of ischemic complications, including cerebral arterial area. Risk factors and precipitants must be taken into account to prevent and treat them early. We must treat the headache but without using ergotamins in patients who are in risk of vasospasm after suffering an SAH, even if it is the usual treatment used by the patient.
References:
1. Adverse cardiovascular events associated with triptans and ergotamines for treatment of migraine: systematic review of observational studies. Roberto G et al. Cephalalgia. 2015.
Learning points: Ergotamine-type drugs and derivatives should be avoided in patients with SAH, since they may precipitate cerebral vasospastic complications.

6224

Thrombosis of superior vena cava in a patient with traumatic brain injury

Johannessen López M. V.[1], Martínez Catala D.[1], Pérez Sancho E.[1], Justo Pavía P.[1], Vicente Guillén R.[1], Argente Navarro P.[1]
[1]Hospital Universitari i Politecnic la Fe - Valencia (Spain)

Background: Thrombosis of Central Venous Catheter (CVC) is emerging as significant cause of Superior Vena Cava Syndrome (SVCS)1. Traumatic Brain Injury (TBI) is a condition where anticoagulation therapy is a very challenging task. We exhibit the concomitance of these entities with opposite goals regarding hemostatic state.
Case Report: We describe the case of a 49-year-old man admitted after severe TBI who develops a SVCS caused by thrombosis of CVC. As main clinical history, our patient had a neuroendocrine pancreatic tumor (disease-free) from which he carried a port-a-cath in right subclavian vein (with asymptomatic thrombosis). Admission cerebral CT scan showed intra and extra-axial hemorrhagic lesions which required a decompressive craniotomy and intracranial pressure (ICP) device insertion. After successful barbiturate coma (following an early hemorrhagic progression), newer uncontrolled elevated ICP was detected, with simultaneous swelling of arms, trunk and face. Repeated scan detected Thrombosis of SVC without hemorrhagic progression. Emergently, a SVC stent was placed. Immediately after, ICP dropped to normal values and swelling diminished. At this point, antithrombotic therapy wasn't initiated. After a negative CT scan, Salicylic Acid was started. At day 30, prophylactic low molecular weight heparine was initiated. Finally, at ICU discharge, the patient presented minor neurological sequelae.
Discussion: Our goal was to prevent thromboembolic events (TE) while minimizing hemorrhagic risk. There are no clear guidelines regarding optimal time of prophylaxis initiation. Recent retrospective studies suggest that early initiation (after 24h) of prophylaxis didn't increase the risk of hemorrhagic progression even in patients of high risk TBI2. Regarding therapeutic doses, weak recommendations are: not to start within the 1st 24h; could be started from day 3 and day 7, for high and low TE risk patients respectively3.In observational studies, the use of antiplatelet therapy is not associated with hemorrhagic progression3.
References:
1. Straka C, et al 2016.
2. Störmann P, et al 2019.
3. Tykocki T, et al. 2016.
Learning points: Despite growing evidence encourages us to early initiate thromboprophylaxis, relying upon observational studies and experts' opinion might not be enough to avoid clinicians fear for hemorrhagic complications. Quality evidence is needed for guidelines to give strong recommendations and therefore to avoid treatment heterogeneity.

6135

Management of neuropathic pain in ICU-related polyneuropathy – a case report

Barros M.[1], Nogueira S.[1], Pinho C.[1], Santos F.[1], Fonseca S.[1]
[1]Centro Hospitalar de Sao Joao - Porto (Portugal)

Background: Intensive care unit-acquired weakness (ICU-AW) is a common impairment in critically ill patients. Critical illness polyneuropathy (CIP) and myopathy are strong contributors to this condition.1 We present a case of neuropathic pain (NP) in a patient admitted in the ICU with sepsis and multiorganic failure (MOF).
Case Report: A 47-years-old man, ASA V, was admitted in the ICU with tertiary peritonitis conditioning septic shock and MOF. Due to a "frozen abdomen" he was submitted to several laparotomies and remained sedated and ventilated for 15 days. For pain management, it was placed a thoracic epidural catheter on the third day and started a multimodal analgesic approach. During the ICU stay, an ICU-AW was developed with generalized motor weakness associated with local sensorial motor deficit: distal ankle hypoesthesia, right hallux extension deficit and allodynia on the dorsal surface of the right 1st, 2nd and 3rd toes. The electromyography showed axonal lesion at L5 right nerve root. A rehabilitation program, along with multimodal analgesia to relief NP, was established with improvement of complains at the day of hospital discharge.
Discussion: Sepsis, MOF and systemic inflammatory response syndrome have been suggested to cause CIP.1 In these vulnerable patients one should be aware of their long-lasting positioning, while on heavy sedation, as it increases the risk of nerve injuries.2 It is also important to be aware of muscle weakness, sensory loss, NP and autonomic impairments. Electromyography, nerve conduction studies, and muscle biopsy can help to establish the diagnosis.1 The therapeutic approach was focused on a specific drug combination to provide greater pain relief and less adverse effects. It turned out to be a challenge since the response to most drugs remains unpredictable.3
References:
1. Piva, S.et al (2019). Intensive care unit–acquired weakness: unanswered questions and targets for future research: F1000Research, 8.
2. Antoniadis, G. et al (2014). Iatrogenic Nerve Injuries, Prevalence, Diagnosis and Treatment.Deutsches Arzteblatt International, 111(16), 273–279.
3. Amorim, D. R. (2015). A Terapêutica Farmacológica da Dor Neuropática: Linhas Orientadoras Recomendadas.
Learning points: ICU-AW has a relevant impact on short and long-term outcomes. One should be aware of such diagnosis and, therefore, muscle function assessment should become a mandatory part of the clinical examination of patients in ICU setting.2

4372

Patient's families in the ICU: Are we listening? Croatian experience

Stojanovic Stipic S.[1], Carev M.[1], Karanović N.[1], Dropulic N.[1], Peris F.[1], Bjelic D.[2]
[1]Department of Anaesthesiology and Intensive Care, University Hospital Split - Split (Croatia), [2]University Hospital Split - Split (Croatia)

Background and Goal of Study: Hospitalization in the ICU is a stressful event not only for the patient but their entire family. Numerous studies have demonstrated the difficulty with which family members understand the diagnosis, management and prognosis of their relatives. The role of an ICU physician is to provide physical and emotional support to affected family members throughout the duration of this traumatic experience, particularly in Croatian ICUs, as intensivists are the primary

contact and source of information. In terms of the available medical literature, there is no such study of this nature in Europe, while more widely this specific area of interest is associated with nursing related health care. This study was undertaken to reveal the needs of family members of those requiring intensive medical care.
Materials and Methods: This was pilot study in University Hospital Split, Croatia, with 48 family members. Inclusion criteria: Direct family of patient in the ICU treated for at least 72 h, that were older than 18 years. Exclusion criteria: family members of patients with a probability of death in less than 48 hours. We used Critical Care Family Needs Inventory, it consisting 37 questions and were divided initially into 5 groups, according to the analysis of the item content. Analyzing intercorrelations of the items and reliability of the scales, the scales were adjusted to 4 summary scales: information (7 items, Cronbach's alpha coefficient 0.675); assurance (10 items, α=0.846); proximity and comfort (8 items, α=0.604); support (11 items, α=0.823).
Results and Discussion: The relatives of patients in intensive care first and foremost require assurance from the medical staff caring for the patient (mean 3.81, standard error of mean 0.04) followed by medical information (3.70+/-0.05, statistical significance for repeated measures T-test 0.003). Proximity/comfort and support are seen as less important (with the scores 3.17+/-0.06 and 3.09+/-0.08, respectively; difference between the two not significant). Both scores are significantly lower than assurance and information (p<0.001).
Conclusion: It is necessary to improve the understanding and satisfaction of patient's family members to effectively minimize symptoms of anxiety, depression and postraumatic stress disorder. We must strive to be increasingly empathetic and approachable, especially towards family of those with a poor prognosis.

5664

Effect of patient-directed interactive music therapy on sleep quality and melatonin levels in critically ill elderly patients

Kim J. M.[1], Joo H. J.[1], Yoo G. E.[2], Jung S.[1], Kim S. J.[2], Na S.[1]
[1]Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea), [2]Ewha Womans University - Seoul (South Korea)

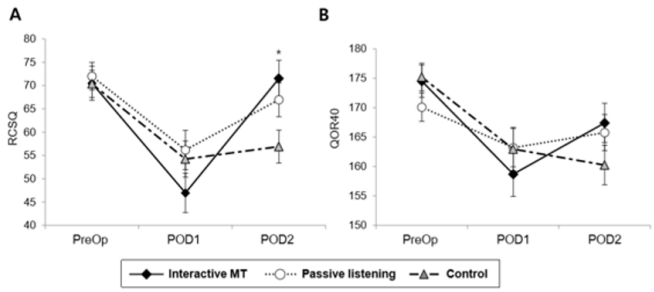
Background and Goal of Study: Sleep is essential to prevent delirium and for recovery from critical illness, however, sleep disruption is common in the intensive care unit (ICU) with various causes. Many pharmacological and non-pharmacological measures have been tried. Music can be an effective way to reduce anxiety and promote sleep with little harm. The aim of this study is to investigate the effects of music on saliva melatonin level and quality of sleep among elderly patients in ICU.
Materials and Methods: 133 patients were randomized into three groups: Interactive Music Therapy (IMT), Passive Listening (PL) and Control group. The control group (n = 45) received routine medical care, while IMT and PL group received music therapy on ICU day 1. IMT group received up to 20 minutes of interactive music session including relaxation technique and PL group received only pre-selected relaxing music listening for 30 minutes.The saliva melatonin level were measured three times at 11pm (preoperative, Operation day and postoperative day (POD) 1). Richards-Campbell Sleep Questionnaire (RCSQ) was surveyed on preoperative day, POD 1 and 2. Postoperative delirium was evaluated with Intensive Care Delirium Screening Checklist.
Results and Discussion: Repeated measures with a linear mixed model revealed significant elevation of saliva melatonin level on POD 1 in IMT group (1.45 ± 0.30 vs 0.66 ± 0.29 vs 0.04 ± 0.35, p = 0.0345) and sleep quality measured by RCSQ showed significant improvement in IMT group on POD2 (71.50 ± 3.72 vs 66.95 ± 3.72 vs 56.88 ± 3.67, p = 0.0270). Postoperative delirium did not show statistically significant differences among groups.
Conclusion: Patient directed interactive music therapy improved sleep quality and elevated saliva melatonin level in elderly critically ill patients after surgery. However, music therapy did not change the incidence of delirium.

Table 1. Linear mixed model of mean changes in melatonin

	Preoperative day		Operation day		POD1		$P_{group*time}$
	N	*LSM±SE*	*N*	*LSM±SE*	*N*	*LSM±SE*	
							0.0345
IMT	38	-0.10±0.23	14	-0.05±0.39	23	1.45±0.30 *	
PL	38	-0.04±0.23	11	0.73±0.44	24	0.66±0.29	
Control	39	0.15±0.23	14	0.14±0.39	17	0.04±0.35	

Note. Data are expressed as Least Squares Means±SE.
* $p < 0.05$ compared with Control group (Bonferroni correction was adopted for multiple comparisons).
Post hoc Analysis ▸ Difference between IMT (POD0-POD1) and Control (POD0-POD1): $p = .00033$
IMT: interactive music therapy, PL: passive listening, POD: post-operative day

Figure 1.



6291

Factor XIII activity in patients requiring surgical re-exploration for bleeding after elective cardiac surgery – a prospective case control study

Adam E.[1], Meier J.[2], Meybohm P.[3], Zacharowski K.[3], Weber C.[4]
[1]University Frankfurt /Main - Frankfurt am Main (Germany), [2]Kepler University Hospital - Linz (Austria), [3]University Hospital Frankfurt - Frankfurt (Germany), [4]Asklepios Clinics Hamburg Wandsbek - Hamburg (Germany)

Background and Goal of Study: Surgical re-exploration due to postoperative bleeding is associated with increased morbidity and mortality. The aim of our study was to assess a potential association between the level of postoperative FXIII activity and need for re-exploration due to bleeding in patients undergoing cardiothoracic surgery.
Materials and Methods: In our prospective single center observational cohort study, we enrolled patients who underwent elective cardiothoracic surgery. Patients who required re-exploration (RE group) were matched to patients from the study population (non-RE group).
Results and Discussion: The study included 678 patients, of whom 32 required surgical re-exploration due to bleeding within the first 24h. Between patients of the RE and non-RE group, a significantly reduced FXIII activity was observed postoperatively (59.0 vs 71.1; p=0.014). Multivariable analysis revealed reduced FXIII activity (p = 0.048) as a parameter independently associated with surgical re-exploration. Further, reduced FXIII activity (p=0.037) and surgical re-exploration (p=0.01) were significantly associated with increased 30 day mortality. In multivariable analysis re-exploration was independently associated with increased risk of 30 day mortality (p = 0.003, HR 10.75).
Conclusion: Reduced postoperative FXIII activity may be associated with the need for surgical re-exploration. Postoperative assessment of FXIII activity should therefore be considered in patients undergoing elective cardiothoracic surgery.

4781

Prognostic role of neutrophil to lymphocyte ratio and mean platelet volume/platelet ratio for 6 month mortality in critically ill patients

Ko D. E.[1], Kang B.[2], Ham S. Y.[3]
[1]Gangnam Severance Hospital, Yonsei University College Of Medicine - Seoul (South Korea), [2]Yonsei University College of Medicine - Seoul (South Korea), [3]Gangnam Severance Hospital - Seoul (South Korea)

Background and Goal of Study: The neutrophil to lymphocyte ratio (NLR) and mean platelet volume (MPV) have been reported to be associated with poor prognosis in various cohorts. We hypothesized that NLR and MPV could be used as predictive marker for mortality in critically ill patients.
Materials and Methods: We retrospectively reviewed 1154 patients admitted to ICU between January 2017 and December 2017. Patients were divided to two group according to 6 month mortality. The NLR and MPV/platelet ratio on each day of ICU admission were compared. Patients were classified in to tertiles according to NLR and MPV/platelet ratio. The incidence of 6 month mortality was compared, and multivariate Cox proportional hazard model was performed to evaluate the risk factors for 6 month mortality.
Results and Discussion: NLR and MPV/platelet ratio were greater in the non-survivor group than the survivor group (16.89±27.01 vs. 10.34±10.98, p<0.001,

9.57±10.19 vs. 7.14±11.51, p = 0.002, respectively). The incidence of 6 month mortality was highest in the 3rd tertile group of NLR and MPV/platelet ratio. In the multivariate Cox proportional hazard models, MPV/platelet ratio on ICU admission (HR 1.018; 95% CI: 1.004-1.033, p = 0.013) was significant risk factors for 6 month mortality.
Conclusion: Our data showed MPV/platelet ratio at ICU admission is a predictive factor for 6 month mortality in critically ill patients.

5092

Secondary metabolites from marine Bacillus sp. display anti-neutrophilic inflammatory effects

Yang S. C.[1], Hwang T. L.[2]
[1]Taipei Veterans General Hospital - Taipei City (Taiwan), [2]Chang Gung University - Taoyuan (Taiwan)

Background and Goal of Study: Local and systemic inflammatory responses in major surgery contribute to wound infection, prolong healing, and worsen post-operative pulmonary functions. Neutrophils are major immune cells involved in local and systemic inflammatory responses. The proinflammatory mediators and proteolytic enzymes secreted from activated neutrophils in response to inflammatory stimuli may damage surrounding tissues and even induce organ dysfunction. N-formyl peptides, from either bacterial peptides or mitochondrial proteins, are recognized by formyl peptide receptor (FPR) 1 of neutrophils to induce sterile and infective inflammation. Therefore, it is important to know how N-formyl peptides activate neutrophilic inflammatory process, and FPR1 has become a therapeutic target for treating inflammatory diseases.
Materials and Methods: Human neutrophils were isolated from healthy volunteers, which have been proven by local IRB. Superoxide generation and elastase release were measured by spectrophotometry.
Results and Discussion: Our previous studies have screened a series of marine bacteria metabolites and found that IA-LBI-07-01, extracted from marine Bacillus sp., showed most significant inhibitory effects on respiratory burst and degranulation in activated human neutrophils. Further studies suggest that inhibition of neutrophil activations by IA-LBI-07-01 may act by blocking FPR1. Accordingly, the active compounds of IA-LBI-07-01 will be identified by bioactivity directed fractionation and isolation. We have identified the natural product, anteiso-C13-surfactin (IA-1) from the extraction IA-LBI-07-01. Our results showed IA-1 significantly inhibited neutrophil immune functions specially induced by the FPR1 agonists.
Conclusion: Considering the importance of activation of neutrophils in inflammatory responses, the results will indicate that metabolites of marine Bacillus sp. may have therapeutic potential to attenuate neutrophil-mediated inflammatory diseases. Finally, our results will provide the lead candidates form marine bacteria metabolites for development of new anti-inflammatory drugs.

5693

Exosomes from red blood units induce mediators secretion from mast cells in vitro

Fang X.[1]
[1]Huaxi Hospital of SIchuan Umiversity - Chengdu (China)

Background and Goal of Study: Activation of mast cells may involve many transfusion-associated complications, and exosomes came from packed red cells (EXs-RBC) have been reported to induce TNF-a secretion from monocytes. However, whether EXs-RBC can elicit mast cells activation, and the possible receptor and pathway involving in this process are still unknown.
Materials and Methods: Exosome came from the plasma of healthy persons (EXs-nor) and EXs-RBC were extracted and identified. Human mast cells (HMC-1) were cultured with PBS, EXs-nor, and EXs-RBC. Activation of HMC-1 was analyzed by expression of Tryptase-1 and Prostaglandin D2 (PGD-2) using Quantitative real-time PCR (qRT-PCR), immunoblotting and immunofluorescence. Secretions of mediators from HMC-1 were determined using enzyme-linked immunosorbent assay (ELISA). The possible cell signaling pathways were measured by immunoblotting. Furthermore, TLR3/dsRNA complex inhibitor and Mitogen-activated protein kinases (MAPKs) inhibitors (SB203580, PD98059, and SP600125), TLR3 agonist (poly(A:U)) on mediators section were evaluated by ELISA.
Results and Discussion: EXs-RBC induced the elevated expression of Typtase-1, PGD-2, and TLR-3, as well as the increasing level of phospho-JNK MAPK, phospho-P38 MAPK (Thr180/Tyr182) and phospho-ERK1/2 MAPK (p44/42) in HMC-1. Secretion of Vascular endothelial growth factor (VEGF), Tumor necrosis factor-α (TNF-α), Interleukin (IL)-4, IL-6, Chemokine ligand (CCL)2, Chemokine (C-X-C motif) ligand (CXCL)1 and CXCL5 from HMC-1 increased apparently, MAPKs inhibitors (SB203580, PD98059, and SP600125) decrease the secretions of meditors from HMC-1. TLR3/dsRNA complex inhibitor also inhibit the sectretions while TLR3 agonist (poly(A:U)) increase mediators secretion.
Conclusion: EXs-RBC induced activation of HMC-1, the releases of multiple inflammatory mediators, as well as activation of TLR-3 receptor and signaling pathways of MAPKs in HMC-1. The secretion of mediators in this process can be enhanced by TLR-3 agonist and depressed by TLR-3 inhibitors and MAPKs inhibitors.

6200

Perioperative bleeding complications for acquired hemophilia A: Case report

Escontrela B.[1], Acevedo I.[2], Gutierrez R.[3], Martinez A.[3]
[1]Cruces University Hospital - Barakaldo (Spain), [2]Hospital Universitario Ramón y Cajal - Madrid (Spain), [3]Hospital Universitario de Cruces - Barakaldo (Spain)

Background: Acquired hemophilia A is a very rare condition resulting from autoantibodies against factor VIII. We present a case of acquired hemophilia diagnosed during perioperative course after revascularization surgery for peripheral arteriopathy.
Case Report: 83-year-old male with history of hypertension, diabetes, hypercholesterolemia, ischemic coronary disease and chronic kidney failure was scheduled for revascularization surgery for ischemic peripheral arteriopathy. An endovascular approach was aborted because significant hemorrhage associated to hemodynamic deterioration. 24 hours later patient presented hemorrhagic shock requiring blood transfusion and urgent surgery. Nevertheless, the hemorrhage continued without hemodynamic deterioration but requiring daily transfusions of red blood cells. Coagulation panel showed a persistent prolongation of activated partial thromboplastin time with normal prothrombin time. Hematology consultation determined autoantibodies of FVIII bringing to the diagnosis of acquired A hemophilia. A multidisciplinary decision was made and the infusion of concentrate of FEIBA (antibodies against anti-FVIII) in two times and corticoids were required. Thereafter the patient presented gastrointestinal bleeding secondary to active hemorrhage of inferior mesenteric artery requiring embolization and acute hemorrhage of surgical wound requiring the infusion of three more doses of FEIBA and corticoids.
Discussion: We present a case of acquired A hemophilia diagnosed during perioperative course of revascularization surgeryy. This setting is especially challenging because the risk of hemorrhage and thrombosis should be balanced. For this reason, in our case a multidisciplinary team of vascular surgeons, anesthesiologists and hematologists made the management decisions just administrating specific treatment in cases of a severe hemorrhagic complications with vital risk.
References:
1. Kruse-Jarres R., Kempton C., Baudo F., Collins P., Knoebl P., Leissinger C., Tiede A., Kessler C. Acquired hemophilia A: Updated review of evidence and treatment guidance. Am J Hematol. 2017;92:695–705.
Learning points: Our case outlined the management of an unknown hematologic condition during perioperative course. Although acquired A hemophilia is a very rare condition the onset of multiple hemorrhagic complications not explained for other causes should be raised the possibility of a hematologic disorder. Multidisciplinary approach is advised.

6355

Acute Intestinal Ischemia Due to the Superior Mesenteric Artery and Vein Thrombosis in a Female Young Patient: Case Report

Beharic S.[1]
[1]Klinički centar Univerziteta Sarajevo - Sarajevo (Bosnia and Herzegovina)

Background: Acute mesenteric ischemia is challenging clinical issue. It is estimated that in most cases is caused by embolism or thrombosis of superior mesenteric artery (65%). Mesenteric venous thrombosis is the least common cause, representing up to 18% of all cases. Artery and vein thrombosis is even rarer.
Case Report: 37-year-old female was admitted with generalized abdominal pain, fever accompanied by vomiting and diminished peristalsis. Intraoperatively surgeon verified “total intestinal ischemia from ligament of Treitz to Bauchini valve“. In ICU she was put on mechanical ventilation, remained on midazolam for sedation and fentanyl for pain control, and was provided supportive care, included continuous

vital signs, standard arterial blood gas analysis, complete blood cell count, coagulation profile, CT angiography scan. Patient has still been at the our ICU (28th day of hospitalisation) with continued intensive resuscitation treatment, including total parenteral alimentation.
Discussion: Clinical diagnosis of mesenteric ischemia is difficult, especially in young patient, but in most cases abdominal pain is cardinal symptom in 94%, accompanied by nausea 56%, vomiting 38%, diarrhea 31%, and tachycardia 31%. Radiological images are different when differentiating etiology of vascular event: in arterial etiology, progression of the damage is slower and thinning of the intestinal wall is typical, but difficult to recognize. In ischemia of venous origin progression of damage is faster even when symptomatology is less dramatic and thickening of intestinal wall is easy to observe and detect.
References:
1. Oldenburg WA et al. Acute Mesenteric Ischemia A Clinical Review, (REPRINTED) ARCH INTERN MED/VOL 164, MAY 24, 2004, www.architernmed.com.
2. Ibarra SA. (2019). Acute Intestinal Ischemia Due to Thrombosis of the Superior Mesenteric Artery in a Female Young Patient: A Clinical Case. Mathews J Case Rep 4: 50.
3. Lee LYW, et al. BMJ Case Rep Mesenteric vein thrombosis; not going with the flow 2014. doi:10.1136/bcr-2013-20239
Learning points: Acute mesenteric ischemia is challenging clinical problem with diverse causes, which often results in delayed diagnosis and treatment. Mesenteric vein thrombosis is increasingly recognized as cause of mesenteric ischemia, but still atypical in young, healthy patient. Mortality rate has still been high (50%-90%). Modality of reference for diagnosis of AMI is contrasted tomography (gold standard).

5884

ICU mortality related to admission source - retrospective study

Iancu I. B.[1], Cherestes R. X.[1], Singh V.[1]
[1]Our Lady of Lourdes Hospital Drogheda - Drogheda (Ireland)

Background and Goal of Study: Intensive care medicine is characterized as being the most complex specialty with the most critically ill patients. Patients admitted to ICU need support for organ/system failure, continuous monitoring and permanent nursing care. The majority of the patients are admitted to ICU after unexpected situations, and only a small part of them as an elective admission. The aim of this study was to quantify mortality differences among patients admitted to ICU from hospital ward, emergency department, operating theatre or from other hospital.
Materials and Methods: We evaluate the ICU mortality during 1 year, from December 2018 until December 2019 in a retrospective study wich included a total number of 429 patients admitted from the hospital wards, emergency department, surgical theatre or other hospitals using ICU record data obtained from a clinical database from an Irish hospital. Our study was approved before by the local audit committee.
Results and Discussion: From a total of 429 patients admitted in ICU, the majority of the patients came from emergency department (47%) followed by ward admission (28%), theatre admission (21%), and from other hospitals (4%).The ICU mortality during 1 year was 17,25% , and the highest mortality rate of the patient was found on the patients admitted from emergency department (9,1%). 72% of the ICU patients went back on the ward, and 4,4 % were discharged directly home after ICU admission.
Conclusions: These findings indicate that there might be differences in the mortality rate dependent on the admission source, and the patients admitted from ED directly to ICU, have the worst prognostic regarding the survival rate. We are looking forward to find the correlation between mortality regarding the time from emergency department to ICU admission.

5269

Comparison of nurse's perceptional difference in rapid response team system between hospitalist available ward and non-hospitalist available ward

Kim M.[1], Kim J.[2], Kim K. H.[2], Jung S.[2], Joo H.[2], Na S.[2]
[1]Department of nursing, Severance Hospital - Seoul (South Korea), [2]Yonsei University College of Medicine, Severance Hospital - Seoul (South Korea)

Background and Goal of Study: Rapid Response Team (RRT) is a medical support team, implemented to detect early warning signs in the forms of physiologic instability for the prevention of unplanned ICU admission, cardiac arrest, and death. Together with RRT, the number of hospitals instituted hospitalist system is increasing recently in Korea. The studies for nurse's perceptional difference and satisfaction in contacting RRT between the hospitalist and non-hospitalist situations are not well described in Korea.
Materials and Methods: 147 nurses working in Severance hospital in Seoul, Korea participated in the survey, using a 14-item Likert scale questionnaire. All data were statistically analyzed with SPSS statistics 25.0. Categorical data was conducted with a two-tailed independent t-test. Continuous data were presented using Mean ± Standard Deviation. All variables are presented using N(number), percentage(%), Mean ± Standard Deviation or median value. P-value < 0.05 was considered statistically significant.
Results and Discussion: Results showed nurses working in the non-hospitalist available ward had higher perception regarding required necessary information including criteria for RRT call and higher perception of overestimation for the severity of the patient's disease status. Nurses working in the non-hospitalist available ward also had positive satisfaction in RRT response after activation, belief in RRT treatment improving patient and guardian's patient service satisfaction, improving their own skill in managing sick patients by RRT intervention.

Response to survey of nurses' attitudes to the RRT

	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1. I have an idea of RRT and their job.	0	0	13.6	65.3	21.1
2. I know the operating time of RRT.	0	13.6	22.4	48.3	15.6
3. I know the criteria for RRT call.	0.7	8.2	21.8	52.4	17.0
4. I know the call number of RRT.	2.0	21.8	19.0	39.5	17.7
5. RRT is helpful in patient's safety on the ward.	0.7	1.4	2.7	41.5	53.7
6. RRT represents a waste of human resources and material resources.	61.2	32.0	4.8	1.4	0.7
7. Patients in the hospital have complex medical problems and the severity of diseases are increasing.	0	0	2.7	31.3	66.0
8. RRT prevents unwell patients from having an arrest.	0	2.0	10.2	47.6	40.1
9. The management of patients at risk is too complex and real time surveillance is difficult on the ward.	0	2.0	6.1	45.6	46.3
10. RRT responded immediately once you called RRT.	0	0	11.4	55.7	32.9
11. I satisfied with RRT treatment.	0	0	9.3	48.6	42.1
12. I think RRT treatment improves patient or guardian's patients service satisfaction.	0	1.4	16.4	50.0	32.1
13. Intervention from RRT is beneficial for patient on ward.	0	0	5.7	40.0	54.3
14. RRT interventions represent an opportunity to improve my skills in managing sick patients.	0	0.7	11.4	45.7	42.1

	Ward without Hospitalist (n=80)	Ward with Hospitalist (n=67)	p-value
I have an idea of RRT and their job.	4.13 ± 0.58	4.01 ± 0.59	0.258
I know the operating time of RRT.	3.80 ± 0.95	3.49 ± 0.82	0.039
I know the criteria for RRT call.	3.80 ± 0.91	3.73 ± 0.79	0.628
I know the call number of RRT.	3.65 ± 1.07	3.30 ± 1.07	0.049
RRT is helpful in patient's safety on the ward.	4.55 ± 0.71	4.36 ± 0.64	0.091
RRT represents a waste of human resources and material resources.	1.41 ± 0.71	1.57 ± 0.72	0.193
Patients in the hospital have complex medical problems and the severity of diseases are increasing.	4.56 ± 0.54	4.72 ± 0.52	0.082
RRT prevents unwell patients from having an arrest.	4.35 ± 0.66	4.15 ± 0.78	0.093
The management of patients at risk is too complex and real time surveillance is difficult on the ward.	4.48 ± 0.57	4.22 ± 0.79	0.028

	Ward without Hospitalist (n=74)	Ward with Hospitalist (n=66)	p-value
RRT responded immediately once you called RRT.	4.32 ± 0.55	4.09 ± 0.70	0.029
I satisfied with RRT treatment.	4.41 ± 0.62	4.24 ± 0.66	0.133
I think RRT treatment improves patient or guardian's patients service satisfaction.	4.30 ± 0.64	3.94 ± 0.78	0.003
Intervention from RRT is beneficial for patient on ward.	4.62 ± 0.52	4.33 ± 0.66	0.005
RRT interventions represent an opportunity to improve my skills in managing sick patients.	4.41 ± 0.59	4.17 ± 0.78	0.042

Conclusion: Further study as planned with the same survey in a year could provide improvement of nurse's perception and satisfaction to contacting RRT among the same population.

5667

Lipofundin induced anaphylactic reaction due to parenteral nutrition

Naumovski F.[1], Toleska M.[1], Trposka A.[1], Kartalov A.[1], Kuzmanovska B.[1], Durnev V.[1]
[1]University Clinic of TOARILUC - Skopje , University of St. Cyril and Methodius - Skopje (Republic of North Macedonia)

Background: Lipofundin is a soybean oil based preparation for parenteral nutrition (1). Only very few seldom allergic reactions to lipid infusions were described in the literature.
Case Report: We present a 42 years old female patient with spontaneous subarachnoid haemorhage due to cerebral artery aneurism rupture with anaphylactic reaction during Lipofundin 20% infusion. The patient was intubated and sedated, demanding mechanical ventilatory support from the begining of the ICU stay. At day 3 since admission in the ICU we started Lipofundin 20% infusion due to the parenteral nutrition in our patient. Few minutes after starting the slow Lipofundin 20% infusion using a infusomat with a infusion rate of 50ml/h and a central vein as a route of administration, the patient became tachycardic with progressive rise of the heart rate >145, hypotensive with blood pressure 55/30 followed with bronchospasam, desaturation (SpO2 58%) and generalized urticarial rash. The Lipofundin 20% infusion was immediately stopped. We gave the patient 0,5mg diluted Adrenaline (i.v), chloropiraminum 40mg, Methylprednisolone 80mg and Aminophilin 250mg which relived the signs of anaphylaxis.
Discussion: Soy-protein, in small quantities, can be detected in soy-oil, while allergic reactions to soy-proteins is well-known and described in the literature (1). In their study Pollini GP et al. suggest a good tolerance to Lipofundin S intravenous administration among surgical patients (2). But even if they are rare, allergic reactions to Lipofundin 20% are still possible. We found only one case report of anaphylactic shock to Lipofundin which was described by Andersen HL in a patient with Hodgkin lymphoma back in 1993.
References:
1. Andersen HL1, Nissen I. Presumed anaphylactic shock after infusion of Lipofundin. Ugeskr Laeger. 1993 Jul 12;155(28):2210-1.
2. Pollini GP1, Scroccaro G, Gelio S et al. Evaluation of the tolerance of a lipid emulsion administrated during total parenteral nutrition in surgical patients. Ann Ital Chir. 1993 Jul-Aug;64(4):423-6; discussion 426-7
Learning points: We can conclude that seldom anaphylactic reactions due to Lipofundin infusion are still possible even if only few were described in the literature.

5458

Acute generalised sialadenitis caused by iodide contrast media. Report of one case

León Núñez M.[1], Flores Cajal B.[1], Réparaz Grávalos P.[1], Gil Mayo D.[1], Martinez De Castro N.[1], Pestaña Laguna D.[1], Anesthesiology and Post-Surgery Critical Care
[1]Hospital Ramón y Cajal - Madrid (Spain)

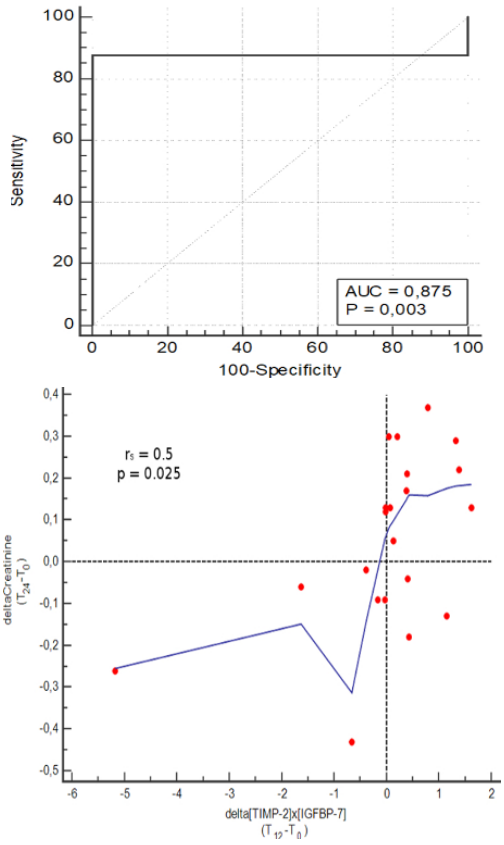
Background: Imaging techniques using radiocontrast iodinated agents are widely used nowadays, although knowing to cause several adverse effects. We consider important to report this case, in order to increase consideration in the differential diagnosis of acute sialadenitis.
Case Report: 69-year-old male patient, with history of diabetes miellitus and chronical renal failure went into programed laparoscopic cholecystectomy. Due to surgery complications the patient needed a non-programed admission in our intensive care unit. He developed septic shock suspecting peritonitis so a Computerized Tomography with iodide-radiocontrast was performed. 72 hours later, symmetric and bilateral submandibular swelling was found, mild pain, but no other systemic symptoms. After a complete exam and echography evincing an enlargement of both submandibular glands, we suspected acute sialoadenitis caused by iodinated contrast media. Epstein-Barr and Parvovirus B19 serologies were requested, being negative. A non-esteroid antiinflamatory treatment was given, leading to complete symptoms resolution in a week.
Discussion: Acute sialoadenitis is an infrequent complication of iodinated contrasts. The diagnosis is mainly clinical and curses as a bilateral, diffuse, painless salivary gland inflammation. The developing exact mechanism is uncertain. It may solve without a targeted treatment as an auto-limited pathology in a few days. The majority of the iodinated contrast media have renal excretion, so an impairment in the renal function may lead to its accumulation [1]. These patients could develop other ways of contrast excretion, such as salivary glands, but only represent 1/3 of the total of cases reported [1]. Patients with normal kidney function developing this pathology are more prevalent, and gland swelling could be a premonitory sign of an anaphylactic reaction. We cannot forget other causes of sialadenitis such as autoimmune, hemorrhagic and most frequently, viruses. Therefore, we must take blood samples including serologies, to stablish a directed treatment.
References:
1. Cuéllar J, Hernandez D, et al. Acute generalised sialoadenitis caused by iodinated radiocontrast media. Report of two cases. Alergol Inmunol Clin 2000;15: 406-409.
Learning points: This kind of acute sialoadenitis is an auto-limited entity. The developing exact mechanism is still unknown and we should take into account the higher risk in patients with kidney failure.

5989

Clinical role of novel biomarkers in the prediction and differentiation of acute kidney injury in the ICU: a preliminary observational study

Saponaro A.[1], Stufano M.[1], Casazzo M.[1], Antonelli P.[1], Ferrari C.[1], Brienza N.[1]
[1]University of Bari, Department of Emergency and Organ Transplantation - Bari (Italy)

Background and Goal of Study: AKI occurs in >50% of ICU patients. Over 60% of episodes evolve into transient AKI. The product of Tissue Inhibitor of Metalloproteinase-2 (TIMP-2) and Insuline-like Growth Factor Binding Protein-7 (IGFBP-7) concentrations in urine has been validated as the best AKI predictor, but there is poor evidence for its use in differentiation. We present preliminary data on the use of biomarkers and their variation over 12 hours for AKI prediction and differentiation in a general ICU population.
Materials and Methods: In a mixed ICU, we retrospectively collected data of adult patients with renal risk factors. Two urine samples for [TIMP-2]•[IGFBP-7] measurement were available for each subject (one at the admission -T0-, one after 12 hours -T12-), along with blood samples for creatinine levels. Primary endpoints were markers absolute values and deltas (T12-T0) performances in AKI prediction and differentiation, assessed with Mann-Whitney U-test and ROC curves. We assessed clinical validity of biomarkers monitoring in comparison with creatinine deltas (T12-T0 and T24-T0) using Spearman's correlation.
Results and Discussion: Twenty-one subjects were included in final analysis: 12 of them (57%) had AKI, 8 (66.7%) transient and 4 (33.3%) persistent. We found no differences in baseline characteristics between groups. Markers values at T0 did not differ between AKI and non-AKI, although ROC analysis showed AUC 0.75 ($p = 0.037$). Marker at T0 was higher in persistent AKI ($p = 0.04$) and helpful to predict transient injury (AUC 0.87; $p = 0.003$). Δ[TIMP-2]•[IGFBP-7] showed moderate correlation with ΔCrea(T24-T0) ($rs 0.5$; $p = 0.025$).
Conclusion: The use of [TIMP-2]•[IGFBP-7] can reliably differentiate persistent from transient AKI. Biomarkers variation correlates with that of creatinine over longer intervals, revealing useful implications in ICU patients.



6149

Clevidipine for acute hypertension management after mechanical thrombectomy

Escontrela B.[1], Acevedo I.[2], Arana E.[3], Martínez A.[3]
[1]Cruces University Hospital - Barakaldo (Spain),
[2]Hospital Universitario Ramón y Cajal - Madrid (Spain),
[3]Hospital Universitario de Cruces - Barakaldo (Spain)

Background and Goal of Study: Hypertension treatment is a goal of care after mechanical thrombectomy. Clevidipine is a short action calcium channel blocker with rapid onset of action and ultra-short half life, making it a good choice especially when rapid and safe treatment of hypertension is required. For this reason, we hypothesized that clevidipine could be effective and safety for hypertension treatment in this population.
Materials and Methods: We conducted a retrospective review of medical records of patients admitted to Reanimation Unit of Cruces University Hospital between 2017 and 2018 after mechanical thrombectomy for ischemic stroke. Age, Sex, Glasgow Coma Scale, NIHHS score, location of ischemia, Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean Blood Pressure (MBP) and previous history of hypertension, stroke or cardiovascular risk factors were recorded. Our primary endpoint was observing the effectiveness of clevidipine for acute hypertension treatment. Our secondary endpoint was observing the safety of clevidipine. The statistical analysis was performed for SPSS (version 23.0) using Fisher test for cualitative variables and U Mann Whitney for cuantitative variables. A level of 5% was considered significant.
Results and Discussion: Our study included 8 patients. Clevidipine was effective for acute hypertension treatment achieving the target level between 10 and 45 minutes in 100% of patients. SBP target was kept during a median of 40 hours or until to discharge to hospitalization floor in 75% of patients. Nevertheless 50% of patients required additional intravenous treatment and 87,5% required transition to oral treatment probably resulting of the higher incidence of chronic hypertension (88%) in our study. Clevidipine was also safe without hypotension or adverse events in none of our patients. Additionally, we found that mortality was related to NIHSS (p 0,007), SBP (p 0,0009), Glasgow Coma Scale (p 0,0009), infusion length (p 0,0009), time of SBP maintenance (p 0,0009) and Reanimation stay (p 0,003).
Conclusion: Our study showed that clevidipine is effective and safe for acute hypertension treatment after mechanical trombectomy especially in patients with chronic hypertension history not reported previously as far as we know. Nevertheless the retrospective design and little size of sample are limitations to make recommendations and requires further investigation.

5137

Epidemiology and outcome of anaphylactic shocks admitted to intensive care units: a French retrospective multicenter study

Tacquard C.[1], Guerci P.[2], Chenard L.[2], Millard D.[1], Mertes P. M.[1]
[1]Hôpitaux Universitaires de Strasbourg - Strasbourg (France),
[2]CHU de Nancy - Nancy (France)

Background and Goal of Study: Anaphylaxis is a serious systemic reaction following exposure to an antigen. Its management has been codified in several international guidelines. Although perioperative allergy has been well studied, there are few data on patients admitted in intensive care units (ICUs) following anaphylaxis. The purpose of our study was to describe the epidemiology and management of patients admitted to the ICU for anaphylaxis.
Materials and Methods: We conducted a retrospective, multicenter study in 21 ICUs of the research network of the French Society of Anesthesia and Intensive Care Medicine (SFAR). All patients admitted to the ICU for anaphylaxis from January 1, 2012 to December 31, 2017 were included. The data were collected using an electronic database after approval by the local ethics committee.
Results and Discussion: During this period, 339 patients were included in this study with 222 grade III anaphylaxis and 51 grade IV anaphylaxis. Main triggers were drugs (77%), iodinated contrast media (11%) and food (7%). Epinephrine was administered prior to ICU admission in 88% of grade III anaphylaxis and 100% of grade IV anaphylaxis. Vascular filling was insufficient with a median vascular filling volume less than 30 ml.kg-1 4 hours after ICU admission. Seventeen patients (5%) died during their ICU stay. The time to epinephrine administration was not statistically different between survivors and non-survivors, but non-survivors received a higher dose of epinephrine (median 5[3-10] vs 3[2-7.3], p<0.0001) which confirms that some forms of anaphylactic shock are resistant to epinephrine. The lactate level at admission was the best predictor of death during ICU stay.
Conclusion: If epinephrine is widely used during anaphylaxis, the use of vascular filling should be improved. The mortality rate remains high, at 5%, despite appropriate treatment of the reaction. This should motivate further studies, both experimental and clinical, to identify new therapeutic targets.

5520

Severe subcutaneous emphysema after thymectomy - a case report

Penedos C.[1], Palha A.[1], Damasceno J.[1], Amorim F.[1]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Thymectomy has become a widespread procedure in the treatment of myasthenia gravis (MG). Radical transsternal is the standard surgical approach. The most frequent reported post-operative complications are miastenic crisis, pulmonary complications and phrenic and recurrent laryngeal nerve palsy. We report a case of severe post-operative subcutaneous emphysema (SE), pneumothorax (PT) and pneumomediastinum (PM).
Case Report: A 37-year-old woman, ASA 2, with a history of obstructive sleep apnoea (OSA) under bilevel positive airway pressure treatment and MG was scheduled for transsternal thymectomy due to thymoma. The patient referred dysphagia to liquids, muscular weakness related to arms and legs and presented with ptosis and cushingoid facies. Functional pulmonary tests and thoracic CT scan didn't have any pertinent findings. In the intraoperative course, patient was monitored with ASA standards, bispectral index® and neuromuscular blockade (TOF®) and submitted to general balanced anesthesia, under orotracheal intubation without any difficulty. The procedure was uneventful. Twenty hours post-operative the patient presented disproportional thoracic pain, dyspnea and exuberant periorbital, facial, cervical and thoracic palpable SE. She was admitted to the emergency room and a thoracic CT scan revealed extensive subcutaneous edema and bilateral PT and PM. She was submitted to bilateral thoracic drainage, intubated awake by fibroscopy and transferred to the intensive care unit (ICU). On the 3rd day in the ICU she presented favourable clinical evolution, weaning from mechanical ventilation was started and was successfully extubated 24 hours later. On the 5th day in the ICU she was transferred to the ward and after a week, drains were removed and thoracic x-ray showed expansion of both pulmonary fields without acute lesions.
Discussion: Although SE, PT and PM are post-operative complications overall uncommon, clinical teams need to be aware for possible warning signs. Patients with severe cervical and facial SE should be carefully monitored for airway obstruction which can be potentially life-threatening, so a structured plan to obtain a secure airway should be a priority.
References:
1. Jaretski A, Steinglass KM, Sonett JR. Thymectomy in the management of myasthenia gravis, Semin Neurol 2004; 24:49.
Learning points: Airway management, monitoring and treatment of severe postoperative SE, PT and PM

5815

Iatrogenic Injury and Intensive Care Follow-up After Foreign Body Removal from Esophagus in a Child Patient

Sahin A. S.[1], Ozaydın S.[1], Ozkan S.[1], Horata E.[1], Yıldız N.[1], Salihoglu Z.[1]
[1]Istanbul University of Health Sciences, Kanuni Sultan Suleyman Training Research Hospital - Istanbul (Turkey)

Background: Esophageal perforations are rare, but morbidity and mortality are high in these cases, as they lead to mediastinal and / or pleural inflammation and infection followed by sepsis. Symptoms and signs of esophageal perforation vary depending on the location, development and duration of perforation. In this case, we wanted to emphasize the importance of early intervention in the esophagus.
Case report: ASA-I, 5-year-old female patient was taken to the operating room because of eraser removal from the lower end of esophagus. He was admitted to the extubated intensive care unit due to respiratory distress while being followed up in the postoperative service. He was intubated when his tachypnea (60 / min) was dyspnea. Sedation was started. Rales were present in the right lung. Tachycardia: pulse: 152 / min, saturation: 97%.Monitored from the right-radial artery. The right jugular CVP was inserted with usg guidance. Right thorax tube and nasogastric catheter were inserted by the pediatric surgeon due to pneumothorax on PA radiography. Methylene blue was sent from the probe. On the third day of hospitalization, the patient's condition worsened and bedside bronchoscopy was performed. On the 6th day, the patient was extubated. On the 10th day, there was a 50cc transudate from the thorax tube.The patient was taken to the operating room for esophagogram and esophageal rupture and mediastinal leakage was detected. The patient was referred to the external center for stent placement in the esophagus. Stayed at Stent for 6 weeks. She was fed with gastrostomy and jejunal tube for 8 weeks. After 10 weeks oral intake started. Gastrostomy was closed in 12 weeks, she started to eat normally and returned to normal life.
Discussion: Iatrogenic injuries are the most common cause of esophageal perforations. Symptoms and signs may vary depending on the cause, location and time of perforation. Especially in cases with iatrogenic development and no oral intake, as in our case, pathological findings may not be detected. If time passes over perforation and oral food is taken after perforation, general condition deterioration, fever, tachypnea and hypotension occur. In conclusion, early diagnosis and treatment of esophageal perforations is life saving.

5897

Amniotic fluid embolism followed by necrotizing fasciitis: Can this life be saved?

Peris F.[1], Stojanovic Stipic S.[1], Karanovic N.[1], Carev M.[1]
[1]University Hospital Split - Split (Croatia)

Background: Amniotic fluid embolism (AFE) is a rare but potentially catastrophic maternal emergency caused by entry of amniotic fluid contents into maternal circulation. Here, we present a case of amniotic fluid embolism with cardiac arrest followed by necrotizing fasciitis after vaginal delivery.
Case Report: A 36-year-old female which at 36 weeks of gestation, vaginally delivered a 1,550-g female infant. Shortly after delivery vaginal hemorrhage increased rapidly with patient's systolic arterial pressure decreasing to 75 mmHg and heart rate increasing to 150 beats/min. The patient was transferred to the operating room where, minutes after general anesthesia induction, immediate cardiopulmonary resuscitation was initiated. Spontaneous circulation resumed after administrating 1.5 mg of epinephrine. Although a B-Lynch suture was attempted, atonic hemorrhage remained uncontrolled and the decision to perform hysterectomy was made. Bleeding from the nose and the tracheal tube was observed. Coagulation tests showed decreased levels of fibrinogen. The patient was maintained on vasopressors and transferred to the ICU before her coagulation profile improved. Treatment with broad spectrum antibiotics and continous venovenous hemodiafiltration were started. Second day post admission the patient's condition was complicated by multiple epileptic seizures and progressive necrotising fasciitis of anterior abdominal wall. Pus culture showed Acinetobacter baumannii and appropriate antibiotic therapy was administered. Multiple and aggressive surgical debridement were done in following days despite patient's unstable condition. Due to surgical complications appendectomy, bilateral ureterostomy and transversostomy were done. After 24 days of extensive therapy patient was weaned from ventilator support, coagulophaty resolved and cardiovascular status stabilized with no neurological deficits.
Discussion: Here, we reported of complicated obstetric patient with many complications after vaginal delivery, which were proptly recognized and treated. Reported and similar cases often show that anesthesiologists are not just anesthesiologists, but the silent force watching over patient's life in the OR and ICU.
Learning points: 1) AFE is a diagnosis of exclusion which should be considered early. 2) Anesthesiologists role as natural leader of interdisciplinary team treating life threatening conditions.

5930

Boerhaave's syndrome: A race against time

Peris F.[1], Stojanovic Stipic S.[1], Karanovic N.[1], Carev M.[1]
[1]University Hospital Split - Split (Croatia)

Background: Boerhaave's syndrome is a life-threatening oesophageal perforation that carries a high mortality rate, up to 50%. Diagnosis is difficult by its rarity and the absence of typical symptoms. We present a case of spontaneous oesophageal rupture complicated by postoperative cardiac tamponade.
Case Report: A 61-year-old female with an unremarkable medical history presented to ED with a sudden onset of severe chest pain radiating to back, after a meal, followed by forceful vomiting. At admission she was conscious, tachycardic and dyspnoic with laboratory values within normal values. A chest CT scan revealed left pleural effusion with pneumothorax, pneumomediastinum with extensive subcutaneous emphysema and hiatal hernia without contrast extravasation. Ten hours after the onset of rupture patient was intubated and admitted to the ICU where intensive monitoring and cardiopulmonary resuscitation, including mechanical ventilation, fluid resuscitation with inotropic support, and administration of broad-spectrum antibiotics, was initiated. Seventeen hours after the onset of rupture, emergency surgical intervention was preformed. Left-sided thoracotomy revealed a 4-cm-longitudinal laceration of lateral wall of the lower oesophagus which was repaired by primary suture. A gastrostomy for gastric drainage and jejunostomy for enteral feeding were also created. Postoperatively, patient was in stable condition and after twenty-four hours was extubated. However, eight-hours after extubation, sudden onset of bradycardia and hypotension occured. Immediate resuscitation protocol, which included adrenaline, atropine, levosimendan, noradrenaline and vasopressine, was initiated. Electrocardiography showed PEA and following 90 minutes of CPR, death was determined. Postmortem echocardiography revealed a small amount of pericardial effusion. Autopsy showed acute cardiac tamponade as a cause of death.
Discussion: Rapid surgical intervention and diagnosis are cornerstones in treatment of this rare condition. Even if treated promptly, the mortality approaches 50%, usually related to sepsis, mediastinitis, pneumonitis or empyema.
Learning points: 1) Time interval between onset of rupture, diagnosis and surgery should be as short as possible. 2) Cardiac amponade caused by effusive pericarditis should be considered as one of the most critical complications in patients undergoing surgical treatment for Boerhaave's syndrome and need to be looked for.

5677

PINK1/PARK2-mediated mitophagy during slow rewarming after hypothermia contributes to neuroprotection in a rat model of cardiac arrest

Hu Y.[1], Sun D.[2], Li Y.[1], Wang X.[1], Jiang W.[1], Cui D.[1]
[1]Shanghai Jiaotong University Affiliated Sixth People's Hospital - Shanghai (China), [2]Department of Neurology and Pediatrics, University of California San Francisco - California (United States)

Background and Goal of Study: Identifying the mechanism of rewarming is of great importance to minimize adverse effects and guide clinical decisions for hypothermia treatment. Besides, whether PINK1/Parkin-dependent mitophagy is also involved in rewarming after hypothermia following CA has not been investigated. We sought to investigate the differences in the survival rate and neurological outcome of different rewarming schedules and to evaluate the role of PINK1/Parkin-mediated mitophagy in rewarming after hypothermia.
Materials and Methods: Asphyxial cardiac arrest was induced for 5 min before resuscitation. Sprague-Dawley rats were randomized into the following groups: (1) normothermia (37.0 ± 0.5°C), (2) hypothermia without rewarming (34.0°C), (3) hypothermia + slow rewarming (0.5°C/h), and (4) hypothermia + rapid rewarming (4°C/h). Cooling was maintained for 4 h immediately after the return of spontaneous respiration, followed by rewarming at the indicated rates. Survival rates and neurologic deficit scores were determined, and morphological and relevant biochemical indicators were determined in rat brain cortices.
Results and Discussion: Slowly rewarmed rats showed improved survival and neurologic recovery compared to rapidly rewarmed rats. PINK1/PARK2-mediated mitophagy was activated during slow rewarming. Mitophagy inhibition in the neurons of slowly rewarmed rats resulted in severe apoptosis and cell death. Moreover, the rapid rewarming group exhibited a loss of PINK1 and mitophagy deficiency, resulting in the marked accumulation of reactive oxygen species (ROS) and motor cortex apoptosis. Furthermore, exogenous PINK1 overexpression in the rapid rewarming group reduced cell death and restored mitophagy.
Conclusion: PINK1/Parkin-dependent mitophagy was activated and played a protective role during slow rewarming at 0.5°C/h, while fast rewarming at 4°C/h decreased PINK1 levels and mitophagy, a result that may be related to the

negative consequences of hypothermia. Thus, enhancing PINK1/Parkin-dependent mitophagy and improving mitochondrial turnover are promising therapeutic approaches for rewarming following hypothermia.
Acknowledgements: This work was supported by the National Natural Science Foundation of China (No. 81671879) and a grant (No. 201740118) from the Shanghai Municipal Commission of Health and Family Planning.

5056

Mean amplitude of glycemic excursions (MAGE) and its association with outcomes in patients with sepsis: a prospective observational study using continuous glucose monitoring

Furushima N.[1], Egi M.[1], Mizobuchi S.[1]
[1]Kobe University Hospital - Kobe City, Hyogo (Japan)

Background and Goal of Study: Mean amplitude of glycemic excursions(MAGE) measured using continuous glucose monitoring(CGM) was a surrogate of glycemic fluctuations, which was reported to be associated with oxidative stress in patients with diabetes. Although glycemic variability has been reported to be a relevant index associated with worsened outcomes in critically ill patients, there is little information on MAGE in septic patients and its associations with outcomes. This prospective study aimed to observe MAGE using CGM in early pahase of treatment in septic patients, and assess its association withoutcomes and oxidative stress(ethics No 170053).
Materials and Methods: We included adult patients admitted to our ICU with a diagnosis of sepsis from December 2017 to November 2019, and were expected to need intensive care for >48 hours. After obtaining informed consent from each patient or the patient's legally representative, we continuously measured blood glucose level for first 48 hours of the patient's stay in ICU using FreeStyle Libre®. MAGE was calculated using glycemic information obtained by CGM. The primary outcome in this study was 90-day all-cause mortality. The secondary outcomes were 90-day ICU free days and the concentration of urinary 8-iso-prostaglandinF2α measured 48 hours after commencement of the study as a biomarker of oxidative stress. We compared MAGE in survivors and non-survivors using the t-test. The correlation of MAGE with 90-day ICU free days and urinary 8-iso-prostaglandinF2α level were assessed with Pearson's correlation coefficient. A p-value >0.05 was considered to indicate statistical significance.
Results and Discussion: We included 39 patients. The mean age of the patients was 65.9 years. The mean APACHE score was 27, the number of patients in septic shock was 20 (51.3%), and 90-day all-cause mortality rate was 30.8%. The mean of MAGE in non-survivors was 3.61±1.79 mmol/L, which was significantly higher than that of 2.16±1.28 mmol/L in survivors (p=0.01). An increase of MAGE was significantly associated with a lower rate of 90-days ICU free days (r2=0.22, p<0.01) and a higher urinary 8-iso-prostaglandinF2α level (r2=0.18, p=0.02).
Conclusion: In the current study in septic patients, MAGE for the first 48 hours measured by using CGM was shown to be associated with 90-day all-cause mortality, 90-days ICU free days and urinary 8-iso-prostaglandinF2α level.

5853

The overview of in-hospital cardiac arrests in a year

Kang H.[1], Park J. I.[1]
[1]Chungbuk National University (Hospital) - Cheongju-si, Chungbuk (South Korea)

Background and Goal of Study: Statistics have shown that those who suffer out-of-hospital cardiac arrest (OOHCA) during the weekend were 20% less likely to survive to hospital admission. There is a few ideas about why survival drops during the weekend. While out-of-hospital codes are less successful during the weekend, we carried out retrospective reviews of in-hospital cardiac arrest (IHCA) records to see if there is also lower odds during the weekends. We also looked into matters relating to IHCA which may be utilized in improving the present CPCR guide-lines and monitoring patients whose cardiac arrests may occur in hospital.
Materials and Methods: Electronic medical records of 327 patients who experienced IHCA were retrospectively reviewed, identified only by anonymous patient identification numbers. In order to investigate probable factors that may influence the occurrence of IHCA and survival, we analyzed one year of data for the following items regardless of medical causes for hospitalization: clinical department, the where (wards or ICUs) and the when (weekdays, weekends, and time of day), time to CPCR code announcing and CPCR start from IHCA, prior intubation before the IHCA, number of intubation attempt after IHCA, and CPCR end status (the dead and the survivor).
Results and Discussion: The data included some patients whose IHCA repeatedly occurred (2-5 times depending on the patients). Of 327 IHCA cases 65.8 % (212 cases) survived, a rate that matches the other previous studies. There was no differences in survival rate between weekday and weekend (chi-square test), and the place and the time of day that IHCA occurred did not also affect survival. Of those who had IHCA only two patients had been intubated before cardiac arrest.
Conclusion: Weekend survival odds were not lower in IHCA. However, pre-IHCA intubation seems to be of greater value than ever considered so far in preventing sudden cardiac arrests. For this reason more careful and meticulous patient care and monitoring should be advised in terms of oxygen therapy whatever it is intra-pulmonary or extra-pulmonary, in addition to promoting CPCR equipment availability and quick responses by rescuers to address IHCA.

6175

Clevidipine for acute hypertension management in aneurysmal subarachnoid hemorrhage

Escontrela B.[1], Acevedo I.[2], Arana E.[3], Martinez A.[3]
[1]Cruces University Hospital - Barakaldo (Spain),
[2]Hospital Universitario Ramón y Cajal - Madrid (Spain),
[3]Hospital Universitario de Cruces - Barakaldo (Spain)

Background: Hypertension treatment is a goal of care for subarachnoid hemorrhage management. Clevidipine is a short action calcium channel blocker with rapid onset of action and ultra-short half life, making it a good choice especially when rapid and safe treatment of hypertension is required. For this reason, we hypothesized that clevidipine could be effective and safety for hypertension treatment in this population.
Materials and methods: We conducted a retrospective review of medical records of patients admitted to Reanimation Unit of Cruces University Hospital between 2017 and 2018 after subarachnoid hemorrhage. Age, Sex, Glasgow Coma Scale, Fisher score, location of aneurysma, Systolic blood pressure (SBP), Diastolic blood pressure (DBP), Mean Blood Pressure (MBP) and previous history of hypertension, stroke or cardiovascular risk factors were recorded. Primary endpoint was observing the effectiveness of clevidipine for acute hypertension treatment. Secondary endpoint was observing the safety of clevidipine. Statistical analysis was performed for SPSS using Fisher test for cualitative variables and U Mann Whitney for cuantitative variables with a significance level of 5%.
Results and Discussion: We included 5 patients. Clevidipine was effective for acute hypertension treatment achieving the target level between 10 and 45 minutes in 100% of patients. SBP target was kept for a median of 59 hours in 100% of patients. Nevertheless 40% required additional intravenous treatment and 80% required transition to oral treatment probably resulting of the higher incidence of chronic hypertension (80%) in our study. Clevidipine was also safe without hypotension or adverse events in none of our patients. Mortality was related to Fisher (p 0,01), SBP (p 0,01), Glasgow Coma Scale (p 0,01), time of SBP maintenance (p 0,01) and Reanimation stay (p 0,01). Complications were presented in 60% of patients probably resulting of the higher incidence of Fisher IV scores in our study (80%).
Conclusion: Our study showed that clevidipine is effective and safe for acute hypertension treatment after aneurysmal subarachnoid hemorrhage. Our study supports the result of a previous pilot study and adding evidence especially in patients with higher Fisher scores and chronic hypertension history which makes blood pressure control more difficult and the complications risk very high. Nevertheless the little size and retrospective design of our study will require further validation

5275

Brain oxygenation during prehospital anaesthesia: an observational pilot study

Nurmi J.[1], Laukkanen Nevala P.[2], Kirves H.[3], Raatiniemi L.[4], Toivonen T.[2], Olkinuora A.[2], Brain Oxygenation during Prehospital Anesthesia (BOPRA)
[1]FinnHEMS / Helsinki University Hospital and University of Helsinki - Vantaa (Finland), [2]FinnHEMS - Vantaa (Finland), [3]Helsinki University Hospital - Helsinki (Finland), [4]Oulu University Hospital - Oulu (Finland)

Background and Goal of Study: Many patients anaesthetised in prehospital setting are at risk of inadequate cerebral oxygenation. We aimed to estimate the frequency of cerebral desaturation events during prehospital anaesthesia.
Materials and Methods: We performed a prospective, observational pilot study in two physician-staffed Helicopter Emergency Medical Services (HEMS) units. Adult patients who underwent rapid sequence intubation and prehospital anaesthesia of any reason were included by the HEMS team. NIRS monitoring of left frontal cerebral regional oxygen saturation (rSO2) with Nonin H500 oximeter was started before induction of anaesthesia and continued to hospital arrival. The treatment of the patients followed routine practice.
Results and Discussion: Of 128 eligible patients, 97 (61 male, age 55±10 years) were enrolled in the study and rSO2 data from 83 patients were available for analyses. There was significant variation in the baseline oxygenation and in the change in oxygenation due to prehospital anaesthesia within the patients (Figure 1). The incidence of cerebral desaturation of 10%, 20% and 30% from baseline for at least 5 minutes occurred in 19 (23%), 4 (5%) and 1 (1%) patients, respectively. Figure 1. Baseline cerebral oxygen saturation and change of saturation after induction of prehospital anaesthesia as comparison to the baseline. OHCA=Out-of-hospital cardiac arrest (patients anaesthetised after return of spontaneous circulation).
Conclusion: A substantial proportion of the patients anaesthetised in prehospital setting suffer a cerebral desaturation event. The consequences of these events need to be assessed further.

4871

Refractory tachycardia with hemodynamic compromise in the prehospital due to Disulfiram-Reaction: a case report

Monteiro C.[1], Carrillo-Alfonso N.[2], Mega S.[1], Gouveia A.[1], Lares A.[1]
[1]Centro Hospitalar e Universitário do Algarve, EPE - Hospital de Faro - Faro (Portugal), [2]Centro Hospitalar e Universitário do Algarve, EPE - Hospital de Faro - Faro (Portugal)

Background: Disulfiram is a drug used for chronic alcohol abuse, as it interferes with the metabolism of ingested alcohol. We report a refractory tachycardia in an unconscious patient managed in the prehospital setting, being only correctly diagnosed accessing medical history in the hospital. This unusual combination of conditions as no pair in the scientific literature, being the only case in this nature to be described.
Case Report: A 56 years old male is found unconscious. Emergency services were activated, and the first team to arrive at the scene identifies a narrow QRS complex tachycardia with severe hypotension. First thought to be a supraventricular tachycardia, adenosine, electrical cardioversion and betablockade were tried without major improvement. Only with access to medical history at the hospital, it was possible to diagnose a Disulfiram-reaction. Afterward, the patient began fluid therapy, thiamine, and Dextrose 5%, with asymptomatic discharge several hours later.
Discussion: Disulfiram-reaction caused a severe narrow QRS complex tachycardia and altered state of consciousness. As an uncommon drug, it wasn't suspected as a possible cause until access to medical history. We report this case as a way of alerting to this rare and unexpected cause of tachycardia in the management of critically ill patients, which may lead to confusion during medical approach.
References:
1. Soghoian S, Wiener S. "Disulfiram Toxicity Clinical Presentation: History, Physical, Causes." https://emedicine.medscape.com/article/814525-clinical#b1. Published in 2016.
2. López-Cuenca S, González-Gómez A, Martín-Pellicer A, Fraile-Sanz A, Pastor A, Palacios F. Hypotension and ST-segment depression in response to disulfiram-ethanol. Med Intensiva. 2013;37(7):495-496. doi:10.1016/j.medin.2012.10.001.

Learning points: To know Disulfiram reaction symptoms, and recognize that it may lead to difficult to treat tachycardia. To acknowledge that in an unconscious patient, sometimes, only access to medical history and medication allows achieving a correct diagnosis.

5798

Thiopental versus Ketamine for Induction of Anesthesia in Septic Shock: A Randomized Controlled Trial

Elsherbeeny M.[1], Hasanin A.[1], Badr E.[1], Osman M.[1], Kamel A.[1]
[1]Cairo University Hospital - Cairo (Egypt)

Background and Goal of Study: Induction of anesthesia in septic shock patients might result in deleterious hypotension. The aim of this work is to compare low-dose thiopental versus ketamine for induction of anesthesia in patients with septic shock. Materials and Methods: In this randomized controlled double-blinded trial, we included 26 patients with septic shock scheduled for emergency operations under general anesthesia. According to the induction protocol, patients were divided into: thiopental group (received thiopental 2 mg/Kg + fentanyl 0.5 mcg/Kg + midazolam 0.05 mg/Kg), and ketamine group (received Ketamine 1 mg/Kg + fentanyl 0.5 mcg/Kg + midazolam 0.05 mg/Kg). Both groups were compared according to mean arterial pressure, cardiac output, heart rate, vasopressor requirements, and incidence of post-induction hypotension.
Results and Discussion: Both groups were comparable in demographic data. No significant differences were reported between both groups based on mean arterial pressure, cardiac output, and heart rate; however, ketamine group showed higher incidence of post-induction hypotension {11/13(85%) versus 5/13(39%) patients, P=0.041} compared to thiopental group.
Conclusion: Both study regimens, thiopental-based regimen and ketamine-based regimen, showed equivalent hemodynamic effects when used for induction of anesthesia in septic shock patients. However, thiopental-based regimen was less likely associated with post-induction hypotension.

5920

Hypothermia combined with xenon reduces secondary injury development and enhances neuroprotection by preventing neuronal cell loss in a rat model of traumatic brain injury

Campos-Pires R.[1], Patten S.[1], Mohamed-Ali N.[1], Aldhoun J.[1], Franks N.[1], Dickinson R.[1], Laboratory animal study: male Sprague Dawley rats
[1]Imperial College London - London (United Kingdom)

Background and Goal of Study: The secondary injury that develops after traumatic brain injury (TBI) is potentially preventable and underlies most of TBI patients' functional impairments. Current TBI treatment is mainly supportive and no specific neuroprotective drugs are available. Excitotoxicity associated with over-activation of NMDA receptors plays a crucial role in secondary injury development. Xenon (Xe), a general anaesthetic and NMDA receptor antagonist, is neuroprotective in preclinical TBI1,2,3. Hypothermia (HT) is a standard neuroprotective treatment in neonatal asphyxia & post-cardiac arrest. Although the mechanisms of HT neuroprotection are not fully understood, HT is believed to reduce excitotoxicity. Current evidence on HT neuroprotection after TBI is still conflicting. The aim of this study was to evaluate the neuroprotective efficacy of HT combined with Xe using the reproducible & well-established controlled cortical impact model of blunt TBI.
Materials and Methods: Young adult Sprague-Dawley male rats (n=24) were intubated & mechanically ventilated (with propofol & buprenorphine anaesthesia) while undergoing right parietal cortical impact and during treatment. Animals were randomly assigned to control (30%O2 balanced N2; 38°C), HT (30%O2 balanced N2; 34°C), Xe (50%Xe:30%O2 balanced N2; 38°C) or HT-Xe (50%Xe:30%O2 balanced N2; 34°C) groups. Physiological monitoring included: core body temperature, peripheral O2 saturation, heart rate, invasive blood pressure and arterial blood gases. Histological outcomes were measured at 30 min (contusion volume, CV), and 24 hr (CV, neuronal cell count) by researchers blinded to treatment. Statistical significance was assessed using Kruskal Wallis test with Benjamini, Krieger, Yekutieli correction.
Results and Discussion: Both HT combined with Xe and Xe alone significantly ($p<0.01$) reduced secondary injury (total CV at 24 hrs minus CV at 30 min). A significant reduction ($p<0.05$) of neuronal cell loss in the ipsilateral hippocampal CA2 area was achieved using both HT combined with Xe and Xe alone. Interestingly, in the contralateral retrosplenial cortex a significant reduction ($p<0.05$) in neuronal

loss was achieved only when HT was combined with Xe.
Conclusion: We show for the first time that HT combined with Xe is neuroprotective in clinically relevant pericontusional areas after TBI using a translationally-focused in vivo rat model with mechanical ventilation and clinically relevant monitoring.

6251

Alveolar ventilation and the risk of hypoventilation - transport ventilators in a Thiels' cadaver study of simulated cardio-pulmonary resuscitation

Orlob S.[1], Wittig J.[2], Auinger D.[1], Metnitz P.[1], Feigl G.[3], Prause G.[1]
[1]Department of Anaesthesiology and Intensive Care Medicine, Medical University Graz - Graz (Austria), [2]Medical University Graz - Graz (Austria), [3]Institute of Macroscopic and Clinical Anatomy, Medical University Graz - Graz (Austria)

Background: Previous studies have posed that hyperventilation occurs commonly in cardio-pulmonary resuscitation (CPR) mainly due to excessive frequencies, especially when a manual valve bag is used [1]. Although hyperventilation is widely perceived as a common occurrence in CPR, actual tidal volumes (Vt) have just been measured rarely. We sought to investigate whether common portable ventilators are able to provide meaningful alveolar ventilation during continuous chest compressions.
Materials and Methods: A three-period crossover study with three common transport ventilators in a cadaver model of CPR was conducted. The three ventilators MEDUMAT Standard², Oxylog 3000 plus and Monnal T60 resembled three different treatments providing volume controlled continuous mandatory ventilation (VC-CMV) via an endotracheal tube with 6ml/kg IBW. Proximal airflow was measured by a mass flow meter. For each respiratory cycle net Vt was derived, deviation to predetermined Vt was calculated and analysed. Several mixed linear models were calculated with the cadaver as random factor and a combination of ventilator, height, gender, crossover period and number of breath in period as covariate.
Results and Discussion: We found all tested transport ventilators to be able to provide alveolar ventilation in a human cadaver model of CPR even though tidal volumes were considerably decreased by chest compressions. Overall observed net Vt (n=715) was in median −21.2% (IQR: 19.6, Range: [−87.9%; 25.8%]) less than the predetermined volume. In a mixed linear model ventilator, crossover period and height were significant factors for decreased Vt. We found significant differences between the ventilator models. The estimated effects for each ventilator were −14.5 [95%-CI: −22.5; −6.5]% (p=0.0004) for Monnal T60, −30.6 [95%-CI: −38.6; −22.6]% (p<0.0001) for Oxylog 3000 plus and −31.0 [95%-CI: −38.9; −23.0]% (p<0.0001) Medumat Standard².
Conclusions: Our results support the concept of using ventilators to avoid excessive ventilatory rates in CPR. If doing so, healthcare professionals should carefully review actual tidal volumes to recognise the occurrence of hypoventilation. Future CPR studies should examine Vt during CPR in vivo.
Reference:
1. O'Neill JF, Deakin CD. Do we hyperventilate cardiac arrest patients? Resuscitation 2007;73:82–5.
Acknowledgements: We thank Mr. Hobisch BSc, Mr. Fellinger and Dr. Honnef for their contributions to this study.

6036

Chest pain and myocardial infarction type 2 after propofol sedation: how echocardiography saved the day

Almeida C.[1], Moço R.[1], Santos G.[1], Rodrigues Alves D.[1]
[1]Centro Hospitalar de Lisboa Ocidental - Lisboa (Portugal)

Background: Modern dialysis still struggles to set the optimal target weight for end-stage renal disease (ESRD) patients, who may suffer from volume overload or dehydration after dialysis1. Therefore, perioperatively it is pivotal to assess the volume status resulting from preoperative dialysis1. However, clinical signs commonly employed, namely blood pressure (BP) and heart rate, are poor predictors of volume status1. Transthoracic echocardiography (TTE) is a particularly helpful technology, growingly used by the patient bedside that should definitely be considered in this regard. We describe herein an intra-operative emergency on an ESRD patient where TTE was paramount to understand the cause of patient decompensation.
Case Report: A 61-year-old, female, ASA III patient with ESRD on a regular hemodialysis program, with ischaemic cardiomyopathy, severe concentric LV hypertrophy and arterial hypertension was submitted to re-anastomosis of dialysis graft on her arm under local anesthesia. Initial BP was 180/90 mmHg. A moderate sedation with propofol infusion was performed, titrated to effect (maximum 75 µg/kg/min). The procedure lasted 48 minutes and was uneventful, with minor blood loss. However, as it ended, the patient developed malaise, severe hypotension (<70/40 mmHg), chest pain and dyspnea. A 12-lead ECG showed sinus tachycardia without repolarization changes. A TTE was then performed showing signs of severe hypovolemia, namely a collapsed inferior vena cava throughout the respiratory cycle, an empty, hyperkinetic LV with "kissing walls" and an intraventricular telesystolic gradient of 36 mmHg. Hypovolemia was identified as the culprit, presumably due to excessive fluid removal in the preoperative dialysis and likely worsened by the vasodilatory effects of propofol. Trendelenburg position and aggressive fluid reposition were adopted, with excellent evolution. BGA confirmed the low perfusion state with lactate levels of 4,7 mmol/L and there was a rise in troponin levels (baseline levels 139 ng/L; peak 273 ng/L). A type 2 myocardial infarction was assumed.
Discussion: This clinical case raises awareness to the risks associated with dehydration after preoperative dialysis and highlights the fragility of BP to predict it. Aggressive fluid reposition is usually avoided in ESRD patients, however some of them actually need it. TTE can be a life-saving and non-invasive method to identify them.
Reference:
1. J Cardiothor Vasc An. 2017 Dec;31(6):2251-2267.

6176

Effects of Intrathoracic Pressure Regulation on Respiratory Function and Mechanics in Hypovolemic Mechanically Ventilated Pigs – A Pilot Study

Scharffenberg M.[1], Wittenstein J.[1], Huhle R.[1], Herzog M.[1], Ran X.[1], Gama De Abreu M.[1]
[1]University Hospital Carl-Gustav-Carus - Dresden (Germany)

Background and Goal of Study: Intrathoracic pressure regulation (IPR) with sub-atmospheric end-expiratory pressure improves hemodynamics during hypovolemic hypotension, but its effects on the respiratory system are elusive. We aimed to describe the effects of IPR on lung function and mechanics during hypovolemia.
Materials and Methods: After approval by the local animal welfare committee (DD24.1-5131/474/22), six pigs (45.4±3 kg) received anesthesia and volume-controlled ventilation (VCV) with tidal volume (VT) of 8 ml/kg and positive end-expiratory pressure (PEEP) of 5 cmH2O. Hypovolemia was obtained by drawing 30% of the calculated total blood volume. Animals were randomly assigned to one of two groups (n=3/group): 1) VCV with PEEP, or 2) IPR of -5, -8, and -12 cmH2O (ZOLL, USA; 60-120 min each, 4 h total), followed by 30 min VCV+PEEP. Respiratory and hemodynamic variables were recorded, including distribution of ventilation and continuous cardiac output. Computed tomography (CT) was used to quantify lung aeration at end-expiration. Postmortem, lung wet/dry ratio (W/D) was determined. Statistics included repeated measurements ANOVA with baseline values as covariate and linear modeling.
Results and Discussion: VT, respiratory rate, peak and plateau airway pressure, as well as gas exchange and arterial pH did not differ between groups. While heart rate and mean arterial pressure did not differ significantly, IPR reduced the central venous pressure (P=0.048). Also, IPR increased cardiac output (P=0.018) as well as global end-diastolic (P=0.045), intrathoracic blood (P=0.043), and stroke volumes (P=0.042). IPR was associated with non-aerated and poorly aerated lung tissue mass (slope=1.89 %/cmH2O, P<0.001, and 0.80 %/cmH2O, P=0.046, respectively), as wells as normally and hyper-aerated compartments (slope=-2.7 %/cmH2O, P<0.001, and slope=-0.01 %/cmH2O, P=0.002, respectively). In addition, IPR shifted the center of ventilation towards non-dependent regions (P<0.001). VCV+PEEP reverted these effects. Extravascular lung water was significantly increased under IPR (P=0.007), but W/D did not differ between groups.
Conclusion: In hypovolemic pigs, IPR improved global blood flow without impairment of the respiratory function. The decrease in aerated lung tissue by IPR could be promptly reversed by VCV+PEEP.
Acknowledgements: We´d like to thank I. Wittig and L. Höller for operating the CT scans.

6191

Resuscitation and Ultrasound – An Intraoperative Obstructive Shock Case Report

Almeida Pinto D.[1], Almeida V.[1], Correia M.[1], Silva C.[1], Barros I.[1]
[1]*Centro Hospitalar Tondela-Viseu EPE - Viseu (Portugal)*

Background: Facing a case of circulatory shock (CS) and cardiac arrest (CA), differential diagnosis relying on clinical criteria can be difficult and slow. Fast identification of the cause can lead to the effective treatment and influence the overall prognosis. Point-of-care ultrasound (US) has increased its role in all emergency scenarios, including intraoperative settings1,2.
Case Report: 75yo male, ASA III (hypertension, dyslipidemia, type 2 diabetes mellitus, heart failure, stage 5D chronic kidney disease). Admitted to the OR for assessment of local edema on a right arm arteriovenous fistula for dialysis. Surgery performed under brachial plexus block (US guided axillary approach; 0.15% mepivacaine, 20mL) and light sedation. Initial phlebography revealed superior vena cava stenosis. During balloon dilatation consciousness loss occurred, followed by transient episodes of ventricular tachycardia, hypotension and CA. Tracheal intubation, mechanical ventilation and advanced life support (ALS) readily started, with reversible causes of CS and CA being excluded during this period. Transthoracic echocardiography performed after 30min of ALS showed pericardial tamponade (presumably iatrogenic). Emergent pericardiocentesis was followed by immediate hemodynamic recovery. Patient was transferred to ICU, being discharged to ward in 24h and leaving the hospital 7d later with no sequels.
Discussion: Identification of the cause of obstructive shock is clinically difficult, but with high sensitivity and specificity with US utilization1. In our case, point-of-care US was decisive for differential diagnosis and treatment, besides the poor prognosis predicted by prolonged CA. We also emphasize that critical events can be more readily identified in the setting of loco-regional anesthesia as in this case, in which consciousness loss preceded CA, leading to a faster start of reanimation maneuvers, decisive in this successful case.
References:
1. Gharib M (2014) Accuracy of early rapid ultrasound in shock (RUSH) examination performed by emergency physician for diagnosis of shock etiology in critically ill patients. Journ Emerg Traum Shock 8(1)5.
2. Mok K (2016) Make it SIMPLE: Enhanced shock management by focused cardiac ultrasound. Journ Inten Cr 4(1).
Learning points: US protocols for emergency settings, particularly in CS, allow faster diagnosis and wider time window for action, although a limitation exist regarding the lack of equipment and trained professionals.

5133

Rapid ascent to 4559 m leads to vascular endothelial glycocalyx damage, that's extend is associated with altitude-induced pulmonary hypertension and the severity of acute mountain sickness

Schäfer L.[1], Schiefer L.[1], Macholz F.[1], Sareban M.[1], Swenson E. R.[2], Berger M. M.[1], Salzburg Mountain Medicine Research Group
[1]*University Hospital Salzburg - Salzburg (Austria),*
[2]*University of Washington - Seattle (United States)*

Background/Goal of Study: Hypoxia and the stress of high altitude alters vascular permeability, which may be related to structural changes in the endothelial glycocalyx. With this prospective study we investigated changes of the endothelial glycocalyx barrier after rapid active ascent to high altitude (4559m). We hypothesized that the increased shear stress on the pulmonary and systemic vasculature resulting from acute hypoxic exposure and the exercise of active ascent alters the structure of the glycocalyx and can be detectable by appearance of its components in the circulating blood. Furthermore, we hypothesized that this may occur to a greater extent in those with peripheral edema and in those with acute mountain sickness (AMS), in whom shedding of the glycocalyx may correlate with symptom severity.
Methods: After ethical approval 16 healthy subjects rapidly (<22h) ascended from 1130 to 4559m (Margherita Hut, Monte Rosa, Italy). At low altitude (423m) and at 3 time points (7, 20, 44h) at high altitude blood was drawn and analysed (ELISA) for plasma concentrations of 3 glycocalyx components: syndecan-1, intercellular adhesion molecule 1 (ICAM-1) and heparan sulfate. In addition, systolic pulmonary artery pressure (sPAP) was measured by echocardiography, and the severity of acute mountain sickness (AMS) was evaluated by standardized questionnaires (AMS-C Score).
Results: After 7 hours at 4559m the capillary PO2 was 46±4mmHg ($p<0,001$ vs. low altitude). The AMS-C score increased from 0,03±0.1 to 0,75±0,93 ($p<0,01$). The overall incidence of AMS was 53%. Concentrations of ICAM-1 and heparan sulfate increased from baseline to 7h after arrival at high altitude ($p<0,05$). The ICAM-1 rise persisted at 20h and correlated with sPAP ($R=0,42$, $p<0,01$) and with the development of peripheral edema. Plasma concentrations of heparan sulfate were higher in subjects with AMS ($p<0,05$). Syndecan-1 concentrations were increased only at 44h without any correlation to sPAP or AMS.
Conclusion: Our study demonstrates that serum concentrations of glycocalyx components change over time at high altitude; furthermore, certain patterns of serum glycocalyx components such as an acute rise in heparan sulfate levels may correlate with the development of AMS, and ICAM-1 with pulmonary artery pressure and peripheral edema. These data suggest that serum markers of glycocalyx alteration may be a useful tool to evaluate the role of the vascular endothelium in disease states of high altitude.

4904

Bi-Level ventilation mitigates neuroinflammation and pulmonary shunt in a cardiopulmonary resuscitation model

Ruemmler R.[1], Ziebart A.[2], Kamuf J.[2], Hartmann E.[2]
[1]*Universitätsmedizin Mainz - Mainz (Germany),*
[2]*Universitätsmedizin Mainz - Mainz (Germany)*

Background and Goal of Study: Optimal ventilation strategies during cardio-pulmonary resuscitation are still heavily debated. So far, no convincing evidence could be presented in favour of outcome relevance and necessity of specific ventilation patterns. In recent years, alternative models to the guideline-based intermittent positive pressure ventilation (IPPV) have been proposed. In this randomized controlled trial, we evaluated a bi-level ventilation approach in a porcine model to assess possible physiological advantages for the pulmonary system as well as resulting changes in neuroinflammation compared to standard measures.
Materials and Methods: 16 male German landrace pigs were anesthetized and instrumented. Ventricular fibrillation was induced and the animals were left untreated for 4 minutes. After randomization, the animals were assigned to either the guideline-based group (IPPV, tidal volume 8-10ml/kg, respiratory rate 10/min, FiO2 1.0) or the bi-level group (inspiratory pressure levels 15-17cmH2O/5cmH2O, respiratory rate 10/min, FiO2 1.0). Mechanical chest compressions and interventional ventilation were initiated and after 5 minutes, blood samples were taken. Afterwards, advanced life support was started for up to 4 cycles. Animals achieving ROSC were monitored for 6 hours and lungs and brain tissue were harvested for further analyses.
Results and Discussion: 5 of the IPPV and 4 of the bi-level animals achieved ROSC. While there were no significant differences in gas exchange or hemodynamic values, bi-level treated animals showed less pulmonary shunt directly after ROSC and a tendency to lower inspiratory pressures during CPR. Additionally, cytokine expression of tumour-necrosis factor alpha was significantly reduced in hippocampal tissue compared to IPPV animals.
Conclusion: Bi-level ventilation with a constant positive end expiratory pressure and pressure-controlled ventilation is not inferior in terms of oxygenation and decarboxylation when compared to guideline-based IPPV ventilation. Additionally, bi-level ventilation showed signs for a potentially ameliorated neurological outcome as well as less pulmonary shunt following experimental resuscitation. Given the restrictions of the animal model, these advantages should be further examined.

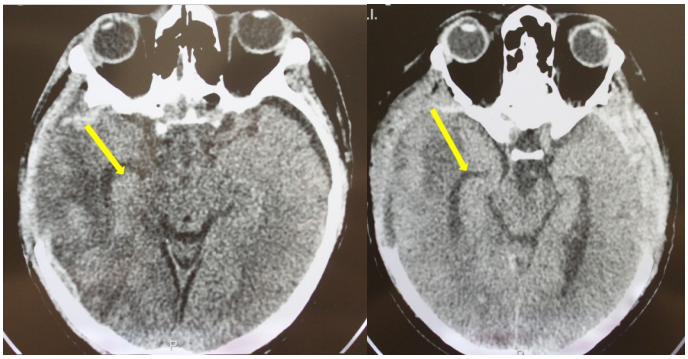
4729

Hippocampus role in predictive assessment of sepsis development in patients with head injury

Savvina I.[1], Lavrinenko N.[2], Zabrodskaya J.[1], Sebelev K.[1], Dolmatov D.[2]
[1]*Almazov National Medical Research Center - St.Petersburg (Russia),*
[2]*Clinical Hospital of Emergency Medical Care - Tver town (Russia)*

Background and Goal of Study: Central nervous system role in systemic inflammation response syndrome (SIRS) starting is well-known. Search of diagnostic methods of sepsis prognosis development in patients with traumatic brain injury (TBI) based on the interrelation between SIRS starting and brain structures (hippocampus) damage involved in immune response is actually.
Materials and Methods: 76 patients with severe TBI were treated in Tver Clinical Hospital of Emergency Medical Care in 2016-2019yy, 24 from them (31,6%;18 male,6 female,age 42,5±3,6) had septic complications started during the first 5 days. Brain CT (PHILIPS BRILLIANS 64) was performed for all patients to assess axial, lateral brainstem dislocation stage and condition of hippocampus and parahippocampus gyrus (1). 17 from 24 septic patients were operated in the first 4 hours after entrance to the hospital with decompressive craniotomy. SIRS and sepsis diagnosis was made on the base of CRP, PCT levels, infectious focus and organ dysfunction.
Results and Discussion: Hippocampus and parahippocampus gyrus damage was

determined in all 24 patients as edema, venous hemostasia and ischemia because of traumatic dislocation syndrome from the first day after TBI (Fig.1,2; yellow cursor). SIRS started from the 2d postoperative day and was transformed to sepsis on the 5th-7th postoperative day independently of surgery factor ($p<0,05$).
Conclusion: Hippocampus and parahippocampus gyrus injury as blood circulation disturbances in consequence of dislocation syndrome in patients with TBI can be predictive factor of sepsis development in acute period of traumatic disease.
References:
1. Marshall LF, Marshall SB, Klauber MR, et al: A new classification of head injury based on computerised tomography. Report on the Traumatic Coma Data Bank. J Neurosurg 1991;75(Suppl):S14-S20.



4804

Anesthesiological experience at field hospital after disaster in Mozambique

Roasio A.[1], Segala V.[2], Cavallo S.[3], Pallavicini J.[3], Tommasoni N.[4], Raviolo M.[4]
[1]Cardinal Massaia Hospital - Asti (Italy), [2]Umberto I Hospital - Torino (Italy), [3]Trauma Centre Hospital - Torino (Italy), [4]Disaster Medicine Service 118 - Cuneo (Italy)

Background and goal of the study: A disaster is defined as a sudden event causing an imbalance between needs and available resources1. In March 2019 a tropical cyclone hit Mozambique requiring international medical support. Aim of the study is to report the anesthesiological experience at the level 2 Italian Emergency Medical Team.
Materials and Methods: In our descriptive cross-sectional study we collected all patients underwent the operating room in the field hospital from March 30th to April 26th 2019 in Mozambique. We became operative within 7 days. Main end point is to describe the anesthesiological experience in this emergency. Data collected: age (years), male gender, triage score (immediate, delayed, minimal, expectant), unscheduled admission, if cyclone-related event, cause of surgery (post-traumatic, visceral, gynecological, other), if available preoperative exams, type of anesthesia (regional anesthesia, general anesthesia with or without intubation), complications occurred during anesthesia, mortality rate. Statistic: numerical data summarized as mean ± standard deviation (SD) while ordinal data as percentage. Windows Excel® was used.
Results and discussion: 1171 admitted patients; 65 surgical treatment realized (5.5% of all activity). Age: 33±21 years, 46,2% male. 10% immediate, 59% delayed, 29% minimal and 2% expectant. 66,2% unscheduled interventions. 36.9% cyclone-related events. 48.4% post-traumatic, 26.6% gynecological, 9.4% visceral, 15.6% other. 9.2% of patients had preoperative exams. Regional anesthesia was applied in 72.4%, general anesthesia without intubation in 21.5% and with intubation in 6.1%. 3.1% severe hypotension. 1 case (1.5%) died due to hemorrhagic shock. Firstly we describe a less severe picture than other reports2 (lower traumatic patients, 48.4% vs. 80%) due to type of disaster (flood vs. earthquake) and time required for the endorsement. Secondly in our experience regional anesthesia was more frequently used than other teams3 (72.4% vs. 46%) due to skilled anesthesiologists and available resources (ultrasound device).
Conclusions: the anesthesiological preparedness for different scenarios of disaster is a great challenge. It depends on type of disaster, delay in responding and human and technical available resources.
References:
1. WHO Humanitarian health Action. Glossary of humanitarian terms.
2. Jiang J et al. Int. J. Care Injured 2010;41:e1–e3.3)Charuluxananan S. et al. Acta Anaesthesiol Scand 2006;50: 320—323.

5546

Implementation of a critical response team in a Romanian Tertiary University Hospital – Conceptualization of an American model. Impact on major outcomes

Toma D. I.[1], Georgescu C. M.[1], Velovan R. R.[1], Filip C.[2], Sandesc D.[1]
[1]Emergency County Hospital Pius Brinzeu Timisoara - Timişoara (Romania), [2]North Shore Medical Center - Salem (United States)

Background and Goal of Study: Following a 3 weeks experience at North Shore Medical Center, Salem, US, a critical response team (CRT) project was implemented on the Neurosurgery (NSG) department of our hospital with the aim of bringing critical care expertise and optimizing standards of care to patients on the ward. The goal of the study was to evaluate the impact of CRT on major outcomes.
Materials and Methods: Prospective, observational, non-randomized study carried out at the Emergency County Hospital Timisoara, Romania. We created 2 study groups, pre-CRT (October 2018-March 2019) and CRT (April-September 2019). We evaluated the impact of CRT on the following outcomes: the number of cardiorespiratory arrests on the NSG ward, the ICU readmission rate, the mortality among readmitted patients to ICU and the global mortality. The results were analyzed for statistical significance.
Results: 136 patients were included to pre-CRT and 153 patients to CRT. There were no significant differences regarding demographics or clinical pathologies between groups. Cardiorespiratory arrest incidence was decreased in CRT vs pre-CRT (1.84% vs. 4.92%; $p>0.05$, 95%CI -16.6320% to 14.9199%, difference 3.13 %). Readmission rate to ICU was similar between groups, but the mortality of readmitted patients was significantly decreased in CRT compared to pre-CRT (42% vs. 73%; $p=0.0437$, 95%CI 1.4572% to 55.2159%, difference 32%). Global mortality on the NSG ward was reduced in CRT but this reduction was not statistically significant.

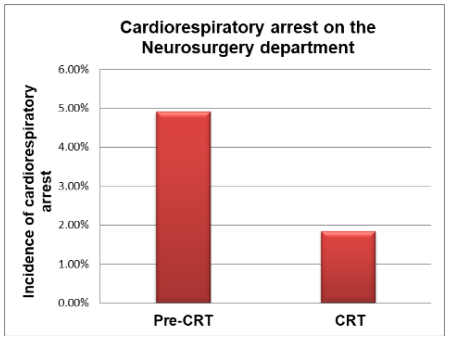


Figure 1. The percentage of cardiac arrests on the NSG ward.

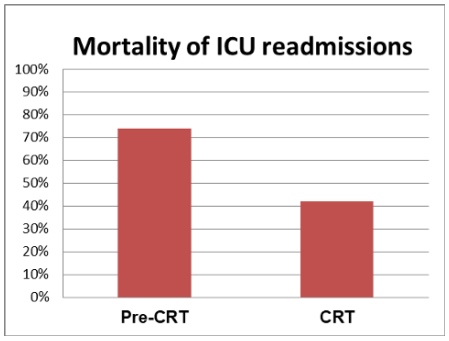


Figure 2. % Mortality rates among NSG patients readmitted to ICU.

Conclusion: CRT is a process improvement project that has led to a decrease of cardiorespiratory arrests on the NSG ward and a decrease in mortality rates among patients readmitted to ICU from NSG department.

5633

An Italian prehospital blood program for remote damage control resuscitation

Daminelli F.[1], Salaroli C.[1], Celi S.[2], Marchetti M.[3], Falanga A.[3], Giupponi A.[4]
[1]ASST Papa Giovanni XXIII and Lombardy Regional EMS Trust (AREU) - Bergamo (Italy), [2]ASST Spedali Civili and Lombardy Regional EMS Trust (AREU) - Brescia (Italy), [3]Department of Immunohaematology and Transfusion Medicine, ASST Papa Giovanni XXIII - Bergamo (Italy), [4]Lombardy Regional EMS Trust (AREU) - Milan (Italy)

Background and Goal of Study: Haemorrhagic shock is the most frequent cause of medically preventable deaths after injury and these deaths occur predominantly in the prehospital phase of resuscitation. Prehospital blood transfusions have been adopted by many civilian helicopter emergency medical service (HEMS) agencies across Europe, early outcomes show that this practice is feasible and safe1. The Lombardy Regional EMS Trust (AREU) operates five HEMS bases in the most populated Italian region with nearly 10 million inhabitants (2% of the European Union population). The aim of the present study is to detail the development and implementation of an Italian "Blood on Board" programme for remote damage control resuscitation 2.
Materials and Methods: The HEMS base in Bergamo is located at the center of Lombardy and next to Papa Giovanni XXIII Hospital. Close cooperation and good relations with the local transfusion medicine department is of paramount relevance. A portable temperature controlled bag (4 liters capacity Crēdo ProMed, Peli BioThermal) will be tested by qualified personnel of the blood bank to determine the best standardized method for packing and storage of 2 units of packed red blood cells (group 0 Rh negative) and 2 units of thawed plasma (group AB) at 4±2°C. A fluid warmer device (°MEQU warmer system, °MEQU Denmark) will be used for blood transfusion to avoid hypothermia. Plasma-first resuscitation is encouraged based on available evidence from a randomized clinical trial 3.
Results and Discussion: Our work started in January 2019. Together with Papa Giovanni XXIII Hospital Department of Immunohaematology and Transfusion Medicine we have approved a prehospital blood components transfusion protocol in adherence to National standards. We are completing equipment supply and we are planning to start in March 2020.
Conclusion: We have described the process to set up the first Italian civilian prehospital blood transfusion programme. Stewardship processes will minimise wastage of blood components while keeping them immediately employable to provide haemostatic resuscitation for bleeding patients in remote and austere environments.
References:
1. Rijnhout et al; Injury, 50 (2019) 1017–1027.
2. Jenkins et al; Shock, 41 (2014) 3-12.
3. Sperry et al; N Engl J Med, 379 (2018) 315-326.
Acknowledgements: Dr Rachel Hawes and Andy Mawson, Great North Air Ambulance (UK) and the Transfusion Team at Royal Victoria Infirmary, Newcastle (UK).

6011

Time from injury to arrival in the trauma centre in patients undergoing secondary transfer

Arleth T.[1], Rudolph S. S.[1], Svane C.[1], Rasmussen L. S.[1]
[1]Rigshospitalet, University of Copenhagen, Denmark - Copenhagen (Denmark)

Background and Goal of Study: Trauma patients may require secondary transfer to definitive care after initial assessment and resuscitation at a primary facility. Prolonged time to transfer may be detrimental and may worsen outcome. A study from 2006 found that trauma patients spent a median time of 150 minutes in a local hospital and 48 minutes on transportation before arrival in the trauma centre. The aim of this study was to determine time from injury to arrival in trauma patients undergoing secondary transfer to the Level I trauma centre at Copenhagen University hospital, Rigshospitalet, in Copenhagen, Denmark. We considered that an adequate level of quality would correspond to a maximum of 10 % of the patients arriving later than 6 hours after time of injury.
Materials and Methods: Data was collected from our local trauma registry. We included patients admitted to the trauma centre with a full trauma team activation in a 3-year period between November 1st, 2016 and November 1st, 2019. Data are presented as median values with interquartile range (IQR).
Results and Discussion: In the study period 250 patients underwent secondary transfer to our trauma centre. The median age was 47 years (IQR 26-65), 15 % were <18 years and 31 % were women. A total of 111 (44.4 %) patients had an Injury Severity Score >15 and 30-day mortality was 6 % (n = 15). The median time from injury to arrival in the trauma centre was 255 minutes (IQR 192-371); median time spent at the primary care facility was 157 minutes (IQR 115-222) and median time spent on transportation was 32 minutes (IQR 18-47). We found that 67 patients (27 %; CI 21.7-32.6) arrived in our trauma centre later than 6 hours from time of injury. Patients arriving after and before 6 hours spent a median of 305 minutes (IQR 219-444) and 136 (IQR 89-179) at the primary facility, respectively. The patients arriving after 6 hours were significantly older (P = 0.004) but there was no significant difference in 30-day mortality (OR: 0.99; CI 0.3-3.2).
Conclusion: Time from injury to arrival in our facility exceeded 6 hours for 67 patients (27 %) who were significantly older.

4817

Shock treatment of acute hand ischemia

Stanciulescu E. L.[1], Monica P.[2]
[1]Clinical Emergency Hospital Bucharest F - Bucharest (Romania), [2]Colentina Clinical Hospital - Bucharest (Romania)

Background: The World Health Organization estimates for 2014 that there are globally around 16 million people who use injectable drugs, which leads to a high incidence of accidental or intentional intraarterial injection in drug abuse. The therapeutic management consisted of restoring the arterial circulation at the ischaemic segment to prevent the propagation of thromboembolic complications by using of i.v. heparine and to preserve the function of the hand by preventing delayed ischaemia and compartment syndrome followed by necrosis.
Case Report: A 31 years old man exintravenous drug abuser who for the past 6 years has been treated with Methadone (3-6 pills/day). The pacient came to the emergency department 6 hours after injecting himself into the radial artery with a suspension composed of 10 pills of Methadone (2.5 mg) and 4 pills of Alprazolam (Xanax 1 mg). The diagnosis of acute right hand ischaemia was established after a Doppler ultrasound of the radial, ulnar and arterial arches of the hand. The medical treatment included: continuous anticoagulation therapy for 14 days, antispasmodic and anti-inflammatory drugs, as well as psychiatric drugs. Unfortunately, the necrosis started and continued until it reached the distal metacarpal level, resulting in amputation of all fingers of the right hand.
Discussion: Intra-arterial injection among drug addicts becomes frequent when there are no more viable veins left for them to insert a needle. Even more dramatic is their attempts to inject crushed pills in peripheral arteries. The result may be reversible ischaemia, distal to the site of injection or, as in this case, necrosis and loss of body parts. The particularity of the case consists in the presence of microemboli that cause ischaemia of the microcirculation from the level of the digital collateral arteries and the arteries for the intrinsic muscles of the hand, resulting in a high level of necrosis. In this case repeated excisions were performed, which latter allowed graft adhesion.
Learning points: The progression of the ischaemia depends on the physiological reaction, which varies according to the vascular spasm, thrombosis and emboli derived from the non-solvable drugs. The case described the successful thrombolytic medical management of an ischemic hand using the continuously anticoagulation therapy for 14 days, antispasmodic and anti-inflammatory drugs therapy.

4975

First pass success in prehospital intubation in resuscitations performed by a non-physician based emergency medical system

Thomas O.[1], Pouwer A.[2], Brouwer F.[2], Thomas C.[3]
[1]VieCuri Medisch Centrum voor Noord-Limburg - Venlo (Netherlands), [2]Viecuri Medisch Centrum - Venlo (Netherlands), [3]Hospital zum Heiligen Geist - Kempen (Germany)

Background and Goal of Study: Endotrachael intubation (ETI) is the gold standard in maintaining the airway. First pass advanced airway insertion is associated with fewer adverse effects. Jarvis et al. 2019 described a first pass intubation success (FPS) in adult patients during resuscitation of 72.7% performed by emergency system (EMS) personnel. Bernhard et al. 2019 entitled a comparable FPS in the resuscitation room performed by physicians in German emergency departments. The aim of this study was to evaluate the first pass intubation success of prehospital endotrachael intubations (ETI) in patients undergoing advanced life support (ALS) in a non-physician based emergency system (EMS). The secondary aim is to determine the additional value of videolaryngoscopy (VL) in this setting using a questionnaire.
Materials and Methods: Data from all resuscitations performed by a non-physician ambulance professional between December 2017 until March 2018

in the region North Limburg were collected. Data consisted of patient file report and a questionnaire. Patients younger than 18 years were excluded. Due to the Netherlands ambulance guidelines, an attempt to intubate during resucitation is indicated if EMV score is 3. The number of intubation attempts per patient were reported. The Cormack-Lehane score (C+L) was used for evalutation of the laryngoscopy. The involved non-physicians ambulance professionals were asked to complete the questionnaire regarding the additional value of VL.
Results and Discussion: Inclusion criteria were met by 120 patients, 89 patients had an indication for endotracheal intubation. FPS succeeded in 70 cases (78,6%) whereas 19 cases (21,3%) demanded a second attempt and in one case a third attempt. The average number of endotracheal intubation attempts was 1,22 per patient. Airway conditions were graded by the Cormack and Lehane scale: in 35 cases the score was grade I (39.3%), in 31 cases grade II (34.8%), in 13 cases grade III (14.6%), in 9 cases grade IV (10.1%) and in one unknown. All non-physician ambulance professionals completed the questionnaire, additional value of VL was seen by 64 (55,6%) whereas 51 (44,6%) did not.
Conclusion: The first pass success of endotracheal intubation in the prehospital setting performed by non-physician ambulance professionals is 78.6% and comparable to the FPS if intubation performed by EMS personal described in recent literature.

5072

ECMO Mobile and Organ Donation in Donor Cardiac Death

Badenes R.[1], Serrano A.[1], Monleon B.[1], Ferrer C.[2], García-Pérez M. L.[1], Romero N.[1]
[1]Hospital Clinic Universitari de Valencia - Valencia (Spain),
[2]Consorci Hospital General Universitari - Valencia (Spain)

Background and Goal of Study: Scarcity of potential dead brain donors and the persistent mismatch between supply and demand of organs for transplantation has led the transplant community to reconsider donation after circulatory death (DCD) as a strategy to increase the donor pool. Normothermic regional perfusion (nRP) by extracorporeal membrane oxygenation (ECMO) may be the most effective method for preserving abdominal organs in DCD, especially in liver transplantation. A pitfall of this method is its complexity and the unavailability of this resource in some hospitals, especially in regional hospitals, where potential DCD donors may exist. Aim of this study is to report the use of Mobile ECMO team in controlled DCD.
Materials and Methods: From June 2018 to October 2019 our group has worked as a mobile ECMO team for cDCD outside our center. Portable equipment included cannulation material and the ECMO device. The transplant team consisted of 1 transplant coordinator (anesthesiologist-intensivist, ECMO operator and organ extraction supervisor), 1 cardiac surgeon (cannulation), 1 interventional radiologist (cannulation) and one cardiovascular perfusionist (ECMO operator).
Results and Discussion: Twenty-four cDCD donations were performed. Characteristics of donors and organs retrieved are summarized in Figure 1. From 24 cDCD, 16 livers, 4 lungs, 43 kidneys were obtained. The evolution of grafts and receptors was favorable at day 30 post-transplant.
Conclusion: Mobile ECMO teams may enable cDCD in hospitals without these resources, thereby increasing the pool of donors and optimizing graft outcomes.
References:
1. Oniscu GC, Randle LV, Muiesan P, et al. In situ normothermic regional perfusion for controlled donation after circulatory death – the United Kingdom experience. Am J Transplant. 2014;14:2846 2854.
2. Eren EA, Latchana N, Beal E, et al. Donations after circulatory death in liver transplant. Exp Clin Transplant. 2016;5:463 470.
Acknowledgements: Organ donors and their relatives.

5556

Damage Control Surgery in a Regional Trauma Centre – Defining the Population: A Pilot Study

Lee A.[1], Burton M.[1], Mcaleer S.[1], Moor P.[1]
[1]Derriford Hospital - Plymouth (United Kingdom)

Background and Goal of Study: Trauma has a major disease burden, causing death and morbidity through physiologial disruption.1 Damage Control Surgery (DCS) minimises physiological disruption.2 At present, the demographics of patients who undergo DCS within our institution are unknown. This study aims to characterise our DCS cohort and potential for prospective study.
Materials and Methods: Our hospital has developed a DCS protocol3 and ORSOS data capture paperwork. This ensures the appropriate patients are safely transferred to an adequately prepared operating theatre in a timely manner. All available DCS protocol and corresponding ORSOS data were captured from Nov 2017 - Sep 2019. Data was reviewed and patient demographics analysed.
Results and Discussion: The DCS protocol was put on standby 42 times and activated in 21 cases. Patient data was held for 38 cases, 30 male and 8 female, median age 37 years (IQR 22-64). Data deficits were identified for future process refinement. Median Injury Severity Score was 29 (IQR 0-36) with patients sustaining injuries from RTC (37%), falls (26%), unknown mechanism (21%), and other (11%). DCS patients remained as inpatients for a median of 12 days (IQR 7-26.5), with a 29% 30-day mortality. Together this shows that despite prompt surgical intervention, DCS in a young patient cohort carries a significant mortality.
Conclusion: We have established the demographics of those who trigger DCS protocol use in a regional trauma centre. The resultant database will enable prospective data collection for future DCS patients. Data deficiencies were identified and future mitigation strategies implemented. Such data will afford our region a greater understanding of the DCS population.
References:
1. Polinder S, Haagsma JA, Toet H, van Beeck EF. Epidemiological burden of minor, major and fatal trauma in a national injury pyramid. British journal of surgery. 2012 Jan;99(S1):114-20.
2. Rotondo MF, Schwab CW, McGonigal MD, Fruchterman TM, Kauder DR, Latenser BA, Angood PA. 'Damage control': an approach for improved survival in exsanguinating penetrating abdominal injury. The Journal of trauma. 1993 Sep;35(3):375-82[PM1] .
3. Moor P, Droog S, Adams S. Damage Control Surgery (Online). Peninsula Trauma Network. University Hospital Plymouth. 2016 Feb [2019 December]. Available from: https://www.plymouthhospitals.nhs.uk/download.cfm?doc=docm93jijm4n3410.pdf&ver=4326.

5629

Successful VA-ECMO resuscitation after 191 minutes of cardiac arrest due to severe accidental hypothermia

Roges Robledo X.[1], Blasco R.[1], Ribas M.[1], Sanchez M. E.[1], Munar F.[1], Manrique S.[1], Anaesthesia, Resuscitation and Pain Management Department. Hospital Universitari Vall d'Hebron. Barcelona (Spain)
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Background: In Spain, there are up to 23.7 deaths per year due to accidental hypothermia.1 Patients under cardiac arrest induced by severe hypothermia improve their survival if extracorporeal life support (ELS) is performed 2,3.
Case Report: A 34-years old female admitted under cardiac arrest due to a severe accidental hypothermia for VA-ECMO placement. Initially, the rescue team transferred the patient to a primary hospital where they secured the airway, they started CPR 38 minutes after witness cardiac arrest and they measured 18ºC of tympanic temperature. The patient was transferred to our hospital by helicopter. The first arterial gases showed pH 7.47, K 4.61 mg/dL, glucose 246 mg/dL, lactate 1.5 mmol/L. A peripheral femoro-femoral VA-ECMO was placed at the operating room after 153 minutes of CPR (a total transfer time of 273 minutes since the emergency call). The central temperature was 19.7ºC with maintained ventricular fibrillation. ECMO management during initial phase was based in slow rewarming and progressive correction of hemodynamic and metabolic parameters. Defibrillation was performed at core temperature of 30ºC, recovering sinus rhythm. The ECMO could be withdrawn after 44 hours with a previous EEG without any signs of neurological damage.
Discussion: Deciding which are the most suitable candidates for ELS is challenging. ECMO has been an update in the management of accidental hypothermia, allowing both progressive rewarming and hemodynamic support. Resuscitation objectives have to be based on the hypothermia pathophysiology and prognostic factors (metabolic biomarkers and withdraw cardiac arrest). Patients with neither trauma nor primary hypoxia have successful outcomes if ELS is performed even though CPR starting is delayed.2,3
References:
1. Soteras I, et al. Accidental hypothermia. Med Clin (Barc). 2011 Jul 9;137(4):171-7.
2. Debaty G, et al. Outcome after severe accidental hypothermia in the French Alps: A 10-year review. Resuscitation. 2015 Aug;93:118-23.
3. Svendsen ØS, et al. Outcome After Rewarming From Accidental Hypothermia by Use of Extracorporeal Circulation.Ann Thorac Surg. 2017 Mar;103(3):920-925.
Learning points: The long-time of CPR or transfer to a reference hospital cannot be the decision making points for not starting the ELS in patients without primary hypoxia neither trauma associated. ECMO management must be based in hypothermia pathophysiology.

5913

Concomitant traumatic atlantooccipital dissociation and atlantoaxial rotatory subluxation. A case report

de la Rosa Estadella M.[1], Masó Serra A.[2], Artigas Soler A.[2], Vallejo Tarrat A. I.[2], Gasulla Rodríguez A.[2], Serrano Martín M.[2]
[1]Consorci Corporació Sanitària Parc Taulí - Sabadell (Spain),
[2]Consorci Corporació Sanitària Parc Taulí - Sabadell (Spain)

Background: Craniocervical junction (CCJ) injuries were once believed to uniformly lead to death at the scene where the injury occurred due to its highly unstable nature and proximity to critical neurologic and vascular structures. Nevertheless, these lesions are increasingly found in the emergency department as a consequence of a better prehospital care and cervical immobilization(1).
Case Report: 45-year-old female, victim of a car accident (lateral impact). She is initially found by emergency services with GCS 9 but recovers fully awareness in a few minutes. Once at the emergency department she explains dyspnea, dysphagia, diplopia and hypoacusia. Neurological examination identifies a bilateral sixth nerve palsy and a right peripheral facial nerve palsy. The cranial and neck CT scan showed an atlantooccipital dissociation (AOD), a retropharyngeal hematoma with mass effect and a right vertebral artery dissection. Given the potential airway compromise added to the impossibility of neck hyperextension we performed an awake fibroscopy-guided intubation. The posterior cervical MRI showed the AOD as well as an unstable atlantoaxoidal rotatory subluxation (AAS), so she underwent an occipital-C2 arthrodesis and a tracheostomy. Sixteen days later a neck CT scan informed of the resolution of the hematoma so the patient was successfully decannulated. A month later no improvement is still seen in the neurological exploration.
Discussion: This is a case of a patient with an AOD and an AAS. Both are relatively rare injuries but the association of both in the same patient is extremely unusual. The early diagnosis and stabilization surgery were crucial for the survival of the patient, as well as the rapid airway protection. Furthermore, the initial neurological exploration could not be explained neither with the findings on the CT nor the MRI so it led us to believe that the injury of several cranial nerves was due to a nerve traction because of the trauma(2).
References:
1. Filiberto DM, Sharpe JP, Croce MA, Fabian TC. Traumatic atlanto-occipital dissociation: No longer a death sentence. Surg (United States). 2018 Sep 1;164(3):500–3.
2. Jacobs SM, Van Stavern GP. Neuro-ophthalmic deficits after head trauma. Curr Neurol Neurosci Rep. 2013 Nov;13(11).
Learning points: The management of the craniocervical junction injuries that arrive to the hospital, the role of the prehospital emergency services and the importance of an early diagnosis and surgical stabilization.

6194

Trauma in “the very old age”: experience at a spanish level I trauma center

Terradillos E.[1], Duque P.[2], Varela A.[2], Rey C.[2], Perez D.[2], Turegano F.[2]
[1]HGU Gregorio Marañon - Madrid (Spain),
[2]HGUGregorio Marañon - Madrid (Spain)

Introduction: The number of elderly people will increase during the next few decades. More importantly, the number of people aged 80 or above are projected to increase 100% in developed countries. In Spain, people over age 80 were 4.68% of the population in 2009, and this will increase to 6.19% in 2019. That has implications in the health services and in the management of trauma patients.
Material and methods: We did a retrospective cohort analysis of trauma patients ≥ 80 y.o. admitted to our Level I Trauma Center during the time-period of 2009-2019. Demographic data, ICU care, and mortality were assessed.
Results: 109 trauma patients ≥ 80 y.o. were admitted during that period. This is a 200% increase compared with the number of patients admitted during the previous decade (1999-2009). Mean age was 84.8±2.4 years, and median New Injury Severity Score (NISS) was 17 (interquartile range 13 to 27). 46% were male. The mechanism of injury was 50% falls, and 47% pedestrian runovers. 48 patients were admitted to ICU, with median NISS of 25 and mortality rate of 38%. Among severely injured trauma patients (NISS ≥35) the hospital mortality rate of those ≥80 years was 90%, much higher than in the age group of 65-79 years (40%), with a significant difference ($p < 0.05$). No differences mortality rates between 65-79 years and youngers with the same NISS.
Conclusion: The geriatric trauma patient population is on the rise worldwide. This should be taken into account in our trauma centres in order to be able to adapt and try to improve trauma care in these patients.
References:
1. Bonne S1, Schuerer DJ. Trauma in the older adult: epidemiology and evolving geriatric trauma principles. Clin Geriatr Med. 2013 Feb;29(1):137-50.

4752

Started basic life activity in the rural Dutch province of North-Limburg. Results of the prelimanary Prehospital Resuscitation Analysis Limburg (PRAL)

Thomas O.[1], Loupatty A.[1], Peters N.[1], Al Hamzeh Y.[1]
[1]Viecuri Medisch Centrum Voor Noord-Limbu - Venlo (Netherlands)

Background and Goal of Study: Aim of this study is to achieve information about the prehospital started basic life activity (BLS) and connection with an AED before Emergency Medical Service (EMS) arrival (EMSA).
Materials and Methods: Data from december 2017 until march 2018 are analysed by standard registration consisting of patient file report and a questionnaire. Patients younger than 18 years were excluded.
Results and Discussion: In total 120 emergencies fulfilled the criterias of resuscitation (chest compression and ventilation). The average age was 62,56 years, 19 (15,83) patients were older than 80 years. The cardiac arrest was witnessed in 71 cases (59%). In totally 65 patients (54,17%) died on scene, 55 patients (45,8%) were transferred to the hospital. Documentaded heart rhythm by arrival of the EMS was asystole in 44 (36,3%) cases, Pulseless Electrical Activity(PEA) in 37 (30,6%) cases, Ventricular fibrillation (VF) in 33 (27,3%) cases. Basic life support was started in 83 cases (69,16%) before EMSA. The average time of arrival of the EMW was 8 minutes and 25 seconds. An AED was connected in 59 cases (49,16%) before ambulance arrival. In 20 cases the first shock was given by an AED. This means that in 32% the first AED rhythm was a shockable rhythm. In 39 cases a non shock rhythm was detected as first rhythm. VF was registrated by 14 patients without an AED. In 20 cases the first defibrillation was given by an AED. Compared to the data of the German Resuscitation Registration (1) a difference is seen in the rate of started BLS by EMS arrival (47,4% versus 69%).
Conclusion: The established combination of well trained citizens, professional and voluntary organizations e.g. police agents, firefighters and civil first responders can achieve a high start quote of Basic Life Support in case of Out-of-hospital Cardiac Arrest (OHCA).
References:
1. J. Wnent, J-T. Gräsner, S. Seewald, S. Brenner, T. Jantzen, M. Fischer, B. Jakisch, A. Bohn Jahresbericht Außerklinische Reanimation 2017 des Deutschen Reanimationsregsiters Anästh Intensivmed 2018;59:355-357.

Results	totally	partner	fire department	police	voluntary civil first responder	physicians	others or unknown
started with BLS before EMSA	83 (69,19%)	16	14	16	20	6	33
AED connected befoe EMSA	59 (49,6%)		15	24	13	2	5

4374

Laryngeal mask facilitated bronchoscopic intubation in a case of scleroderma

Tzima M.[1], Zemou S.[1], Grousouzakou E.[1], Bilali P.[1], Katsanoulas K.[1], Katsika E.[1]
[1]*Hippokrateion General Hospital Thessalon - Thessaloniki (Greece)*

Background: Scleroderma is a connective tissue disorder. Its name depicts the primary sign, which is hard (sclero-) skin (dermis- in Greek). Characterized by an excessive production of collagen, results in tissue fibrosis and thickening. There are two main types of scleroderma, localized and systemic. In the latter, heart, digestive track, lung and renal involvement may present. Head and neck region is involved in approximately 70% of cases. Characteristic orofacial features comprise a mask- or mouse-like face due to the pinched nose, atrophy of the nasal alae, thin and rigid lips and loss of normal for age facial wrinkles or sagging. Other features are inability for wide mouth opening, reduced inter incisor gap, tongue rigidity and xerostomia. All the above represent an anaesthetic challenge, when intubation is considered.
Case Report: A 60y old woman, with a 6-years history of scleroderma, controlled arterial hypertension and dyslipidaemia, presented for scheduled laparoscopic cholecystectomy. As expected, the patient had a difficult airway (Mallampati III) with an El Ganzouri score of 3, due to limited mouth opening and neck movement, and a thyromental distance below 4cm. Anaesthesia was induced with propofol, fentanyl and rocuronium. Laryngeal mask (#4 i-gel®, Intersurgical, UK) was successfully inserted and a 7cm I.D. endotracheal tube was passed through the mask, guided and confirmed over a single use flexible videoscope (AMBU® a Scope,Denmark). Nasogastric tube was also inserted through the i-gel mask, since the operation was laparoscopic. Maintenance was done with sevoflurane 2% and remifentanil 0.12 mcg kg-1 min-1 supplemented by paracetamol, ondasetron, parecoxib and morphine. Patient's recovery was excellent and she was extubated with no airway trauma or complaint.
Discussion: Scleroderma is a challenge for intubation. Successful attempts have been made with the use of optical stylets. Fibreoptic-guided tracheal intubation using a supraglottic airway device as a conduit has been also used, with no difference between LMA Protector and i-gel devices.
References:
1. Mendonca C, Tourville CC, et al. Fibreoptic-guided tracheal intubation through i-gel® and LMA® ProtectorTM supraglottic airway devices - a randomised comparison. Anaesthesia 2019;74(2):203-10.
Learning points: New generation supraglottic and bronchoscopic devises provide an excellent alternative for difficult airway problems as scleroderma.

4528

Blind intubation through an I-gel® in prone position: a prospective case series

Van Dijck M.[1], Houweling B. M.[2], Koning M. V.[3]
[1]*Leiden University Medical Center - Leiden (Netherlands),* [2]*Haaglanden MC - The Hague (Netherlands),* [3]*Rijnstate Ziekenhuis Arnhem - Arnhem (Netherlands)*

Background and Goal of Study: Accidental extubation in prone position is an emergency in which quick and low-resource demanding airway management is required. Regain of oxygenation is the goal, but intubation may be required for patients with ARDS in prone position to regain oxygenation. Blind intubation through an I-gel may be such a quick and low-resource demanding method. This study aims to determine the success rate of intubation through an I-gel in prone position. A success rate of 70% is hypothesized.
Materials and Methods: Patients scheduled for short lasting lumbar surgery were eligible for inclusion in this prospective study. Exclusion criteria were BMI > 32, edentulous state, mouth opening < 3 cm, professional voice usage or increased aspiration risk. Patients laid on the operation table in prone position and general anesthesia was induced with propofol and remifentanil. An I-gel was inserted and a correct position was confirmed by obtaining etCO2 and low leakage volume. Mivacurium was administered when the correct position was confirmed and up to three intubation attempts with a VivaSight Single Lumen-tube were performed. This device was used to prevent injury and to investigate the cause of failed intubation. The first two attempts were blinded for the anesthesiologist, but an anesthetic nurse followed the on-screen intubation and was able to stop intubation if harm was imminent. The first attempt was with the head in neutral position and the second attempt was with the head rotated to a lateral position. The third attempt was an on-screen intubation for the anesthesiologist and every maneuver to facilitate intubation was allowed. Once a tube was placed endotracheally, no further attempts were performed.
Results and Discussion: The study was terminated early because the success rate of 70% was not achievable. 73 patients were screened for inclusion, 18 patients met exclusion criteria and 14 patients agreed to participation. Ventilation using the I-gel was successful in 13 patients (93%, 95%CI: 79-100%). Intubation was successful in 1 patient in the first attempt (8%, 95%CI: 0-22%), 1 patient in the second attempt (8%, 95%CI: 0-24%) and in 3 patients in the third attempt (27%, 95%CI: 1-53%). The overall success rate was 36% (95%CI: 11-61%).
Conclusion: This study shows that in emergency airway situations in prone position insertion of an I-gel may be considered, but blind intubation with an I-gel as intubation conduit is not recommended.

4808

Usage of Supreme laryngeal mask for optimization the respiratory support in a multidisciplinary hospital

Gavrilov S.[1], Dolbneva E.[2], Stamov V.[3], Pasko V.[1], Ermakova N.[1], Bunyatyan A.[2]
[1]Fsbi Clinical hospital №1 (Volyn) of the office of the President of the Russian Federation - Moscow (Russia), [2]Petrovsky National Research Centre of Surgery - Moscow (Russia), [3]Sechenov First Moscow State University (Sechenov University) - Moscow (Russia)

Background and Goal of Study: There is still a question how to solve the problem in the absence of modern devices for tracheal intubation (TI) with a patient having "difficult airway". We wanted to evaluate the efficiency and safety of Supreme LM (SLM) in case of total myoplegia and mechanical ventilation while performing planned laparoscopic cholecystectomy for patients with predictable and unpredictable difficult TI.
Materials and Methods: 102 patients with signs of predictable difficult TI - 77, with unpredictable - 23. (Cormac 3-4); I – II class ASA; 56.2±12.2 years; 98.5±9.6 kg. Examination was performed using the Mallampati and Wilson scales, the Patila test, and the determination of the atlanto-occipital angle. In the presence >4 predictors of difficult TI, patients underwent direct laryngoscopy. Induction: diprivan 182.0±11.5 mg, fentanyl 0.14±0.05 mg, rocuronium 65.4±11.3 mg. Maintenance: Sevoran 1 MAC with a fresh gas flow of 1.5-2 l/min. SLM application time, ventilation quality, leakage in the neck and stomach, hemodynamics were evaluated. To determine the leak, the drainage canal was "sealed" and, after application of carboperitoneum (CP), a gastric tube was installed. CP exposure time> 30 min. in the Fowler position. At the end of the surgery, all patients were injected with Sugammadex 2 mg/kg at TOF 1-2.
Results and Discussion: 79 patients (77.5%) had 4-5 signs of predicted difficult TI, 23 patients (22.5%) had 2–3 signs. In 100% of cases, SLM was established on one try after 4.3 ± 0.4 min. Ventilation through SLM was adequate without audible and visible leakage. Respiratory Mechanics: Pin 15-18 cmH2O, VT med. = 515.5 ± 65.0 ml, SpO2 = 98-100%, EtCO2 = 34.5 ±1.6 mmHg After applying the CP there was no leakage. The duration of the surgery is 38.1 ±12.5 min, general anesthesia is 58.3±13.6 min. At the end of the surgery, SLM was removed at TOF ≥90%. The time from the end of the surgery until the removal of the SLM was 160.5 ±32.5 sec. 25% of patients indicated slight sore throat, which passed in 5-10 min. after removing the SLM. There was no regurgitation and aspiration, as well as respiratory complications.
Conclusion: SLM has established itself as a highly efficient, simple and atraumatic device. The usage of SLM in the combination of rocuronium + Sugammadex for "difficult airway" allows you to quickly start surgery, avoid residual curation and increase the turnover of the operating table.

4782

The comparison of 2-nd generation laryngeal tube vs laryngeal mask in paralysed patients undergoing laparoscopic hysterectomy with controlled ventilation

Andreenko A.[1], Arsentiev L.[1]
[1]*S.M.Kirov Military Medical Academy - Saint Petersburg (Russia)*

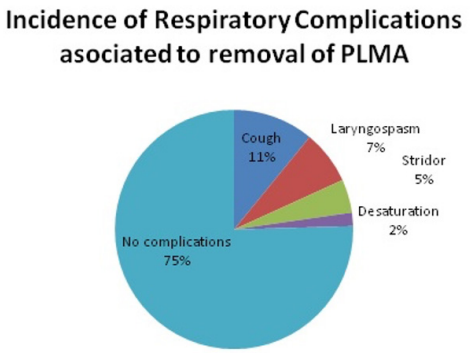
Background and Goal of Study: Till date, the endotracheal tube was considered as the gold standard for laparoscopic procedures under general anaesthesia. The disadvantages of tracheal intubation are haemodynamic responses, trauma of oropharyngeal structures, failed intubation and hypoxia. This requires a better and safe alternative. Goal of study - to compare the laryngeal tube (LTS-D) and Supreme laryngeal mask airway (SLMA) in patients undergoing laparoscopic hysterectomy under general anaesthesia.
Materials and Methods: prospective single-center randomised study was conducted on 100 ASA II female patients, 50 each in two groups, who were posted for laparoscopic hysterectomy. Patients with anticipated difficult airway, morbid obesity, oropharyngeal pathology or at increased risk of aspiration were excluded. After preoxygenation and induction of anaesthesia LTS-D (group 1) or SLMA (group 2) were inserted and cuff inflated. The outcomes measured were as follows: successful placement of the devices from 1-st attempt; time required for insertion; oxygen saturation (SpO2) and end-tidal carbon dioxide (EtCO2); oropharyngeal seal pressure (the PAP was not allowed to exceed 40 cm H2O); the PAP at the intra-abdominal pressure (IAP) 14 mm Hg; incidences of gastric distension (by surgeon), intraoperative and postoperative complications.
Results and Discussion: There were no significant differences between groups by success rate for the first attempt 96% in group 1, 92% in group 2 (p=0,86), 100% successful insertion was in both groups from two attempts. Mean time for insertion was 16,7 s (12-20,3 s) and 19 s (15,4-22,6 s) for group 1 and group 2, respectively (p=0,079). There were no statistically significant differences in SpO2 or EtCO2 between the two groups before or during peritoneal insufflation. Maximal PAP at IAP 14 mm Hg during 5 min was 19 (18-20) cm H2O and 18 (16,5-20) cm H2O for 1 and 2 groups, respectively, (p=0,68). Oropharyngeal seal pressure was higher (p=0,011) for LTS-D group (33 cm H 2O; 27-38) than in SLMA group (26 cm H 2O; 23,5-29). There was no case of regurgitation, or aspiration recorded. No significant difference in laryngopharyngeal morbidity was noted.
Conclusion: A properly positioned LTS-D and SLMA provided high degree protection of airways against aspiration and equally effective ventilation during laparoscopic hysterectomy.

4580

Respiratory complications in pediatric anesthesia asociated with the removal of ProSeal™- Laryngeal Mask Airway (PLMA) during inmediate postoperaotrory period

Mirón Alonso P.[1], Park S. H.[1], San Luis Calo E.[1], Alvarez Escudero J.[1]
[1]*University Hospital of Santiago de Compostela - Santiago de Compostela (Spain)*

Background and Goal of Study: Respiratory complications are the most common and feared problem in pediatric anesthesia. The type of device used to secure the airway is identified as one of the risk factors. This study was conducted to determine possible respiratory complications that can occur in immediate postoperative period after removal of PLMA in the pediatric population.
Materials and Methods: A group of a hundred and ten patients with ages between 0 to 15 years, for various procedures requiring general anesthesia with minimum duration of 2 hours, were included in a prospective observational study during 2015 to 2017. They were induced with sevoflurane and the ProSeal™- LMA, was put following the instructions of the fabricant, according to patient's weight. The anesthesia technique and controlled ventilation were standardized. The muscle relaxant was used only for respiratory complications or inadequate mechanical ventilation. The PLMA was removed as soon as patients regain spontaneous breathing with expired sevoflurane less than 0.3. Any occurrence after the PLMA removal was recorded (laryngospasm, bronchospasm, cough, desaturation <95%, stridor, bleeding, sore throat) then the data was analyzed using Statistical Package for the Social Sciences (SPSS).
Results and Discussion: The laryngospasm was seen in 8 cases out of 110 (7.27%); in 6 cases patient recovered with positive pressure ventilation. The other 2 patient required deepening of sedation with propofol and administration of succinylcholine. In this group, 5 patients were younger than 3 years old and had a history of respiratory infection within 10 days. The cough was most common complication. No bronchospasm, sore throat nor bleeding was present in our patients, which are possible complications of tracheal intubation.



Conclusion: The PLMA is safe dispositive to manage airway in pediatric population of any range of age for many procedures that require general anesthesia with low incidence of respiratory complications in the emergence related to its removal. It is an excellent alternative to tracheal intubation minimizing use of muscle relaxant and patient's discomfort.

4869

A randomized controlled trial comparison of LMA Gastro, classic LMA and endoscopy mask for anesthesia during adult gastroscopy

Menegatti F.[1], Lievens M.[1], Devolder L.[1], Haegeman O.[1], Coppens M.[1], De Baerdemaeker L.[1]
[1]*Ghent University Hospital - Ghent (Belgium)*

Background and Aim: The use of endoscopy masks during monitored anesthesia care for routine gastroscopy is very prevalent due to the ability to combine spontaneous breathing with moderate to deep sedation. Endoscopy masks are associated with disadvantages for both patient and anesthesiologist. There is growing anesthetic interest in the use of the classic laryngeal mask and the recently developed dual channel LMA®GastroTM during gastroscopy under anesthesia. The latter device is equipped with a second channel for gastroscope insertion, while maintaining an unobstructed airway. This single blinded randomized controlled trial aims to investigate whether LMA®GastroTM is equally efficient in maintaining safe oxygenation compared to the endoscopic mask and the classic laryngeal mask during anesthesia for elective gastroscopy in adults.
Method: After Ethical Committee approval and obtaining informed consent, 65 patients scheduled for elective gastroscopy were included between July and September 2018. Patients were randomly assigned to endoscopy mask (N=22), classic laryngeal mask (N=20) or LMA®GastroTM(N=23). Sedation was with BIS adjusted IV propofol (BIS 45-55). SpO2 and FiO2 were automatically registered every 30 seconds. The area under the curve was calculated for both SpO2 and FiO2. ANCOVA was performed to detect group-related differences in saturation while controlling for relevant variables that could influence patients' saturation: BMI, smoking behaviour and FiO2.
Results and Discussion:

Table 1. Descriptive statistics of the sample

	Endoscopy mask (N = 22)	Classic laryngeal mask (N = 20)	LMA®Gastro™ (N = 23)
Gender (N_{male}, $\%_{male}$)	9 (40.9)	10 (47.6)	12 (52.2)
Age (Mean, SD)	49.3 (14.9)	58.5 (16.5)	54.7 (11.4)
BMI (Mean, SD)	25.7 (6.8)	26.3 (7.5)	26.7 (7.6)
Smoker (N_{yes}, $\%_{yes}$)	11 (50.0)	11 (55.0)	15 (65.2)
Duration gastroscopy (Mean, SD)	10.4 (4.2)	12.3 (4.1)	12.5 (5.3)

Table 1 provides the patient's characteristics.
After checking for assumptions, ANCOVA was conducted. Results indicate no significant differences in patients' SpO2 between the three groups after controlling for BMI, smoking and FiO2($F(2,51)=0.16$, $p=.85$). Both BMI ($F(1,51)=8.20$, $p=.006$) and FiO2 ($F(1,51)=14.78$, $p<.001$) were significantly related to patients' SpO2, smoking behaviour was not ($F(1,51)=3.20$, $p=.08$).
Conclusion: No overall difference in patients' saturation could be found between the endoscopy mask, the classic laryngeal mask and the LMA®GastroTM even after taking into account other parameters such as the percentage of inspired oxygen, BMI and smoking behaviour.

5396

Comparison of the air-Q® sp versus the LMA® Supreme™ in adults undergoing gynecological laparoscopic surgery: A single-blind, Randomized Controlled Trial

Song S.[1], Sim S.[1], Noh C.[1], Lee S. Y.[1], Ko Y. K.[1], Kim Y. H.[1]
[1]Department of Anesthesiology and Pain Medicine, Chungnam National University Hospital - Daejeon (South Korea)

Background and Goal of Study: The supraglottic airway device (SAD) is a good alternative to endotracheal intubation in general anesthesia. The LMA® Supreme™ has been shown in previous studies to be clinically useful in laparoscopic surgery under general anesthesia, but little research has been performed on the usefulness of the self-pressurized air-Q® sp. The purpose of this study was to compare the clinical suitability of the air-Q® sp and the LMA® Supreme™ in gynecological laparoscopic surgery.
Materials and Methods: Fifty-two patients (American Society of Anesthesiologists class I-II) scheduled for gynecological laparoscopic surgery were randomly assigned to one of two groups: the air-Q® sp group or the LMA® Supreme™ group. We evaluated perioperative ventilator parameter including the airway leakage pressure, peak inspiratory pressure, leakage rate. Also insertion difficulty and changes in vital signs over time evaluated.
Results and Discussion: The air-Q® sp has lower airway leakage pressure than the LMA® Supreme™. However, there were no significant differences in peak inspiratory pressure and leakage rate between the two groups. The airway leak pressure was higher than the peak inspiratory pressure at all times in both groups.
Conclusion(s): The results produced by air-Q® sp were comparable to those of LMA® Supreme™. Therefore, the use of air-Q® sp is considered clinically useful and safe.

Sex (M : F)	28 : 4
Age (years)	46.1 ± 11.8
Height (cm)	171.0 ± 6.6
Weight (kg)	69.9 ± 15.2
Disease duration (Month)	13.9 ± 17.2
Site (UE : LE)	8 : 24
Diagnosis (CRPS 1 : CRPS 2 : non CRPS)	13 : 9 : 10

	Positive
t	26 (81.2%)
s	19 (59.4%)
w	18 (56.2%)
ts	18 (56.2%)
tw	17 (53.1%)
tsw	14 (47.5%)

5658

Two right crico-arytenoid subluxations after I-gel laryngeal mask insertions

Lin B. C.[1], Liao K. H.[2], Fan Y.[3], Zhang J.[4], Chang E.[5]
[1]Henan Province People's Hospital - Zhengzhou (China), [2]China Medical University Hospital - Taichung (Taiwan), [3]Jintan Hospital, Jiangsu University - Changzhou (China), [4]Henan Provincial People's Hospital, Zhengzhou University People's Hospital - Henan (China), [5]Henan Provincial People's Hospital, Zhengzhou University People's Hospital - Henan (China)

Background: Persistent crico-arytenoid subluxations are a rare complication of laryngeal mask insertion. On literature search only one case of left crico-arytenoid subluxation and three cases of right crico-arytenoid subluxation were retrieved with no information of what type of laryngeal mask was used.
Case report: There are two cases of right cricoarytenoid subluxations within one year-period after the I-gel laryngeal mask insertion in a regional hospital. These 2 cases were a 50 years old male and a 69 years old female underwent operations under general anesthesia with I-gel laryngeal mask. Hoarseness of voice was noticed at post-operative care and video-laryngoscopic examination revealed erythematous edematous right vocal cord with limitation of movement of the cord and its joint in both cases.
Results and Discussion: Patient 1 received the right humerus head fracture fixation with arthroscopy under general anesthesia. The patient progressively recovered after 3 months, but still had residual hoarseness of voice and cough on drinking. After half a year, the patient's hoarseness improved and recovered completely after a year. Patient 2 received the breast tumor removing surgery under general anesthesia with i-gel laryngeal mask. The patient recovered after one week but retained hoarseness of voice. This patient recovered fully after a month. By observation of the video image of these two patients, both of the vocal apertures are inclining to the left side with the esophageal aperture situated posto-laterally at the left side of the midline. In a study that was still collecting cases of CT image of the laryngeal mask we found that most of the patients had the esophagus aperture at the left side of the midline with the vocal cord inclining to one side with the right vocal cord situated slightly posterior to the left vocal cord anterior to the cervical vertebral body. This means that if a laryngeal mask is put into the pharynx and if it is forced to fix at the midline anterior to the cervical vertebral body, it will eventually push the posteriorly placed right vocal cord and its cricoarytenoid joint anteriorly. It will potentially cause subluxation of the joint but may not essentially cause a persistent subluxation. Some cases may turn to persistent subluxation if the effect lasts longer in prolonged operation time.
Learning points: These two cases and the three cases in the literature give some clue to the right-sided selection of this rare complication.

4734

Application analysis of the spatula-assisted technique in placing a flexible laryngeal mask airway

Xiong T.[1], Wang L.[1], Jin L.[2], Yao Y.[1], Zhou J.[1]
[1]Shanghai Fifth People's Hospital, Fudan University - Shanghai (China), [2]Shanghai Fifth People's Hospital, Fudan University - Shanghai (China)

Background and Goal of Study: This study aimed to explore the feasibility of placing a flexible laryngeal mask airway(fLMA) with the spatula-assisted technique. Materials and Methods: A total of 64 patients scheduled for elective surgery under general anesthesia with fLMA, aged 18-80 years old, ASA I-III. The patients were randomly divided into standard finger-guided group and spatula-assisted group using random envelope method, with 32 cases in each group. The insertion time of fLMA, oropharyngeal leak pressure were measured, the fiberoptic view score, first insertion success rate and sore throat were recorded in two groups.
Results and Discussion: Sixty-two patients were available for final statistical analysis, with 31 cases in each group. Fiberoptic view score and oropharygeal leakage pressure were significantly higher in the spatula-assisted group than those in the standard finger-guided ($Z=-4.241$, $P<0.001$; $t=-4.474$, $P<0.001$). There was no significant difference in the first insertion success rate between two groups. The insertion time was significantly longer in the spatula-assisted group than that in the standard finger-guided ($t=-15.171$, $P<0.001$). There was no sore throat within 24 hours in both groups.
Conclusion: The spatula-assisted technique can significantly improve the efficiency of fLMA, and it can be promoted in clinical anesthesia.

5778

Comparison of ultrasound and fibre optic bronchoscope guided percutaneous tracheostomy

Chakma A.[1], Nadeem A.[1], Ahmed S. M.[1], Hasan M.[1], Kalsang T.[1], Naseem S.[1]
[1]Aligarh Muslim University - Aligarh (India)

Background and Goal of Study: Percutaneous tracheostomy is among the most commonly performed procedures in critically ill patients in intesnive care units. It has many potential advantages over endotracheal intubation such as reduced laryngeal ulceration and respiratory resistance,early weaning and easier nursing care,ability to perform bedside.Despite numerous advantages,this may also cause serious complications due to its invasive nature. It can be performed under ultrasound or fibreoptic bronchoscope guidance to minimize complications.Recent data suggest that ultrasound can be alternatively used in percutaneous tracheostomy, hence our aim is to compare posterior tracheal wall hit,total time taken for each procedure,cannulation site in relation to carina,number of needle puncture attempt. Materials and Methods: This prospective randomised study was conducted in critical care unit of Department of Anaesthesia,JNMCH,AMU in total 50 patients, 25 in each group after ethical clearence(CTRI number CTRI/2019/11/021969). They were randomised by chit in the box method into USG group who recieved Ultrasound guidance and FOB group who receieved Fibreoptic guidance and underwent percutaneous tracheostomy using Griggs technique. In USG group, we included a third physician who is not part of the study and he used fibreoptic to observe complications and noted them only and the performing physician was blinded from this. SPSS software of latest version was used for statistics. Mean,percentages,independant students t test were used for comparison in between groups.
Results and Discussion: The mean number of posterior tracheal wall hit either introducing needle or griggs forcep tip was significantly higher in USG group than FOB group(1.47±1.06 vs 0,p<0.05).Posterior tracheal wall hit in USG group was observed once in 7,twice in 9,thrice in 4 and none in 5 cases.Cannulation site in relation to carina was more towards laterally in USG group than FOB group(19,76% vs 4,16%,p<0.05). Total duration was higher in FOB group than USG group(<0.05) and number of needle puncture attempt was more in USG group(2.13±0.74 vs 1.06±0.62, p<0.05).
Conclusion: USG group may have adantage of lesser time duration and better neck anatomy examination but more posterior tracheal wall hit,cannulations away from centre and needle puncture attempts resulted in support of use of bronchocope to enhance the reliabilty of the percutaneous tracheostomy.

5737

Physiology in Anaesthesia Regarding Apnoeic Oxygenation during nasal cannula therapy at different flow rates (PHARAO)

Kaluza P.[1], Kaiser H.[1], Riva T.[1], Riedel T.[2], Greif R.[1], Theiler L.[1], Airway Management
[1]Inselspital, Bern University Hospital - Bern (Switzerland), [2]Kantonspital Graubunden - Chur (Switzerland)

Background and Goal of Study: Oxygenation via high-flow nasal cannula (HFNC) postulates a ventilatory effect and thus increased elimination of CO2. Recently, we demonstrated the absence of significant differences between high- and low-flow oxygen in children regarding the rates of CO2-increase per minute and apnoea time [1]. This study investigates apnoeic oxygenation and the effect of different O2 flow rates on the rate of increase of CO2 in adult patients undergoing general anaesthesia.
Materials and Methods: With ethics committee approval and written informed consent, this single-centre, single-blinded, randomised controlled trial compares five groups: 1) Minimal-flow group: 0.25 l/min via a tracheal tube; 2) Low-flow group: 2 l/min using jaw thrust; 3) Medium-flow group: 10 l/min using jaw thrust; 4) High-flow group: 70 l/min using jaw thrust; 5) Control group: high-flow 70 l/min using continuous laryngoscopy. After induction of standardised anaesthesia including preoxygenation and neuromuscular blockade the groups were allocated to the randomised intervention. Every two minutes, arterial blood gases were analysed. The study intervention ended with either SpO2 <92 %, PtCO2 >100 mmHg, or if 15 min of apnoea time were reached.
Results and Discussion: To date, 98 patients have been included (minimal-flow 10 patients; low-flow 20; medium-flow 21; high-flow 22; control 23). The patients were (median [IQR]) 49 [30-62] years old, weighed 71 [64-85] kg, and 45 were female. In the control group, the model revealed an arterial CO2 increase of 2.0 [1.9-2.3] mmHg*min-1. None of the four intervention groups showed significantly different rates of increase: minimal-flow 2.0 [1.9-2.4] mmHg*min-1, low-flow 2.1 [1.9-2.3] mmHg*min-1, medium-flow 1.9 [1.7-2.4] mmHg*min-1, and high-flow 2.0 [1.8-2.3] mmHg*min-1.
Conclusion: Our preliminary results show no significant difference between the 5 groups regarding arterial CO2 increase. This challenges the "ventilatory effect", the idea that the clearance of CO2 is linearly dependent on oxygen flow rates during HFNC.
References:
1. Riva, T., et al., Transnasal humidified rapid insufflation ventilatory exchange for oxygenation of children during apnoea: a prospective randomised controlled trial. Br J Anaesth, 2018. 120(3): p. 592-599.

5687

Apnoeic Oxygenation in Intubation: Prolonging the Time of Safe Apnoea. A Systematic Review and Meta-Analysis

Marin Prado A.[1], Torres A. D.[1], Giraldo A.[1]
[1]Universidad del Valle - Cali (Colombia)

Background and Goal of Study: The management of the airway is a fundamental part of the anesthetic act, multiple strategies have been proposed enhance safety during laryngoscopy to achieve a definitive approach of the airway, i.e., tracheal intubation. Ouir aim is to evaluate the effect of apnoeic oxygenation in the safe apnea time in patients older than 18 years scheduled for elective surgery with general anesthesia.
Materials and Methods: We reviewed in the MEDLINE/PubMed, EMBASE, Cochrane Library, Scopus, and Google Scholar databases, Mesh terms “apnoeic oxygenation”, “nasal cannula", "randomized controlled trial” with unlimited start date to April 2019 , unlimited start date to April 2019 , there wasn´t restriction on language for randomized-controlled trials (RCTs). Eligibility criteria: RCTs of adult patients (age older , 18 yr.) who received general anesthesia for elective surgery, who required Orotracheal Intubation, that compared apnoeic oxygenation with nasal cannula or nasopharyngeal catheter against Traditional preoxygenation strategy. Which reported results in severe desaturation> 80% SpO2, Safe apnoea time SpO2> 92% and complications of any etiology. All statistics were performed using Review Manager 5.3 (Cochrane Collaboration, Oxford, UK).
Results and Discussion: Our primary Outcome was Safe apnoea time is the result reported in all 6 articles (n = 205) patients who were intubated for elective surgery without prior respiratory failure, in the group using nasal oxygenation with nasal or nasopharyngeal catheter with low oxygen flows, a significant increase safe apnea time to 1.97 minutes is achieved (95% CI = 1.38; 2.55) with heterogeneity (I2 = 93%, P <0.01)
Conclusion: Apnoeic Oxygenation is associated for prolonging the time of safe apnea by 1.97 minutes, time that can make a difference in situations in which a difficult airway is addressed since a longer period of time will be obtained to offer a secure intubation without desaturation. Our study showed that using this strategy is simple, economical and safe.

5669

Shuttlescope®, a novel laryngoscope. Is one-handed endotracheal intubation feasible?

Alonso-Babarro J. M.[1], Barrachina B.[2], Spandole S.[3], Salazar C.[2], Medrano J.[2]
[1]The Prince Charles Hospital - Brisbane (Australia), [2]Hospital Universitario de Araba, Osakidetza-Servicio Vasco de Salud - Vitoria-Gasteiz (Spain), [3]Facultad de Medicina y Enfermería, Universidad del País Vasco (UPV-EHU) - Vitoria-Gasteiz (Spain)

Background: Despite the fact that video-laringoscopes have largely improved laryngoscopy, endotracheal intubation (ETI) is still a two-handed procedure, as the second hand is required for the actual introduction of the endotracheal tube (ETT). Shuttlescope® is a novel laryngoscope that allows performing both laryngoscopy and delivering of the ETT using only one hand, leaving an extra hand free.
Hypothesis: Shuttlescope® videolaryngoscope allows effective and safe ETI by ensuring laryngoscopy and delivering of the ETT with only one hand. It also improves safety by leaving an extra hand free.
Objective: To compare efficacy and safety of ETI with Shuttlescope® and Macintosh laryngoscope by anaesthesiologist in a manikin model.
Methods: We conduct a randomized cross-over trial to assess efficacy and safety of Shuttlescope® videolaryngoscope compared to Macintosh laryngoscope in a manikin model (AirSim, TureCorp®). Primary endpoints were time to intubation and success rate after three attempts with each device. Secondary endpoints quantified the necessity of the right hand to manipulate the ETT during ETI and availability

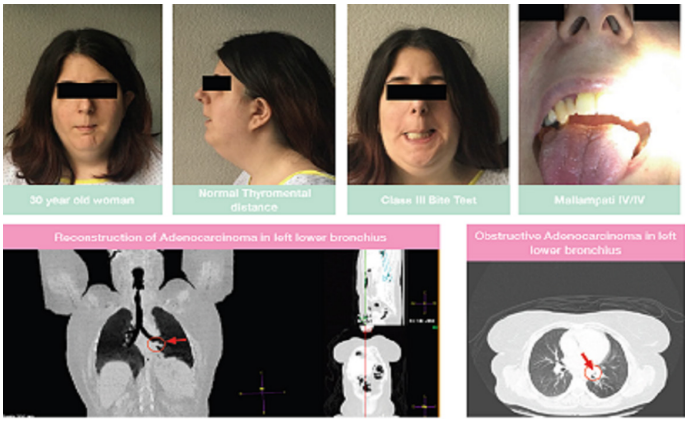
of the right hand to do common maneuvers. All operators were anesthesiologists from the Hospital Universitario Araba (Vitoria, Spain) who received a rigorous 5 min standardized training on the new device and technique, which they didn't have previous exposure to, prior to the attempts.
Results: In total, 20 operators (12 females, 8 males) participate in the study. After randomization, 11 anesthesiologists started ETI with the Shuttlescope® and 9 started with Macintosh, doing a total of 60 intubations with each device. Mean time for ETI was 13 sg [8-32] with Macintosh laryngoscope compared to 15 sg [6-27] for the Shuttlescope®. Success rate was 100% of ETT in the trachea with both devices. All operators had to use their right hand when they intubate with Macintosh laryngoscope but only 3 operators used it to complete intubation with the Shuttlescope®.
Conclusions: Shuttlescope® is a novel device that allows safe and easy ETI while leaving the right hand of the operator free during the procedure, which may be a major advantage in many situations.

5571

Successful intubation of a difficult airway with lung isolation in Treacher-Collins syndrome: a case report

Levstek M.[1], García Gutierrez A.[1], Valencia Orgaz O.[1], Calderón Barajas Z. A.[1], Arboleda Salazar R.[1], Cortés Guerrero M.[1]
[1]University Hospital Doce de Octubre - Madrid (Spain)

Background: Treacher Collins syndrome (TCS) is a congenital malformation of craniofacial development where conventional direct laryngoscopy is difficult and often unsuccessful because of the upper airway malformation.
Case Report: 30-year old woman with TCS needed surgery for left lower pulmonary lobe adenocarcinoma. Her medical history includes numerous craniofacial surgeries, obesity grade III, obstructive sleep apnoea and Crohn's disease.
Preoperative airway evaluation: class III bite test, limited mouth opening, class IV Mallampati, normal thyromental distance, mandibular length and cervical flexion and extension.



We decide to realize awake fibreoptic oral intubation with a flexometallic endotracheal tube (ETT) and later place endobronchial blocker (EB) for left lung isolation. The patient was premedicated with atropine, midazolam and nebulized 5% lidocaine. In the operation room (OR) topic 10% lidocaine was applied in the mouth to tolerate VAMA® canula. The SAYGO technique was used to anesthetize the airway. The trachea was identified and entered without problems and the ETT was progressed until 2 cm proximal to carina. After positive capnography was confirmed, the general anesthesia was induced. EB was placed in the left main bronchus. Left pneumonectomy was carried out and the patient was extubated in the OR and transferred to ICU for observation.
Discussion: The difficult airway in thoracic surgery is a challenge. Double-lumen endobronchial tubes may be difficult to place in anticipated and non-anticipated difficult airway. Awake fibreoptic intubation is the gold standard for anticipated difficult airway in patients with limited mouth opening. When anticipated, awake fibreoptic intubation followed by EB placing is a safe choice for the non-expert in thoracic anesthesiology.
References:
1. Collins SR et al. Lung Isolation in the Patient With a Difficult Airway. Anesth Analg. 2018 Jun;126(6):1968-1978.
Learning points: 1.The fibreoptic bronchoscopy is a gold standard for awake difficult airway intubation in patients with limited mouth opening. 2. EB is a good alternative to double-lumen endobronchial tubes in difficult airway.

5450

The role of virtual laryngoscopy in preoperative airway assessment.

Svare A.[1], Kazūne S.[2], Krastiņa A.[3], Svare A.[3]
[1]Riga East University Hospital - Riga (Latvia),
[2]Hospital of Traumatology and Orthopedics - Riga (Latvia),
[3]Oncology Centre of Latvia - Riga (Latvia)

Background and Goal of Study: Clinical examination and radiographic studies play a significant role in the airway evaluation of the head and neck tumor (HNT) surgery patients but have flaws as predictors of intubation difficulty. To overcome these obstacles a comprehensive airway assessment with free online imaging software was performed. Images from patients diagnostic computed tomography (CT) study were obtained to reconstruct three-dimensional virtual laryngoscopy (VL). The goal of the study was to determine whether VL is capable of predicting precisely the view of the larynx during direct laryngoscopy.
Materials and Methods: The study was performed at Oncology Centre of Latvia and included patients with the HNT. The selection criteria for inclusion were upper respiratory tract tumor and a pre-operative CT scan which was used to create virtual laryngoscopy three-dimensional images using RadiAnt DICOM Viewer 5.5.0 (Medixant, Poland). Preoperative assessment of airways was performed using El-Ganzouri index and when available images of nasendoscopy were obtained. After the induction of anesthesia, a photograph of the direct laryngoscopy view was recorded. Cormack-Lehane laryngoscopy view, ability to identify obstructive hypopharyngeal lesions precluding intubation and presence of supraglottic lesions were compared between VL images and photographs of direct laryngoscopy view.
Results and Discussion: We included a total of 6 patients. VL in 5 of 6 patients precisely identified laryngeal view during laryngoscopy. Hypopharygeal airway obstruction was seen on VL reconstructions in 3 of 4 cases. In all cases, airway anatomy information obtained from VL was inferior to unprocessed diagnostic CT and nasendoscopy.
Conclusion: VL as a single technique is not successful in predicting difficult airways in patients with HNT tumors. Multidisciplinary assessment with involvement of radiologists and surgeons allows to anticipate possible problems better.

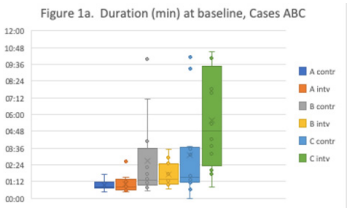
5314

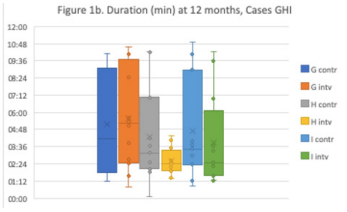
Assessing improvement of intubation skills with flexible bronchoscopy (FB) by training on an airway simulator

Van Haperen M.[1], Kemper T.[1], Hollmann M.[1], Schlack W.[1], Hermanides J.[1], Preckel B.[1]
[1]Academical Medical Centre Amsterdam - Amsterdam (Netherlands)

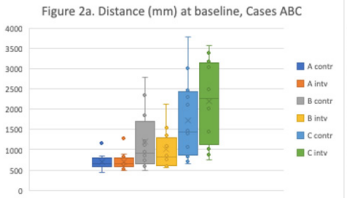
Background and Goal of Study: The difficult airway remains challenging not only for novices, but also for experienced anaesthesiologists. With current airway equipment, exposure to using FB for intubation decreases constantly. We investigated whether regular training with a bronchoscopy simulator of experienced users in FB improves fiberoptic skills.
Materials and Methods: Using the ORSIM bronchoscopy simulator1, 24 volunteers with some skills in using FB performed 6 exercises (one game, followed by two basic and three difficult airway procedures) at baseline, at 6 and 12 months. After baseline, volunteers were randomized to either no training (control), or practicing with the ORSIM (intervention) every 6 weeks for 10 minutes using a game to hit targets. Main outcome was difference in time to successful management of difficult airways at 12 months. Secondary outcomes included difference in distance with fiberscope, rotation, direction changes, tissue collisions, and confidence in own skills at 12 months.

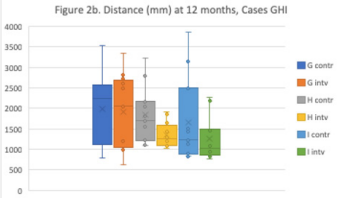
Results and Discussion: Duration to finish difficult airway cases at baseline (cases a-c, fig. 1a) and at 12 months (cases g-l, fig. 1b) we're not different between control and intervention group.





Rotation of and tissue collisions with the fiberscope showed minimal improvement in the intervention group. Total distance (fig.2a+b), number of direction changes, and confidence in own skills showed a greater improvement in the intervention group.





Conclusion: Training fiberoptic skills by a game on an airway simulator did not overall improve performance for FB, although it improved some handling aspects during FB.

References:

1. Baker et al., BJA 2016.

5166

Ultrasonic verification of intubation tube

Usikyan E.[1], Zaitsev A.[1], Zhukova S.[2], Dolbneva E.[1]
[1]Petrovsky National Research Centre of Surgery - Moscow (Russia), [2]I.M. Sechenov First Moscow State Medical University - Moscow (Russia)

Background: Confirmation of the endotracheal tube (ETT) position in the trachea is important for the safety Protocol in maintaining upper airway patency. The search for new perspective methods of ETT visualization allowed to pay attention to ultrasonic visualization. The goal of the study was to determine the features of ultrasonic verification of the intubation tube (IT) in the trachea.
Materials and methods: The study was performed in 20 patients. All patients underwent ultrasound scanning of the trachea before, during and after endotracheal intubation. Ultrasound research was performed from four positions of the ultrasound sensor:in the longitudinal, suprasternal, transcricoid and transthoracic positions. During intubation the endotracheal tube location was verified by direct and indirect methods. Direct took all the methods when it is possible to see ETT or its various parts on ultrasound. Indirect included methods when it wasn't possible to determine the ETT, but it was possible to suspect the location of the ETT in the trachea. Indirect methods included:pleural sliding, detection of the esophageal ring during esophageal intubation, the phenomenon of "double path"(the appearance of a second echonegative shadow during esophageal intubation).
Results: Ultrasound studies have shown that the direct method in the longitudinal position of the sensor was able to visualize ETT in 100% of patients (n=20). Visualization became possible due to the use of reinforced ETTS and filling the cuff with 0.9% NaCl. The presence of a spring in the wall of the reinforced ETT allowed to differentiate the tissue-air border, filling the cuff created the possibility of visualization of the trachea from the front to the back wall . From suprasternal and transcricoid position to visualize ETT was possible only in 80% (n=16) cases. Indirect methods were able to determine the location of ETT in 100% (n=20) patients, which led to timely detection of esophageal intubation.
Conclusions: 1.It is possible to see the intubation tube in the trachea by direct methods but it is difficult because it is easily confused with the tissue-air border or other anatomical structures. 2.The use of reinforced tubes or filling the cuff with fluid greatly facilitates the finding of the intubation tube in the trachea by ultrasound, especially in the longitudinal position of the sensor. 3.Ultrasound is the fastest method of detecting esophageal intubation by detecting the phenomenon of "Double path".

5018

Voice Analysis as a Preoperative Prediction Method of a Difficult Airway, preliminary results

Rodiera C.[1], Moragues I.[2], Giralbo B.[2], Callicó F.[3], Borrás R.[4], Valls A.[5]
[1]Quiron Dexeus University Hospital - Barcelona (Spain), [2]Polytechnic University of Catalonia - Barcelona (Spain), [3]Anesthesiology Department Teknon Medical Center - Barcelona (Spain), [4]University Hospital Dexeus Quironsalud Group - Barcelona (Spain), [5]Maxillofacial Institute Teknon Medical Center - Barcelona (Spain)

Background and Goal of Study: The occurrence of an unpredicted difficult airway is one of the greatest challenges faced by anesthesiologists. These situations are rare, as the prevalence is 2,2% in the general population.However, might entail severe complications. Therefore, a preoperative airway assessment is paramount. Traditional predictive tests evaluate multiple anthropometric characteristics in which the physical presence of the patient is mandatory. Nevertheless, none can predict a difficult airway based on a single characteristic nor remotely. In this pilot study, we propose that voice characteristics analysis could reflect airway's anatomy and correlate with Mallampati. Building on this, future studies will be performed on a remote voice airway assessment method to replace anthropometric parameters evaluated in traditional tests to predict a difficult airway
Materials and Methods: We recorded 5 vowels (A,E,I,O,U) of 54 patients in neutral, extension and hyperextension positions with a smartphone located 15cm from the mouth in sitting position. Mallampati grade and clinical characteristics of the patient were collected during the preoperative visit. Voice signal was processed, and parameters related to frequency, morphology and perturbation were extracted employing Matlab®. To determine the statistical significance of the differences within parameters the non-parametric test of Kolmogorov-Smirnov was used. These variables were introduced into several classification algorithms based on machine learning. Patients were classified into expected easy airway (grades I-II) and expected difficult airway (grades III-IV) according to Mallampati scale.
Results and Discussion: The final sample was divided in 34 easy airway patients and 20 difficult airway patients. The ensemble method algorithm yielded the best results obtaining a 70.0% of sensibility, 79.0% of specificity and 75.9% of accuracy. Even though, the data obtained is encouraging, not having achieved greater results may be due to Mallampati's considerable variability and the study's small sample size
Conclusion: We can confirm a statistically significant relationship between voice characteristics and Mallampati. Further studies including a larger sample size, testing other classification algorithms and correlating the voice signal with a difficult airway defined by the Cormack-Lehane scale, might enable the development of a voice-based airway assessment method facilitating a remote airway evaluation.

4497

AutoFlow® vs. volume-controlled ventilation for laparoscopic gynaecological surgery using LMA® ProSeal™: A randomised controlled trial

Nakanishi T.[1], Sakamoto S.[2], Yoshimura M.[3], Toriumi T.[4]
[1]Nagoya City University Graduate School of Medical Sciences - Nagoya (Japan), [2]Japan Community Healthcare Organization Tokuyama Central Hospital - Shunan (Japan), [3]Ube Industries Central Hospital - Ube (Japan), [4]Nippon Kokan Fukuyama Hospital - Fukuyama (Japan)

Background and Goal of Study: LMA® ProSeal™ (pLMA) has been used in laparoscopic gynaecological surgery. During surgery, pneumoperitoneum and the Trendelenburg position would increase the peak airway pressure (PAWP), which can cause airway leak during pLMA anaesthesia. Ventilation-mode AutoFlow® (AF) delivers the set tidal volume at the lowest PAWP using decelerating flow pattern. Thus, AF may prevent the increase of PAWP and airway leak of pLMA. We hypothesised that AF would decrease PAWP compared with volume-controlled ventilation (VCV) during laparoscopic gynaecological surgery using pLMA.
Materials and Methods: After the approval by the institutional review board and registration to the UMIN Clinical Trials Registry (identifier: UMIN000023173), this study was conducted in a single tertiary hospital in Japan. Eighty adult women were recruited and randomly allocated into two groups as AF group and VCV group. pLMA fitting was evaluated using the bubble test, ease of gastric tube insertion, oropharyngeal leak pressure (OLP), and fibreoptic score. Further, 8 ml/kg tidal volume and 5 cmH2O positive end-expiratory pressure were used and the respiratory rate was adjusted between 12 and 16 per minute to maintain the end-tidal carbon dioxide at 35–40 mmHg in both groups. PAWP and the audible leak of pLMA were measured at four time points (after insertion of gastric tube, after administration of neuromuscular blocking drug, after initiation of pneumoperitoneum, and after change to Trendelenburg position). The primary outcome was PAWP at both pneumoperitoneum and the Trendelenburg position.

Results and Discussion: A total of 40 patients in the AF group and 39 patients in the VCV group were finally analysed. There were no differences in the patients' characteristics or pLMA fitting tests between the two groups. PAWP at both pneumoperitoneum and the Trendelenburg position was significantly lower in the AF group compared to the VCV group [median (IQR), 16 (15–18) vs. 18 (17–19); P < 0.001]. Audible leak was found in 4 patients in the AF group and 2 patients in the VCV group (P = 0.68). A total of 6 patients with leak showed lower OLP compared to the remaining 73 patients without leak [22 (19–23) vs. 28 (25–34); P = 0.0015]. Patients in the AF group showed lower PAWP at all time points; however, the other parameters and vital signs showed no differences.
Conclusions: AF ventilation decreased PAWP compared with VCV in laparoscopic gynaecological surgery using pLMA.

6043

Does oxycarbon improve cerebral oxygenation during apnea? A mono-center randomized cross-over trial inspired by aviation-research

Schmidt M. T.[1], Studer M.[2], Bonvini J. M.[1], Haile S.[3], Beck-Schimmer B.[1], Schläpfer M.[1]
[1]University Hospital Zurich - Zurich (Switzerland), [2]Swiss Air Force - Bern (Switzerland), [3]Epidemiology, Biostatistics and Prevention Institute, University Zurich - Zurich (Switzerland)

Background: Several projects in aviation and high-altitude research have demonstrated improved cerebral perfusion, performance, and oxygenation by adding CO2 in hypobaric hypoxia [1]. Hypoxia is of concern also in anesthesia, especially in patients with a decreased oxygen reserve. This study aimed to test whether 5% CO2 in O2 increases the time until significant cerebral hypoxia was detected by near-infrared spectroscopy (NIRS) in bariatric patients under normobaric conditions.
Methods: After ethical approval, patients (18-65 years), BMI >35kg/m2 requiring anesthesia for bariatric surgery at the University Hospital Zurich were included in this mono-centric, single-blinded, controlled, crossover proof-of-concept study. According to the randomization, patients received first oxycarbon (5%CO2, 95%O2) or the comparator (95%O2). After a wash in of 10 minutes, apnea was performed by disconnecting the ventilator from the endotracheal tube until NIRS value dropped by 20% from baseline, or until SpO2 decreased to 80% (as a safety termination criterion). Reventilation was then performed until parameters returned to baseline. With the crossover design, the procedure was repeated with the other substance (oxycarbon or comparator). During apnea, NIRS, vital signs, and bispectral index were recorded permanently, blood samples were drawn at the beginning and the end of the apnea.
Results: Based on the power calculation, 30 patients were enrolled. Tissue oxygenation drop by 20% was not reached in this patient population, as the safety termination criterion was reached first. The time until oxygen saturation dropped to 80% was similar after both interventions (mean difference -6s [95%CI from -19 to 7] p=0.37), but both cerebral tissue oxygenation index and PaO2 were higher after oxycarbon administration (difference of 1.46% [95% CI: from 0,33 to 2.59], p=0.018, and 0.6 kPa [95 CI: 0.12 to 1.09], p=0.021, respectively).
Conclusion: This study demonstrates improved blood and cerebral tissue oxygenation upon oxycarbon administration. The possible link to a clinical scenario for improvement of cerebral oxygenation has to be investigated in future trials.
References:
1. Imray CH et al, Clin Sci (Lond) 2003.

6030

Evaluation of effect of PCV-VG mode vs. VCV mode on atelectasis in patients undergoing laparoscopic surgery: a prospective randomized controlled clinical trial

Turan A. Z.[1], Saracoglu A.[2], Saracoglu T.[2]
[1]Health and Science University Derince Training and Research Hospital - Derince (Turkey), [2]Health and Science University Kartal City Hospital - Istanbul (Turkey)

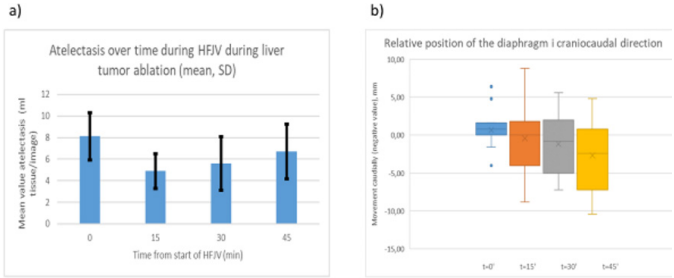
Background and Goal of Study: Laparoscopic surgery, which has increased in frequency in recent years, results in less bleeding, less postoperative pain, shorter hospital stay and better cosmetic results compared to open technique. However, although less invasive, lung dynamics can be affected by the pneumoperitoneum. After laparoscopic surgery, atelectasis develops firmly. In our study we aimed to compare the effect of different ventilation modes to prevent atelectasis that develops during perioperative period by using pulmonary ultrasonography in patients undergoing laparoscopic surgery.
Materials and Methods: After approval of the ethics committee (KIA 2018/260) (NCT03614845) and written patient approval, totally 60 ASA I-II patients between the ages of 18 to 75 undergoing laparoscopic cholecystectomy under general anesthesia, were included in the study. The patients were randomly assigned into two groups: volume-controlled ventilation(VCV) group (group V) or pressure-controlled-volume guaranteed ventilation (PCV-VG) group (group PV). Preoperative (L1) and postoperative at min. 0 (L2) and min.30 (L3). LUS (lung ultrasonography score) was obtained by lung ultrasonography. In the intraoperative period, hemodynamics data (T1-6) and mechanical ventilation parameters (T2-T3-T4) were recorded at different times.
Results and Discussion: Demographic data, lenght of operation/anesthesia/pneumoperitoneum, hemodynamic data of the intraoperative period and tidal volume were similar between the groups. Peak inspiratory pressure (PIP) was found statistically higher in the group V than the group PV before pneumoperitoneum(T3). Plateau pressure was found higher in the group V than the Group PV at all the times (T2,T3,T4). Compliance was found statistically higher in the Group PV than the Group V at all the times. At T3 and T4 the compliance was determined lower in the group V than the group PV respectively 15% and 14%. LUS score was similar between the groups at all the times. Change of LUS score of right lower anterior chest is statistically higher in the group V than the group PV($p<0.05$).
Conclusion: We are in the opinion that PCV-VG mode provides optimal ventilatory pressures and maintains high compliance. Additionally, PCV-VG mod might be superior to VCV mode in preventing from atelectasis of lower lung areas, in particular in the right lower lung areas which is exposed to high surgical mechanical pressure during laparoscopic abdominal surgery.

4797

Quantitative assessment of atelectasis formation under high frequency jet ventilation during liver tumour ablation

Galmén K.[1], Jakobsson J. G.[2], Freedman J.[2], Harbut P.[2]
[1]Danderyd Hospital - Danderyd (Sweden), [2]Danderyd Hospital - Stockholm (Sweden)

Background and Goal of Study: Liver tumour ablation treatment has many advantages. The ablation procedure however demands immobilisation of the liver to avoid harm. Total intravenous general anaesthesia, intubation and the use of high frequency jet ventilation (HFJV) has been shown to improve the ablation procedure (1). The formation of atelectasis during general anaesthesia is known, the effects of HFJV during anaesthesia for liver ablation is not well investigated. The aim was to study a) the formation of atelectasis and b) the displacement of the diaphragm over time during general anaesthesia and HFJV.
Materials and Methods: This is a prospective, observational study, where computer tomography scans (CTs) of the lung aeration were analysed both manually and in software programme MATLAB during HFJV and general anaesthesia. All patients had i.v. anaesthesia; propofol, remifentanil and rocuronium. They were intubated and ventilated with HFJV (HFJV catheter through the tube). CTs were taken during HFJV; baseline, 15', 30' and 45'. Atelectasis was defined as radiological density of Hounsfield Units -100 to +100. One-way RM ANOVA was used to analyse the results.
Results and Discussion: 25 patients above 50 years of age were studied. A decrease in atelectasis volume ($p<0.001$) and a caudal displacement of the right diaphragm ($p=0.047$) was observed during the study period, see fig. The reason for the decrease is unclear but might be an effect of intrinsic PEEP known to occur during HFJV. The caudal displacement of the diaphragm, observed in consecutive CT scans was small but significant and could be an effect of less atelectasis as well as other variables such as muscle relaxation, BMI and liver elasticity.
Conclusion: HFJV do not have any negative effects on lung aeration, the formation of atelectasis was found to decrease during the HFJV period studied.



a) Atelectasis in ml tissue/image during the first 45 minutes of HFJV under general anaesthesia.
b) Caudal displacement of the right hemidiaphragm.

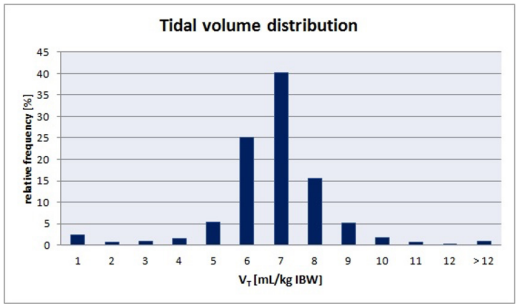
References:
1. Abderhalden S, et al. CT-guided navigation of percutaneous hepatic and renal radiofrequency ablation under high-frequency jet ventilation: feasibility study. J Vasc Interv Radiol. Elsevier; 2011;22(9).

4657

Automated control of mechanical ventilation during general anaesthesia (AVAS-Study)

Miestinger G.[1], Engl P.[2], Janda D.[3], Sattler B.[3], Schädler D.[2], Hörmann C.[3]
[1]UK St. Pölten - St. Pölten (Austria), [2]UK Schleswig-Holstein, Campus Kiel - Kiel (Germany), [3]UK St. Pölten - St. Pölten (Austria)

Background and Goal of Study: Automated ventilation has been established in critical care setting for years. With Smart Ventilation Control (SVC, by Drägerwerk AG & Co. KGaA), a system for automated intraoperative ventilation was introduced. Safety as well as efficacy of the use of this system during general anaesthesia have been investigated in this study.
Materials and Methods: SVC controls the patient's respiratory settings by adjusting respiratory rate, inspiratory pressure, inspiratory time and trigger sensitivity in order to keep the ventilation within adjustable physiological target zones (VT, etCO2).
In this prospective bicentric observational study 100 patients were ventilated with SVC. Inclusion criteria were: elective limb or peripheral vascular surgery under general anaesthesia, ASA classification I-III, Age >= 18 years and written informed consent. For the duration of the entire anaesthesia, continuous recording of all respiratory parameters was carried out. A singular arterial blood gas analysis was performed to objectify the ventilatory situation. Primary endpoints were the occurrence of the following adverse events: Hypoventilation (MV < 40 ml/kg IBW or etCO2 > 5 mmHg above the target corridor for more than 5 min.); Hyperventilation (etCO2 > 5 mmHg below the target corridor for more than 5 min.); Apnoea > 90 s; Tachypnoea (RR > 35 min-1); Manual override by the anaesthetist in charge.
Results and Discussion: In the population of 100 included patients (49 female, 51 male; in average 65 years old), n=18 hypoventilations (14 defined by low minute volume, 4 defined by increased etCO2), n=12 hyperventilations, no apnoeas and no tachypnoeas were recorded. SVC was capable of regulating the occurring hyper- and hypoventilations back into the target corridor. A manual override was not necessary in any case. The following medians and interquartile ranges were observed: Respiratory rate: 12 (10-14) min-1; Inspiratory pressure: 13,9 (12,2–15,7) mbar; etCO2: 41 (37-43) mmHg; PaCO2: 43 (39-46,6) mmHg.



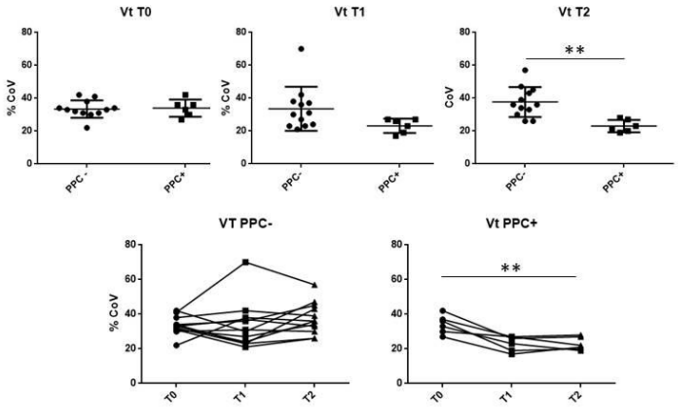
Conclusion: According to the collected data, SVC provides safe and presumably lung protective automated ventilation during general anaesthesia.

5083

Monitoring of the respiratory health and detection of postoperative respiratory complications using respiratory variability

Graverot M.[1], Benhassen K.[1], Kindler U.[2], Boichat C.[1], Lebrun T.[1], Kindler F.[1]
[1]CHU de Martinique - Fort de France (Martinique),
[2]Technical University of Applied Sciences Lübeck - Lübeck (Germany)

Background and Goal of Study: The incidence of Postoperative Pulmonary Complications (PPC) after non-thoracic surgery varies between 2 and 19% and are associated with an increase of morbi-mortality. However, few non-invasive monitoring possibilities are available to identify PPC during the postoperative recovering period. Respiratory variability reflects "healthy' breathing, whereas decreasing variability of the breathing pattern components is a reflection of "poor health". This decrease may be due to the "filtering" of the central variability changes in regards to the mechanical loads. Breath-by-breath variability is related to the neuro-mechanical coupling and the load-capacity adequacy. In intensive care, low ventilatory variability predicts mechanical ventilation weaning failure and is also an independent risk factor of death. Monitoring of respiratory variability during the postoperative recovery period may be useful for early non-invasive detection of PPC.
Materials and Methods: interventional noninvasive prospective monocentric non-blinded study in adults undergoing emergency or elective abdominal surgery with laparotomy. Measurement of the Coefficient of Variation of breathing pattern variables preoperative for baseline (T0), conscious after extubation (T1) and within the first 24h after surgery (T2) using thoracic chest movement measurement with a non-invasive respiratory belt. PPC (defined as respiratory failure, pleural effusion, respiratory infection, atelectasis, pneumothorax or bronchospasm) were screened during 7 days following surgery. Comparison of the CoV for breathing pattern variables (Tidal Volume, Vt) between the group of patients with (PPC+) and without (PPC-) complications using Mann Whitney and Friedman test for statistical analysis.
Results and Discussion: preliminary results;19 patients included; 7 with complications (PPC+) between day 0 an day 3 after surgery.



Conclusion: CoV of Vt at T2 decreases in the group with respiratory complications during the first 3 days following surgery. Monitoring of respiratory variability in the postoperative recovering period might be a potential technique for detecting PPC.

5037

Effects of airway resistance on distribution of ventilation in a two-compartment lung model with an asymmetric alveolar compliance

Lee B. W.[1], Yun S. H.[1], Park J. C.[1]
[1]Jeju National University Hospital - Jeju (South Korea)

Background and Goal of Study: Diseases of lung on one side can cause hypoxia due to the asymmetric distribution of ventilation volume. The purpose of this study is to describe how distribution of ventilation is affected by airway resistance when alveolar compliance is asymmetric in a two-compartment lung model.
Materials and Methods: The two-compartment lung model was constructed as follows: the internal diameter of the airway can be changed to 3-8 mm, the compliance of the disease lung (L1) can be changed to 15, 60 and 120 ml / cmH2O. called C15, C60, and C120 groups, respectively. Compliance of normal lung (L2) was fixed at 60 ml / cmH2O. The ventilator of anesthesia machine is set to 600 ml of tidal flats, respiratory rate 10 bpm and inspiratory pause 50% in VCV mode. A spirometry during mechanical ventilation measures pressure, flow and volume in the trachea and bronchus.
Results and Discussion: The volume ratio of L1 / L2 at the airway internal diameter 3, 4, 5, 6, 7 and 8 was 0.10 ± 0.05, 0.11 ± 0.03, 0.12 ± 0.02, 0.12 ± 0.02, 0.12 ± 0.02 and 0.12 ± 0.02 in the C15 group; 1.05 ± 0.16, 1.01 ± 0.09, 1.00 ± 0.07, 0.97 ± 0.09, 0.96 ± 0.06 and 0.97 ± 0.08 in the C60 group; 1.46 ± 0.18, 3.06 ± 0.41, 3.72 ± 0.37, 3.78 ± 0.47, 3.77 ± 0.45 and 3.78 ± 0.60 in the C120 group.
Conclusion: The distribution ventilation volume is proportional to the ratio of compliance of both lungs, an uneven distribution of ventilation improved when airway internal diameter was less than 4 mm, but a significant increase in PEEP was observed.
References:
1. Otis AB, McKerrow CB, Bartlett RA, et al. Journal of applied physiology 1956; 8: 427-43.
2. Bates JH, Rossi A, Milic-Emili J. J Appl Physiol (1985) 1985; 58: 1840-8.
3. Marini JJ, Crooke PS, 3rd. The American review of respiratory disease 1993; 147: 14-24.

4562

Comparison of two ventilation strategies during general anesthesia for retrograde intrarenal surgery (RIRS): a preliminary study

Tena B.[1], Monsalve C.[1], Beltran J.[1], Vendrell M.[1], Magaldi M.[1], Luque P.[1]
[1]Hospital Clinic Barcelona - Barcelona (Spain)

Background and Goal of Study: Retrograde intrarenal surgery (RIRS) has been proven to be an effective treatment in management of intrarenal lithiasis. However, the movement of stones associated to ventilation-induced kidney movement during surgery remains a challenge. The aim of the study was to compare two ventilation strategies to minimize stone movement: low ventilation (LV) and the use of apnea (A).
Materials and Methods: After informed consent was obtained, patients were prospectively randomized in one of the two group: LV (tidal volume≤5ml/kg and respiratory rate≤10) or A (5 min apneas). These ventilatory strategies were started when laser shooting began. Demographic data and stone characteristics (number, size, density and location) were recorded. Precision before and after initiation of LV or A (number of successful shots out of 5 attempts), fragmentation, removal and surgical time, as well as end-tidal CO2, oxygen saturation, need to convert to standard ventilation and complications were assessed in all patients. Data was analyzed using SPSS vs22 and variables compared by means of U Mann-Whitney or Fisher exact test when appropriate.
Results and Discussion: A total of 34 patients were included. There were no statistical differences between groups in demographic data or lithiasis characteristics. No complications occurred throughout the duration of the study. The A group showed lower fragmentation time. However, there were no statistical differences in surgical time, end-tidal CO2, oxygen saturation and need to convert to standard ventilation. A better precision was detected with both LV and A compared to standard ventilation but no differences were found between groups. Conversion to standard ventilation was necessary only in 2 and 1 patients in LV and A group, respectively.
Conclusions: The use of ventilatory strategies to minimize renal movement during RIRS appears to increase surgical precision and is not associated with respiratory adverse effects or complications. The use of apnea seems to reduce fragmentation time in our preliminary results, though larger studies are required.
References:
1. Gadzhiev N et al. Reducing kidney motion: optimizing anesthesia and combining respiratory support for retrograde intrarenal surgery: a pilot study. BMC Urol. 2019;19(1):61.2. Kourmpetis V et al. Toward Respiratory-Gated Retrograde Intrarenal Surgery: A Prospective Controlled Randomized Study. J Endourol. 2018; 32(9):812-817.

4487

Diaphragm ultrasonography as a method to confirm ventilator-induced diaphragm dysfunction: the prospective observational cohort study

Filyk O.[1], Pidhirnyi Y.[1]
[1]Department of Anesthesiology and Intensive Care - Lviv (Ukraine)

Background and Goal of Study: Mechanical ventilation can cause diaphragm injury. The aim of this study was to find out whether ventilator-induced diaphragm dysfunction lead to prolonged ventilation. The study hypothesis was that the duration of mechanical ventilation, and the frequency of complications in children depend on duration of diaphragm inactivity, low (<15%) or high (>30%) diaphragm thickness and presence of patient–ventilator dyssynchrony.
Materials and Methods: We examined data of 57 patients at the age 1 month-3 year, who needed invasive mechanical ventilation. In 4 patients ultrasound investigation was impossible. 53 patients were included in the study results analysis. The presence of diaphragm inactivity, the diaphragm thickness (Tdi) at the end of inspiration and the presence of patient–ventilator dyssynchrony were obtained on 1st, 3rd, 5th and then every five days during mechanical ventilation. The primary outcome was the time to liberation from mechanical ventilation. Secondary outcomes were complications: prolonged ventilation, reintubation, tracheostomy or death. Statistical Package for the Social Sciences was used and the results were presented using median [IQR], adjusted hazard ratio (HR), duration ratio.
Results and Discussion: 61.4% of patients at day 1st had diaphragm inactivity. Presence of diaphragm inactivity during first 5 days after admission was associated with lower daily probability of liberation from ventilation (adjusted HR 1.87, 95%CI 1.62-3.15, per 10% decrease). 38.6% of patients at day 1st had Tdi less than 15% (Tdi 9% [11% to 6%]), at days 3rd and 5th there were 35.1% (Tdi 11% [8% to 12%]) and 21.1% (Tdi 10% [8% to 14%]) of patients, respectively. It was associated with lower daily probability of liberation from ventilation (adjusted HR 1.34, 95%CI 1.22-1.95, per 10% decrease). There were no patients at day 1st who had Tdi more than 30%, however, at days 3rd and 5th there were 21.1% (Tdi 41% [38% to 46%]) and 24.6% (Tdi 48% [34% to 51%]) of patients with Tdi more than 30%. There were no incidences of patient–ventilator dyssynchrony at day 1st, however, at days 3rd, 5th and 10th the incidences were 28.1%, 35.1% and 14% respectively. It was associated with a prolonged mechanical ventilation (duration ratio 0.42, 95%CI 0.22-0.97).
Conclusion: Diaphragm inactivity, low level of diaphragm thickness might impact clinical outcomes.

6222

Flow-controlled expiration during laparoscopic surgery diminishes intratidal derecruitment – a randomized controlled cross-over study

Schmidt J.[1], Aduse-Poku V.[1], Wenzel C.[1], Borgmann S.[1], Schumann S.[1], Wirth S.[1]
[1]University Hospital Freiburg - Freiburg (Germany)

Background and Goal of Study: Intraoperative mechanical ventilation with flow-controlled expiration (FLEX) showed dorsal lung recruitment in lung-healthy patients undergoing cranial surgery.1 We hypothesized that FLEX may counteract impaired lung mechanics during laparoscopic surgery. Therefore, we examined the effects of FLEX on tidal lung derecruitment and oxygenation during laparoscopic surgery.
Materials and Methods: After ethical approval, 26 patients undergoing laparoscopic surgery received conventional volume-controlled ventilation (VCV) and FLEX in a randomized cross-over design. Each ventilation-phase lasted 20 minutes with identical ventilation settings (tidal volume 7 ml·kg-1, positive end-expiratory pressure (PEEP) 7 mbar). Peak expiratory flow (PEF), inspiratory plateau pressure (Pplat), mean airway pressure (Pmean) and respiratory system compliance (CRS) were calculated offline. The intratidal compliance profiles2 were determined to indicate strong or moderate expiratory derecruitment. Additionally, the ratios of arterial oxygen partial pressure and inspiratory oxygen fraction (PaO2/FiO2) were determined. Statistical analyses included linear mixed models and chi-square tests. Data are shown as mean ± SD.
Results and Discussion: FLEX decelerated PEF (-305 ± 64 vs. -513 ± 79 ml·s-1, p<0.001). Pplat (21 ± 4 vs. 21 ± 3 mbar, p=0.76) was comparable. With FLEX, Pmean was higher (14 ± 2 vs. 12 ± 1 mbar, p<0.001), strong expiratory derecruitment was rarer (30% vs. 57%, p=0.026), CRS (41 ± 7 vs. 38 ± 10 ml·mbar-1, p=0.036) and the PaO2/FiO2 ratio were higher (451 ± 31 vs. 437 ± 82 mmHg, p=0.023) than with VCV.
Conclusion: During laparoscopic surgery, ventilation with FLEX counteracts impaired lung mechanics by diminishing tidal derecruitment. This leads to an improved lung compliance and oxygenation.
References:
1. Wirth et al., Anesth Analg. 2017 Oct;125(4):1246-1252.
2. Schumann et al., Physiol Meas. 2009 Dec;30(12):1341-56.

6165

Take a deep breath: cross-sectional study of volume-related ventilation practices in the light of new mechanical ventilation guidelines

Moguš M.[1], Karmelic D.[1], Šitum I.[1], Tucić I.[1], Habijanec B.[2], Lojna K.[1]
[1]University Hospital Centre Zagreb - Zagreb (Croatia), [2]University of Zagreb, Faculty of Humanities and Social Sciences - Zagreb (Croatia)

Background and Goal of Study: Modern-day mechanical ventilation guidelines (1) suggest "lung-protective ventilation strategies" as optimal for all patients, as the opposite was shown to increase postoperative pulmonary complications (PPC). Their fundamental component is ventilation with low tidal volumes (VT) of 6–8 ml/kg predicted body weight (PBW). In order to examine compliance with lung-protective ventilation guidelines, we conducted a cross-sectional study operating theaters in University Hospital Centre Zagreb.
Materials and Methods: Ventilation parameters and physical characteristics were noted intraoperatively of all adult patients under general anesthesia, ventilated in controlled modality, during one day, for all types of surgeries. We noted patient's age, weight, height (from which PBW and BMI were calculated), ventilation modality and set VT. If the patient was ventilated using pressure-controlled mode, mean VT was calculated based on three consecutive breaths.
Results and Discussion: In 36% of cases, ventilation settings were not consistent with lung-protective ventilation strategies (while allowing for +/-0,5 ml/kg deviation from the guidelines). Patients ventilated with more than 8.5 ml/kg had higher BMI

(p = 0.010), with anesthesiologists administering 5.44 ml more for every one point increase in BMI. 66% of our patients had BMI outside the range of normal (18.5-25kg/m2).
Conclusion: Even with the awareness of the importance of lung-protective ventilation, our results show that there are discrepancies between guidelines and clinical practice. Furthermore, patients with above-normal BMI have higher risk of receiving inadequate VT, compared to patients with BMI within normal ranges. Anesthesiologists must take greater care to calculate PBW for each patient and adjust ventilation settings accordingly, as to not predispose our patients to PPC.
References:
1. A .Young, C. C., Harris, E. M., Vacchiano, C., Bodnar, S., Bukowy, B., Elliott, R. R. D., … Sprung, J. (2019). Lung-protective ventilation for the surgical patient: international expert panel-based consensus recommendations. British Journal of Anaesthesia, 123(6), 898–913. doi: 10.1016/j.bja.2019.08.017.

6145

Recovery After Cardiopulmonary Arrest (CA) During the Approach of a Difficult Airway Planned in Patient with Acute Respiratory Distress Syndrome secondary to Severe Pneumonia

Ortega Abad A.[1], Osorio Salazar E.[2], Sánchez Posada D.[2], Vilà Justribò X.[2], Ron Villalba Z.[2], Buriticà Aguirre A. M.[2]
[1]University Hospital Arnau de Vilanova - Lleida (Spain),
[2]University Hospital Arnau de Vilanova - Lleida (Spain)

Background: We present a clinical case on the approach of difficult airway management in a patient with Acute Respiratory Distress Syndrome (ARDS). Complications due to severe hypoxia were respiratory acidosis, hemodynamic instability and subsequent CA.
Case report: 26-year-old patient with Childhood Cerebral Palsy was diagnosed with ARDS due to severe pneumonia. She was taken to the operating room for placement of a chest tube . She had dyspnea, desaturation and hemodynamic stabilty. Chest X-Ray found left lung condensation in> 50%. She had difficult airway criteria and was evaluated to perform awake fiberoptic intubation.The tube was exchanged with a Frova guide to a left double-lumen tube. The patient started with severe desaturation, absence of capnography wave and the tube was removed. Subsequently, direct laryngoscopy was performed and it could be intubated without difficulty with a left double-lumen tube. During the airway approach, the patient presented a severe desaturation and CA recovering to sinus rhythm 8 min later. Pulmonary recruitment maneuvers were initiated and the oxygenation improved. Thoracic drainage was placed and 25 days later she was discharged.
Discussion: Although Arne Test is a good tool for predicting the VAD, in some cases it doesn´t correlated. It is important to perform an adequate approach to the airway according to current guidelines (1). ARDS management includes pulmonary recruitment maneuvers, protective ventilation and adequate driving pressure control (2). In this way, we improve oxygenation, alveolar ventilation and avoid pulmonary overdistention.
Learning Points: Secure the airway is vital to ventilatory control. It is important to make the right approach to the airway based on current guidelines. Adequate management plan reduces morbidity and mortality in patients with ARDS. Pulmonary recruitment manoeuvres and driving pressure control are currently validated for oxygenation control in these patients (3)
References:
1. Frerk, C. et al. Difficult Airway Society 2015 guidelines for management of unanticipated difficult intubation in adults. Br J Anaesth. 2015;115(6):827–848.
2. Pérez Nieto, O. et al. www.medigraphic.org.mx Driving pressure: Main objective for alveolar protection.222-227.
3. MiHye, P. et al. Driving Pressure during Thoracic Surgery: A Randomized Clinical Trial. Anesthesiology 2019;130(3):385-393.

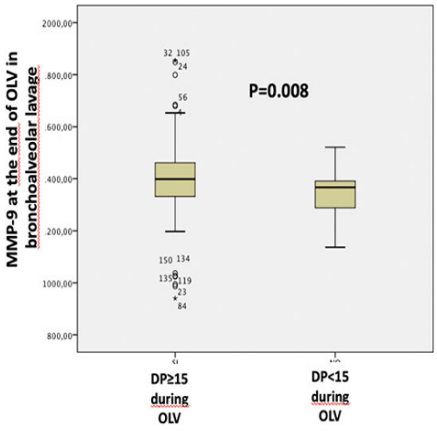
6065

Driving pressure and its relation to matrix metalloproteinase-9 expression in bal after one lung ventilation period in lung resection surgery

Pérez Á.[1], Higuero F.[2], Martínez D.[2], De Miguel J. P.[2], Reyes M. A.[2], De La Gala F.[2]
[1]Hospital General Universitario Gregorio Marañón - Madrid (Spain),
[2]Hospital General Universitario Gregorio Marañón - Madrid (Spain)

Background and Goal of Study: Inflammatory injury to the alveolar epithelial and endothelial capillary membrane is a central event in the pathogenesis of acute lung injury (ALI). Matrix metalloproteinase-9 (MMP-9) has been implicated in ALI associated to mechanical ventilation. Driving pressure (DP) is defined as the End-Inspiratory Plateau Pressure (EIPP) minus Positive End-Expiratory Pressure (PEEP). Previous studies have shown association between DP>15cmH2O and lung injury and mortality. We hypothesized that DP is associated with increased levels of MMP-9 at the end of one-lung ventilation period (OLV).
Materials and Methods: Our study, approved by local Ethics Committee, included 174 patients undergoing a lung resection surgery with an OLV longer than 1 hour. The anesthetic protocol was as follows: after intubation ventilation was initiated with a TV 8 ml/Kg, PEEP 5 cmH2O and FiO2 0.4–0.5. Respiratory rate was set to keep an EtCO2 of 30–35 mmHg. During OLV, TV was reduced to 6 ml/kg and FiO2 increased at 0.6–1 to keep a SatO2 > 90%. BAL was performed in dependent lung before and after OLV period to quantify the levels of MMP-9, that were measured using Western Blot test. Haemodynamic and respiratory parameters were registered 5 min before OLV (baseline), 30 min after initiating it, and at the end of it. Patients were divided into 2 groups: one with a DP>15 and another one with a DP<15 during OLV. The Pearson correlation test was used to analyze the relation between MMP-9 values in BAL and pressures in airway and lung compliance. We also compared MMP-9 values in patients with DP>15 and DP<15 during OLV using the Mann-Whitney test. Statistically significative p < 0.05.
Results and Discussion: MMPs are known to be involved in several physiopathological processes, but the role of MMP-9 during OLV has not been analyzed. We demonstrated the influence of ventilatory set in the expression of this protein in BAL (table 1 and figure 1).

	R COEFFICIENT	P VALUE
DrivingPressure_OLV	.264	<0.001
Ppeak_baseline	.183	0.016
Pplateau_baseline	.226	0.003
Pplateau_30min OLV	.212	0.005
Complian_30min OLV	-.183	0.016



Conclusion: We conclude that MMP-9 could be included in postoperative acute lung injury related to mechanical ventilation.

6046

Video Laryngoscopy associated injury of the Anterior Tonsillar Pillar: a case report

Couto C.[1], Lourenço S.[1], Machado H.[1]
[1]Centro Hospitalar do Porto - Porto (Portugal)

Background: In predictably difficult airways, the use of videolaryngoscopy (VLG) is a useful adjunct. During insertion of the endotracheal tube (ETT), oral or pharyngeal cavity lesions may occur, with a prevalence of complications estimated at 1% for small lesions and 0.3% for more complex lesions1.
Case Report: 63 years old male, ASA physical status 3, was scheduled for a laparoscopic total gastrectomy due to a tumor. The airway evaluation showed a mallampati 3 score and macroglossia. The team approached the airway with a GlideScope® VLG blade 4 and a 7.5 mm internal diameter ETT with the Gliderite® rigid stylet, correctly placed. After the first attempt at orotracheal intubation, without difficulties, it was observed that the ETT had crossed the right tonsillar pillar, without edema or active bleeding (picture 1). The surgery was performed and an otolaryngology observation was requested. A small laceration of the right anterior tonsillar pillar without active hemorrhage was reported. The patient was uneventfully extubated and maintained under antibiotic prophylaxis and surveillance at the intermediate care unit for 24 hours. At the time of discharge, the lesion presented good healing, without signs of infection or asymmetries (picture 2).
Discussion: Several factors contribute may to increase the risk of injury in orotracheal intubation. The way the ETT and stylet are introduced into the oral cavity, the direct visualization of their passage, stopping and improving conditions if any resistance is felt and using a more malleable stylet are some of the strategies used to reduce that risk23.
References:
1. Thorley DS, Simons AR, Mirza O, Malik V: Palatal and retropharyngeal injury secondary to intubation using the GlideScope® video laryngoscope. Ann R Coll Surg Engl 2015; 97:e67–9.
2. Pacey JA: Anterior Tonsillar Pillar Perforation During Glidescope Video Laryngoscopy. Anesth Analg 2007; 104:1611.
3. Amundson AW, Weingarten TN: Traumatic GlideScope® video laryngoscopy resulting in perforation of the soft palate. Can J Anesth Can d'anesthésie 2013; 60:210–1.
Learning points: Based on this case report, we recommend assessing the degree and extent of the pharyngeal injury before and after ETT removal by an otolaryngology team. Ensuring a tighter surveillance period and initiating antibiotic prophylaxis is essential.

6211

How good sense could be important with airways challenges – a case report

Silva M.[1], Ribeiro C.[1], Dourado C.[1], Serôdio P.[1], Vaz I.[1], Ferreira P.[1]
[1]Centro Hospitalar Vila Nova de Gaia/ Espinho - Vila Nova de Gaia (Portugal)

Background: Deep neck infections (DNI) present challenging airways for an anesthesiologist. Although various techniques are available to secure the airway, their success in DNI have not yet been established. A clear algorithm with multiple airway management plans is critical.1
Case Report: A 72-year-old obese female, presented with a progressive submandibular swelling following dental infection. She was classified as ASA II E. The diagnosis of Ludwig's Angina was postulated by clinical signs and the evidence of infection from parapharingeal space until the hyoid bone. She was scheduled for emergency drainage of the abscess. Difficult airway was identified during the anesthetic examination. A nasotracheal awake fiberoptic intubation was initially planned. Patient was sedated with a perfusion of remifentanil and local anaesthetic was applied to the nasal mucosa. Several attempts to negotiate the flexible tip of the fibrescope across the glottis were unsuccessful and whenever the tip contacted the mucosa a progressive edema and a blurred vision occurred. McGrath video laryngoscope was considered as plan B, although surgical team was prepared for tracheostomy. Image of the epiglottis was obtained and with bougie, tracheal intubation was possible on first attempt. Patient was kept in spontaneous ventilation until airway was secure. There were no complications during the surgical act. She remained mechanically ventilated in the intensive care unit.
Discussion: DNI are potentially lethal conditions because of their tendency to cause edema and obstruction of the airway and may arise as a consequence of airway management mishaps. Although awake fiberoptic nasotracheal intubation may be one of the preferred techniques to secure airway, it requires experience. On the other hand, video laryngoscopy technique could be also an acceptable alternative. Our case pretends to illustrate the importance of having a prepared plan B and how clinical judgment could be critical for selecting of the appropriate method for airway intervention.
References:
1. Medicine (Baltimore). 2016 Jul; 95(27): e4125.
Learning points: The choice of the safest technique to approach airway in DNI should be based on clinical signs, technical conditions available and the urgent need to preserve the patient's life. The presence of an experienced team and having a backup plan should be our focus.

5921

Video laryngoscopy: is it always the same?

Stamov V.[1], Gavrilov S.[2], Dolbneva E.[3], Bunyatyan A.[3]
[1]Sechenov First Moscow State Medical University - Moscow (Russia), [2]Clinical Hospitan N (Volyn) of the office of the President of the Russia - Moscow (Russia), [3]Petrovsky National Research Centre of Surgery - Moscow (Russia)

Background and Goal of Study: In recent years, several types of video laryngoscopes (VL) have been introduced into practice. We evaluated the capabilities and learning curve of the four types of video laryngoscopes (VLs).
Materials and Methods: After approval from the ethics committee, we analyzed tracheal intubation in 256 adult patients (144 men, 112 women) at the age of 26-84 years with BMI 18,1-43,4 kg•m-2 1-4 ASA classes for various types of surgery (mainly abdominal). A preliminary assessment was made of the number of risk factors for difficult tracheal intubation (TI) according to generally accepted criteria. First, a direct laryngoscopy (DL) was performed to evaluate the visualization of the larynx. Then TI by endotracheal tube (ETT) was performed using VLs C-MACTM Macintosh or D-Blade (n=116), AirtraqTM Avant (n=105), McGraphTM MAC Macintosh or X-Blade (n=18), or i-viewTM (n=17).
Results and Discussion: Evaluation of DL according to Cook T.M. score in all cases amounted to 1-3A grades. Evaluation of VL according to Fremantle score in all cases amounted to full (n=143), partial (110), or none (3). For different VLs, the easy/modified degree was as follows: 68/48 for C-MAC, 67/38 for Airtraq, 16/2 for McGraph and 15/2 for i-view. There were 6 unsuccessful attempts for Airtraq (rescue with C-MAC and DL), 1 for McGraph (Airtraq), and 2 for i-vew (Airtraq). The reasons were the impossibility of overcoming the epiglottis (n=5) and esophageal intubation (1) for Airtraq, the fogging for McGraph (1), the lack of visualization of the glottis (1) and the tubular epiglottis (1). In uncomplicated cases of rapid TI, the hemodynamic response during VL procedure was unexpressed.
Conclusion: The i-view for single use is only available with one type and size of blade and not for really difficult intubation. McGraph and i-view do not allow making photos and videos for the complete training of beginners. The VL Airtraq channel has a unique geometry, an excellent camera with the ability to remotely view and record, but for reliable use with the functions of the epiglottis, the development of special methods of rotation of the ETT is required. C-MAC is easy to learn, provides excellent image quality, speeds up the process of learning for beginners, allows for various combinations of techniques for the most difficult situations.

5861

Which one can be more convenient for the airway management of a patient who has a huge maxillary tumor; fiberoptic intubation or videolaryngoscope?

Ceran A. C.[1], Büyük S.[1], Karadağ Erkoç S.[1], Gökcan M. K.[2], Alkış N.[1]
[1]Ankara University School of Medicine Ibn - Ankara (Turkey), [2]Ankara University School of Medicine, Department of Ear-Nose-Throat - Ankara (Turkey)

Background: Awake fiberoptic intubation (FOB) is the gold standard approach for the management of a predicted difficult airway. However anesthetists need to perform at least 25 intubations to obtain the competence with FOB. Once learned, regular practice is still required to maintain this skill (1). Recent rewievs revealed that when awake intubation is performed by experienced operators, videolaryngoscope (VL), with a shorter intubation time, is as effective and safe as FOB (2).
Case Report: We report a case of 24-years-old man with an aggressively growing maxillary tumour. The patient has a past medical history of pregabalin use and iv drug addiction for 2 years. The patient's mouth opening was limited (2.1 cm) and the tumour narrowed the oral cavity so that mallampati score couldn't be evaluated. CT was reported as; an exophytic mass lesion starting from the uvula level, narrowing the pharyngeal airway to the right; extending to the anterior and lateral parts of the maxillary bone; closing left nasal passage. The mass size was 15x12x13 cm. Awake intubation couldn't be planned because of rejection of the patient. After preoxygenation, sedation was started with 3mg midazolam and 50mcg fentanyl.

Conscious sedation was continued with propofol infusion according to BIS monitor. When achieved the targeted BIS, laryngoscopy performed with VL and vocal cords seen clearly, than rapid sequence induction (RSI) performed and the patient was intubated successfully within 38 seconds. During the procedure the patient's hemodynamic and vital signs were stable.
Discussion: In these case we thought that in patients whose mallampati score can't be evaluated, the mouth opening is narrow and the extension of the intraoral mass can't be evaluated, awake airway evaluation and adequate vision of vocal cords with VL may be a good option to secure the airway and decide on the following steps.
References:
1. Heidegger T, Gerig HJ, Ulrich B et al. Structure and process quality illustrated by fibreoptic intubation: analysis of 1612 cases. Anaesthesia. 2003;58(8):734–739.
2. Jia Jiang, Da-Xu Ma, Bo Li et al. Videolaryngoscopy versus fiberoptic bronchoscope for awake intubation – a systematic review and meta-analysis of randomized controlled trials Therapeutics and Clinical Risk Management 2018:14
Learning points: When the patient predicted as difficult airway refuses to be awake, RSI after visualisation of the airway under deep sedation by VL can be an alternative to awake technique.

5759

Association of the use of video laryngoscopy and the interpretation of a difficult intubation

Analitis A.[1], Kalogiannis E.[1], Mavromattis E.[1], Stratigopoulou P.[1]
[1]Laiko General Hospital of Athens, University of Athens, Greece - Athens (Greece)

Background and goal of the study: The current definition of a difficult intubation is largely based on direct laryngoscopy (DL). Video laryngoscopy (VL) has shown to facilitate tracheal intubation, and has been gaining popularity in airway management. Therefore, we designed this study to examine if anesthesiologists' interpretations of a difficult intubation are consistent with current guidelines, and if they are affected by the extended use of VL.
Materials and Methods: Tracheal intubation records for adult patients from January to March 2018 were analyzed.The documentation of intubation difficulty was compared with the defined intubation difficulty based on current guidelines for any discrepancy. Two different criteria of a difficult intubation were used for analysis: 1) 3 or more attempts to achieve tracheal intubation, or 2) Cormack-Lehane grade 3-4 view with direct laryngoscopy. The reasons for such discrepancy were further investigated. We also conducted a survey among anesthesia providers on their interpretation of a difficult intubation.
Results and Discussion: Analysis of 250 records has shown that documentation of intubation difficulty in over 95% of records were consistent with current definitions. However, there was evidence of disagreement between each definition and documentation ($p=0.002$ and $p<0.001$ for definitions based on the number of attempts and Cormack-Lehane grade during DL, respectively). We also found that the use of VL, when compared to DL alone, was associated with higher probabilities of discrepancy. When questioned about the definition of a difficult intubation, 66.4% of anesthesia providers considered 3 or more attempts for intubation as difficult and only 10.9% considered Cormack-Lehane grade 3-4 view during DL as difficult. Moreover, over 50% of anaesthestists would choose VL as their first-line device for an anticipated difficult intubation.
Conclusions: Anaesthetists do not consistently use current guidelines to interpret and document a difficult intubation. The use of VL appears to be associated with this discrepancy.

5466

Primary and rescue techniques for anticipated and unanticipated difficult airways: retrospective analysis of four years at a University Hospital

Domenech de la Lastra J.[1], Angeles G. S.[1], Martínez A.[1], Belda I.[1], López A.[1], Valero R.[1]
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background and Goal of Study: A safe management of Difficult Airway (DA) requires prior preparation and the use of alternative techniques to limit the number of unsuccessful attempts. The aim of this retrospective study is to determine the effectiveness of the primary and rescue techniques that allow to secure the airway of those patients classified as DA, both predicted or unpredicted.
Materials and Methods: Electronic anesthesia records were retrieved from all patients that required airway management for general anesthesia from January 2015 to December 2018. The techniques used in patients with anticipated and unanticipated DA, the number of attempts and the causes of failure were analyzed.
Results and Discussion: Data of 38.008 patients was analyzed. Based on a multivariate risk index 4515 patients (11,88%) were classified as Anticipated DA in the preoperative assessment, of whom 41,4% (1868 patients) were managed by videolaryngoscopy (VL), with a success rate of 98,5%; 25,2% (1138) were managed by conventional laryngoscopy (CL), succesful in 84,9% cases; 22,5% (1014) by flexible bronchoscope (FBS), most of them awake, with a success rate of 98,6%; the 10,9% remaining (495) were managed by other techniques, more than half by laryngeal masks (LM). The differential analysis of these four years shows a progressive increase in the use of VL, which grows from 34,8% in 2015 to 45,6% in 2018; as well as a proportional decrease in the use of FBS, which falls from 27,9 to 15,7%. The number of patients managed by other techniques remains stable: CL is maintained between 27,5 and 28,5% and other techniques between 9,8 and 10,2%. Unanticipated DA after CL was registered in 574 patients (1,51%): 140 could be succesfully intubated on the first attempt, but 392 patients (68,3%) required a second technique to secure the airway, 34 patients (5,9%) a third and 8 patients (1,4%) required a fourth one. The VL was the preferred rescue technique and was used in 54,4% of these cases with a success rate of 92%. Intubation stylet was used in 40,2% with an efficacy of 85%. FBS (5%) had a success rate of 96% and LM were used in 2 cases, both succesful.
Conclusions: VL is becoming the preferred technique for anticipated and unanticipated DA in our hospital, with a high success rate, and it's progressively displacing FBS as the main tool for approaching these patients. FBS is the preferred technique for awake intubation and maintains the highest success rate of all techniques.

5267

Difficult intubation in severely obese patients in the era of video laryngoscope

Aze C.[1], Yamada T.[1], Nishimura D.[1], Igarashi T.[1], Ihara N.[1], Morisaki H.[1]
[1]Keio University School of Medicine - Tokyo (Japan)

Background and Goal of Study: Obesity is one of the major risk factors for difficult intubation. Prevalence of severe obesity, which is defined as body mass index (BMI) ≧ 35 kg/m2, in Japan is reported to be 0.5%, and the rate is increasing. The rate of obesity is rising in recent years, and it is the coming concern for anesthesiologists. Meanwhile, the use of video laryngoscopes has been popularized and spread, which facilitates intubation in obese patients. The purpose of this study is to clarify the incidence of difficult intubation in severely obese patients and to describe intubation time and laryngoscope type.
Materials and Methods: Following Institutional Review Board approval, all anesthesia records between April 2017 and October 2019 at Keio University Hospital were retrospectively studied. There were 25297 anesthesia cares provided by anesthesiologists, and of these, 145 patients (0.57% of all cases) with severe obesity (BMI ≧ 35 kg/m2) who underwent general anesthesia with tracheal intubation were identified. Thirteen cases managed by supraglottic devices were excluded.
Results and Discussion: The patients were 71 men and 74 women, 50.6±14.8 years old, and the average BMI was 37.8 (maximum 68.4). Major performed procedures were orthopedic procedures in 44 cases and obstetric and gynecologic in 36 cases. Tracheal intubation was successful in all cases. Eight cases were classified as "difficult" intubation in the record, however, even in those cases, intubation was completed within 20 minutes after entering the operating room. The classifications of difficulty in intubation were recorded by the anesthesiologist in charge, as selected from three categories of "easy," "moderate," and "difficult." The time from the start of preoxygenation to completion of intubation was 10 minutes 26 seconds on average. McGRATHTM were used in 78 cases and conventional laryngoscopes in 66 cases. One case was planned to utilize bronchial fiberscope. In our institution, McGRATHTM and bronchial fiberscope are equipped in every room and can be used on a physician's preference. There was no case of difficult ventilation and extubation. Nasopharyngeal airways were used to support spontaneous ventilation after extubation in 4 cases.
Conclusion: With the widespread use of video laryngoscopes, the incidence of difficult intubation in severely obese patients is considered to be decreased.

4905

Straight blade technique for intubation with McGRATH MAC videolaryngoscope is superior to standard approach

Takahashi K.[1], Suzuki A.[1], Aoki Y.[1], Sakamaki D.[1], Amagai C.[1]
[1]The Jikei University School of Medicine - Tokyo (Japan)

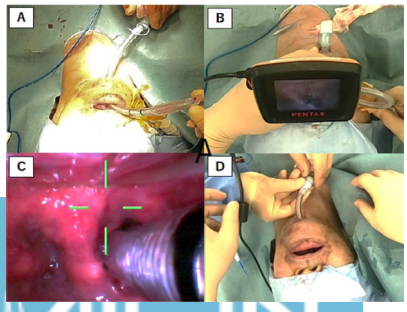
Background and Goal of Study: Videolaryngoscope (VL) is known to improve glottic visualization, and becoming the first line device for difficult airway management. McGRATH MAC VL is one of the popular VL used in Japan. As there is less lifting force required during glottic exposure, direct elevation of the epiglottis, named “straight blade technique” is allowed if the view is not great with standard technique that the blade tip inserted into the vallecula. This study aimed to compare two intubation technique, 1) standard technique and 2) straight blade technique using McGRATH MAC VL in retrospective manner.
Materials and Methods: Patients without having difficult intubation profiles and intubated with McGRATH MAC for elective surgery between October,2017 - October,2018 were searched from our anesthesia database. A total of 15 variables including patient characteristics, intubation profile, postoperative complication were collected.For statistical analysis, unpaired t test, chi-square test, fisher’s exact test, and other if necessary was used with R statistical software package, version 3.6.1 (R foundation for Statistical Computing, Vienna, Austria) A p value less than 0.05 was considered significant.
Results and Discussion: 70 data were collected, and 5 in each group was excluded because of missing data. Therefore, total of 60 (30 each) was used for analysis. The patient characteristics were not different between groups. For intubation profile, POGO was significantly improved by straight blade technique compared with standard technique (82±14% vs 67±14%, p=0.002). Time for intubation was shorter but not significantly different (23±9 sec vs. 28±13sec, p=0.067). Complication rate were not significantly different (hoarseness (6 (20%) vs. 4 (13%), p=0.729), sorethroat (9 (30%) vs. 6(20%), p=0.551)), but one folding epiglottis was noted in straight blade technique group.
Conclusion: Straight blade technique provides improved glottic visualization when evaluated by POGO score, without causing prolonged intubation time or increased complication rate. This technique can be a useful method for McGRATH MAC intubation, but practitioner should be cautious about chance for epiglottic displacement.

4900

Submental Intubation Using Airway Scope® in Patients with Complicated Facial Trauma

Sugimoto Y.[1], Otani S.[1], Suga Y.[1], Kida K.[1]
[1]The Jikei University School of Medicine - Tokyo (Japan)

Background: Submental endotracheal intubation has been reported to be useful for airway management in facial trauma patients. However, the original method has risks of loosening due to universal connector removal. We previously demonstrated a modified submental endotracheal intubation method using a tube exchanger which made the connector removal unnecessary. Although our modified method was safe and fast compared with the previous reports, the apnea time during intubation was rather long. Here we report the novel method using the AWS (Airway Scope®, Nihon Kohden, Tokyo, Japan). With this method, the apnea time dramatically shortened even in patients with complicated facial trauma.
Case report: Two patients were scheduled for maxillofacial injury repair. After oral endotracheal intubation with a normal tube, the surgeon made the incision in the right mandible. Next, an armored tube was inserted from the incision towards the oral cavity (Fig. A). After insertion of the AWS blade, the armored tube was attached to the channel of the AWS (Fig. B). The patient was ventilated through the normal tube during this sequence. Then the normal tube was extubated and the armored tube was intubated with the AWS (Fig. C). After detaching the armored tube from the AWS, it was connected to the ventilator (Fig. D). The apnea time was 59 and 70 seconds in each patient.



Discussion: submental endotracheal intubation was first described by Hernandez Altemir in 1986, there have been many reports of modified techniques (1, 2). In our previous modification, even though we were able to avoid connector detachment, the mean apnea time was longer than expectation (204 seconds). We suspect that the reason is the tube exchanger being tough to bend, when inserting the armored tube with the tube exchanger as a guide. The mean apnea time in the present two cases with AWS was 64.5 seconds, which is one third of the previous modification.
References:
1. Hernandez Altemir F. Journal of Maxillofacial Surgery 1986; 14: 64-5.
2. Amin M, et al. Anesthesia 2002; 57: 1195-9.
Learning points: Submental intubation using Airway Scope® shorten the apnea time in patients with complicated facial trauma.

4601

Videolaryngoscopy versus direct laryngoscopy for airway management in paediatric patients: randomized controlled trial

Klucka J.[1], Stourac P.[1], Kosinova M.[1], Skrisovska T.[1], Klabusayova E.[1], Stoudek R.[1]
[1]University Hospital Brno and Faculty of medicine, Masaryk University - Brno (Czech Republic)

Background and Goal of Study: Videolaryngoscopy can improve the laryngeal inlet (vocal cords) visualisation and is frequently implemented into the clinical practice in patients with predicted difficult airway or even during the unexpected difficult airway management. The aim of the study was to compare the clinical effectivity and safety of elective videolaryngoscopy use for airway management in paediatric patients compared to direct laryngoscopy.
Materials and Methods: Trial was approved byl Ethics Committee (10/2018), registered on clinicaltrials.gov (NCT03747250) and designed as prospective randomized pragmatic trial. After obtaining informed consent, paediatric patients undergoing general anaesthesia with tracheal intubation were randomized in to elective videolaryngoscopy versus direct laryngoscopy. The first attempt success rate, time to first ETCO2 wave, type of videolaryngoscope, type of tracheal tube, type of anaesthesia induction, complications were recorded.
Results and Discussion: Overall 338 patients (1/2019-10/2019) were included, and data was available for 330 patients (162 video/168 direct). There were no significant differences in demographics between the groups. Inhalation induction was preferred choice in both groups (78.4% video vs. 76.8% direct). Most patients were intubated with uncuffed tracheal tube (77.0% video vs. 73.8% direct). The first attempt success rate (86.4% vs. 93.5%), median time to first ETCO2 wave (30 vs. 18 seconds) and incidence of complications (5.5% vs. 3.6%) were all inferior for videolaryngoscopy.
Conclusion: The first attempt success rate was higher in the direct laryngoscopy group versus videolaryngoscopy. Videolaryngoscopy was associated with higher incidence of complications.
Acknowledgements: Supported by a Specific University Research provided by MŠMT (MUNI/A/1111/2018 and MUNI/A/0943/2019), supported by MH CZ – DRO (FNBr, 65269705) and supported by funds from the Faculty of Medicine MU to junior researcher (Jozef Klučka, Martina Kosinová).

4426

Evaluation of McGrath MAC® video laryngoscope experience among anaesthetics' trainees in a large Irish teaching hospital

Hussein K.[1], Duggan E.[2]
[1]Beaumont Hospital - Dublin (Ireland), 2Beaumont Hospital - Dublin (Ireland)

Background and Goal of Study: Video laryngoscopes are widely available and become increasingly used as routine for tracheal intubation. We evaluated trainees' experience using McGrath MAC® video laryngoscope for tracheal intubation in the operating theatres.
Materials and Methods: Anaesthetics' trainees were asked to fill out a survey when they used a McGrath MAC® video laryngoscope. The survey included years of experience, previous training on its use, presence of predictors for difficult intubation, use of airway adjuncts, difficulties with railroading endotracheal tubes (ETT), complications during intubation and overall satisfaction score (on a scale of 100). This survey was registered with the Clinical Audit department.

Results and Discussion: 55 responses were collected from 23 trainees over a three week period. On 26 occasions (47%) trainees had less than two years of experience of anaesthesia compared with 53% who had three or more years of experience. Although McGrath MAC® video laryngoscope is used on a regular basis in our anaesthesia department, only one third of the trainees received formal training before starting its use. Airway adjuncts were used in 16 patients (29%); a bougie was used in 14 patients and a stylet in two patients. Seventeen patients (30%) were deemed to be a difficult intubation requiring an airway adjunct in 56% of these cases. There was difficulty railroading the ETT tube in only 3 cases. There was a 5% complication rate associated with the McGrath laryngoscope, one oxygen desaturation to 88% and difficulty visualising the anatomy due to lubricating jelly obscuring the scope camera on two occasions. The average satisfaction score was 86% which reflects the ease of use of McGrath MAC® video laryngoscope. A common problem reported with video laryngoscopes is advancing the endotracheal tube inspite of having a good view of glottis which usually requires the use of airway adjuncts. Difficulty railroading the ETT was low in this survey which may have been due to the frequent use of airway adjuncts.
Conclusions: McGrath MAC® video laryngoscope is easy to use with high satisfaction among trainees. Airway adjuncts are commonly used to facilitate endotracheal tube advancement especially in patients with predictors for difficult intubation. We recommend that all anaesthetists should be trained on the proper technique for using McGrath MAC® video laryngoscope before starting its use.

5858

Determining a safe upper limit of oxygen supplementation for adult patients: a systematic review

Lassen M.[1], Risgaard B.[1], Baekgaard J. S.[1], Rasmussen L. S.[1]
[1]Rigshospitalet, University of Copenhagen, Denmark - Copenhagen (Denmark)

Background and Goal of Study: Supplemental oxygen is commonly used in critically ill patients and during anaesthesia to prevent desaturation. However supplementary oxygen may result in hyperoxaemia, with the risk of tissue hyperoxia, and an increasing body of evidence has connected these conditions with increased mortality. Thus, hypoxia must be avoided, but patients should not be exposed to high concentrations of oxygen if not needed. This systematic review aimed to describe the connection between the inspired oxygen fraction FiO2 and pulmonary complications in adult patients, with the objective of determining a safe upper limit of oxygen supplementation.
Materials and Methods: MEDLINE and Embase was systematically searched in August 2019 for studies fulfilling the following criteria: intubated adult patients (Population); high fractions of FiO2 (Intervention) versus low fractions of FiO2 (Comparison); atelectasis, ARDS, pneumonia and/or duration of mechanical ventilation (Outcome); original studies both observational and interventional (Studies). Screening, data extraction and risk of bias assessment was done by two independent reviewers.
Results and Discussion: 5891 records were assessed for eligibility, of which 12 were included. Seven studies were conducted in the emergency setting, and five studies included patients undergoing elective surgery. Eight studies reported data on atelectasis, three on ARDS, three on pneumonia and two on duration of mechanical ventilation. There was a significantly increased risk of atelectasis if an FiO2 of 0.8 or above was used, RR: 1.44 [1.05-1.97] (figure). One study showed an almost three-fold higher risk of pneumonia in the high FiO2 group, RR 2.83 [2.25-3.56]. The three studies reporting ARDS and the two studies with data on mechanical ventilation showed no association with FiO2. Half of the randomized controlled trials had high risk of bias.
Conclusion: In this systematic review we found that there was inadequate evidence to identify a safe upper dosage of oxygen, but the available studies suggest a benefit of keeping inspiratory oxygen fraction below 0.8 with regards to formation of atelectasis.

5807

A method for the prevention of atelectasis of the alveoli in patients during mechanical ventilation of the lungs

Piacherski V.[1], Lidziya M.[1], Hramazdou D.[1], Brukhnou A.[1]
[1]Mogilev Regional Hospital - Mogilev (Belarus)

Background and Goal of Study: Prevention of atelectasis of the alveoli during prolonged mechanical ventilation of the lungs in adults without severe ALI.
Materials and Methods: 38 patients on MVL were divided into two groups. Patients of groups A (19 patients) and B (19 patients) were given MVL in BIPAP, PSIMV, PSV modes with protective parameters (PEEP 5-10 mbar, Vt 6-8 ml / kg, MV and FiO2 were selected for MVL in normocapnia mode and normoxemia). Groups differed in the tactics of management, prevention and treatment of existing or emerging atelectasis. In group A patients, with the appearance of atelectasis on a chest X-ray, a bronchoscopy was performed. Group B patients, on the background of MVL, changed the parameters of mechanical ventilation according to the following algorithm: after auscultation of the lungs and confirmation of the endotracheal tube patency and sputum aspiration, PEEP increased by 4 mbar from the original with simultaneous increase in peak inspiratory pressure to 30 mbar with a duration of 5 minutes and a repetition interval every 4 hours, and at each change of a position of the patient. Exclusion factors: pneumothorax, COPD, spontaneous pneumothorax, severe ALI. The groups were compared by the number of patients who did not develop atelectasis during MVL or were resolved on a chest X-ray, the number of which had atelectatic changes, and according to the need to perform bronchoscopy.
Results and Discussion: In group A, atelectatic changes in the lungs were initially in 10 patients and developed in 9 patients. Bronchoscopy was performed in 12 patients with a positive result in 4 patients. In group B, atelectatic changes in the lungs were initially in 11 patients, in 6 patients they did not develop -. After the algorithm, atelectatic changes resolved 11 patients. Bronchoscopy in group B compared with group A was not performed in any patient ($p < 0.05$). In comparison with group A in group B, when applying the proposed algorithm, MVL complications in the form of disatelectasis did not develop or were resolved during treatment without the use of bronchoscopy ($p < 0.05$).
Conclusion: The use of MVL with protective parameters and the use of the proposed preventive algorithm makes it possible to reduce the likelihood of atelectasis of the alveoli, to obtain a positive result with the initial presence of disatelectatic changes in the lungs, and to reduce the frequency of bronchoscopy.

5515

The protective effect of closed suction systems on the incidence of ventilator-associated pneumonia

Lapin K.[1], Chernova T. V.[1], Sovalkova M. S.[1], Kuzkov V. V.[1], Kirov M. Y.[1]
[1]Northern State Medical University - Arkhangelsk (Russia)

Introduction: Ventilator-associated pneumonia (VAP) is most common ICU-acquired infection resulting in significant attributive mortality, increased length of stay, personnel workload and ICU costs. Therefore, the barrier precautions to prevent VAP are of paramount importance. The goal of our pilot study was to assess the effect of closed suction systems (CSS) as a part of the barrier bundle on VAP incidence and pulmonary inflammation.
Methods: Forty ICU patients were prospectively randomised into either the CSS (n = 20) or the control (n = 20) groups. The VAP was diagnosed in patients with CPIS score ≥ 6 pts. beyond 48 hrs of invasive ventilation. Point-of-care lung ultrasound, gas exchange and ventilatory parameters were monitored. Soluble triggering receptor expressed on myeloid cells-1 (sTREM1) was assessed in sputum obtained by bronchoalveolar lavage at 48 and 96 hrs using immunofluorescence assay. The microbiological samples were taken from oropharyngeal and tracheal secretions as well as from the closest unanimated surfaces to explore the colonisation, infection, and contamination, respectively.
Results: In the SCC and the control groups, VAP (CPIS ≥ 6) was diagnosed in 3 (15%) and 9 (45%) patients, respectively, with a significance gained mainly by the cases of late VAP in the control group (after 96 hrs; 0 vs. 4 patients, respectively) ($\chi 2$ 4.29, p = 0,038). Surprisingly, at 48 hrs sTREM1 tended to be higher in the CSS group (8.4 (5.6–14.0) vs. 5.2 (4.0–15.1) pg/mL in the control group (p = 0.175)) and was lower in early VAP (48–96 hrs) compared with patients without VAP (p = 0.04). In contrast to the unprotected suction, the use of CSS resulted in the dissociation of colonising oropharyngeal and tracheal flora as well as contaminating flora of the unanimated surfaces.
Conclusion: Closed suction systems may reduce the risk of late VAP diagnosed with CPIS score. This barrier prevention measure may also be effective for distracting the oropharyngeal and tracheal flora compartments as well as for reduction of the contamination of the closest unanimated surfaces. Analysis of sTREM1 has shown implausible results, thus this marker should not be used for the diagnosis or risk estimation of VAP.

5413

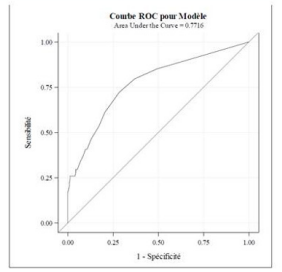
Risk factors for Postoperative Pulmonary Complications in an Afro-Caribbean Population: the CareCoi Score

Rivet A.[1], Drame M.[1], Lebrun T.[1], Carles M.[2], Kindler F.[1]
[1]CHU de Martinique - Fort de France (Martinique),
[2]CHU de Guadeloupe - Pointe a Pitre (Guadeloupe)

Background and Goal of Study: Postoperative Pulmonary Complications (PPC) are associated with an increase of morbi-mortality and longer hospital stays. The incidence of PPC after non-thoracic surgery varies between 2 and 19%. The most of the existing prediction scores for postoperative pulmonary complications were based on Caucasian populations. Only little is known about Caribbean populations and postoperative pulmonary complications, but differences in comorbidities between Caucasian en Caribbean populations are well known. Epidemiologic data shows that Caribbean populations are more at risk for asthma, diabetes and obesity. Objective of this study is to identify risk factors for postoperative pulmonary complications in an afro-Caribbean population
Materials and Methods: Observational, longitudinal, retrospective, descriptive study. Main judgement criteria: respiratory complications (defined as respiratory failure, pleural effusion, respiratory infection, atelectasis, pneumothorax or bronchospasm) within the 7 days after surgery with general anaesthesia. Univariate analysis for identifying risk factors for PPC followed by a logistic regression for identifying independent risk factors.
Results and Discussion: Preliminary results: 720 patients were operated and 235 includes in the study during the inclusion period. 56 patients developed a PPC. Incidence of PPC was 19,2%. Mean age 58 years (+/-18 years); mean BMI was 26 (+/-6); 48% female; 21% ASA1; 53% ASA2 and 26% ASA3. After logistic regression following independent factors PPC were identified: Smoking (OR=2,24; IC95%=1,02-4,91; p=0,04), SpO2 91-95% (OR=3,47; IC95%= 1,52-7,92 ; p=0,003), SpO2 <91 (OR=7,75 ; IC95%=1,54-39,01 ; p=0,01), heart Insufficiency (OR=6,39; IC95%= 2,45-16,69 ; p<0,0001), major surgery (OR=3,51 ; IC95% 1,45-8,48 ; p=0,005); BMI>30 (OR=2,44 ; IC95%= 1,08-5,5 ;p=0,03).

	Odds ratio	Score	p
smoking	2.245	2pts	0.0001
Heart Insufficiency	6.39	6pts	0.013
BMI >30	2.44	2pts	0.0053
Major surgery	3.51	4pts	0.0001
SpO2 91-95%	3.47	3pts	0.043
SpO2 <91%	7.75	8pts	0.003

CareCoi Score	Risk of Complications (%)
Score <0	15
0 <Score <13	24
Score ≥13	61



Variable d'analyse : score							
N	Moyenne	Ec-type	25ème ctl	Médiane	75ème ctl	Minimum	Maximum
279	10	12	0	8	13	0	60

Conclusion: The incidence of PPC is higher compared to the literature data. The identified independently associated risk factors for developing a PPC are different to the in the literature described factors. It may be useful to use a specific PPC prediction score for a Caribbean population

5362

Slower gait speeds during operation room entrance is predictive of hypoxemia in supine position patients during one lung ventilation

Wada A.[1], Shibata S.[2], Fujino Y.[2]
[1]Osaka University Graduate School of Medicine - Osaka (Japan),
[2]Osaka University Graduate School of Medicine - Suita (Japan)

Background and Goal of Study: Gait speed is used for the diagnosis of frailty and assessment of postoperative morbidity risk. Slower gait speeds have been related to poor outcomes in patients undergoing surgery. Measuring gait speed when patients are entering the operation room (OR) is a noninvasive easy method. The gait speed on entering the OR provides information of the current physical status of patients and may possibly reflect the capacity of the patient to tolerate changes in the ventilation-perfusion ratio during one lung ventilation (OLV). In this study we explored the association of gait speed on entering the OR with the frequency of intraoperative hypoxemia during OLV in non-cardiac thoracic surgery.
Materials and Methods: After review board approval, we performed a retrospective review of hospital records of all patients undergoing non-cardiac thoracic surgery with OLV at our center from September 2018 to October 2019. Gait speed was calculated postoperatively by reviewing video recordings from monitoring cameras in our surgical department. Patients with walking disabilities or prior lobectomy were excluded. Other data included patient positioning during OLV, preoperative spirometry, and BMI. Our primary outcome was the association of gait speed with the event of hypoxemia (SpO2<91) unrelated to surgical procedures during OLV. Statistical analysis of the data included student's t-test and multivariate logistic regression analysis.
Results and Discussion: The final cohort consisted of 353 patients. Overall mean gait speed was 0.94±0.13 m/s and hypoxemia during OLV occurred in 13.0% (n=46). Patients experiencing hypoxemia during OLV (hypoxemia group) had significantly slower gait speeds than control group (0.91±0.15vs 0.94±0.13 m/s, p=0.045). Our multivariable analysis showed slower gait speeds were predictive of hypoxemia only in patients in the supine position. Hypoxemia group patients in the supine position (n=13, 30.2%) had significantly slower gait speeds than control group (0.89±0.16vs1.00±0.12 m/s, p=0.018). An increase in gait speed reduced the odds for hypoxemia during OLV. (Odds ratio 0.993 for every 1/1000 m/s increase in gait speed, 95% confidence interval 0.987-0.996, p=0.004).
Conclusion: Our study suggests the gait speed on entering the OR is a predictor of hypoxemia during OLV in supine position undergoing non-cardiac thoracic surgery.

4959

A case of post-extubation airway obstruction and aspiration pneumonitis due to nasal pack aspiration

Yap S. H.[1], Wong J.[2], Tan Y. R.[2], Loh K.[2], Abdullah H. R.[2]
[1]Singapore General Hospital - Singapore (Singapore),
[2]Singapore General Hospital - Singapore (Singapore)

Background: Nasal packs are routinely inserted post nasal surgery to assist with haemostasis. Nasal pack aspiration is a rare cause of acute airway obstruction in the post-operative period that can quickly become life threatening if not rapidly managed.
Case Report: We report a case of post-extubation airway obstruction due to aspiration of a Merocel® nasal pack into the trachea, resulting in hypoxia, hypercapnoea and tachycardia requiring re-intubation and bronchoscopic retrieval of the pack. Post-procedurally, the patient developed aspiration pneumonitis and required oxygen supplementation, antibiotics, and high dependency monitoring. He was subsequently discharged well and did not have any long term complications on follow up at 3 and 6 weeks post-event.
Discussion: Nasal pack aspiration has previously been reported in a similar patient demographic[1]. Factors such as patient profile and the type of nasal pack used[2] may contribute to aspiration. Young, healthy, male patients may be at increased risk of aspiration due to their ability to generate a greater negative inspiratory force. Self-expanding nasal packs may cause severe airway obstruction by expanding to occlude the lumen of the airway. By identifying risk factors for airway obstruction and aspiration, we can reduce the morbidity of these events by avoiding the use of nasal packs in at-risk patients and instituting closer monitoring if nasal packing is required.
References:
1. Walton, S.L. Postextubation foreign body aspiration: a case report. AANA J. April 1997; 65 2: 147-9.
2. Wang J, Cai C, Wang S. Merocel versus Nasopore for nasal packing: a meta-analysis of randomized controlled trials. PLoS One. 2014;9(4):e93959. Published 2014 Apr 7. doi:10.1371/journal.pone.0093959.
Learning points: Nasal pack aspiration is an uncommon cause of potentially life-threatening post-extubation airway obstruction. Indications for use of nasal packs should be weighed against the potential risk of complications, and care should be taken to secure packs well to prevent aspiration. Surgeons may also consider the use of non-expandable packs so as to reduce the severity of obstruction should aspiration occur.


Bronchoscopic image of nasal pack aspirated in trachea occluding lumen

4898

Dynamic respiratory movements of vocal cords during emergence from general anaesthesia in children with supraglottic airway

Ishibashi K.[1], Isono S.[1], Kitamura Y.[2], Kato S.[3]
[1]*Chiba University Hospital - Chuo-ku, Chiba-shi (Japan),*
[2]*Matsudo City General Hospital - Matsudo-City (Japan),*
[3]*Beth Israel Deaconess Medical Center - Boston (United States)*

Background and Goal of Study: We often encounter laryngeal stridor during emergence from anaesthesia in children managed with supraglottic airway (SGA). However, we know little about the mechanisms of the stridor and behavior of the vocal cords (VC). VC patency is determined by the balance of forces between laryngeal abductor and adductor muscles. We hypothesized that this balance control is depressed during anaesthesia and recovers during anaesthesia emergence while no previous studies have explored the recovery processes.
Materials and Methods: We took an advantage of assessing the dynamic VC behavior during emergence with using the previously-reported data obtained in 27 anaesthetized children undergoing minor surgeries with SGA (19 to 53 months) (Ishibashi K, et al. Br J Anaesth 2019). Endoscopic VC images, respiratory variables and respiratory sound were used for this secondary analysis. We focused on changes of VC angle (VCA), an angle formed by lines connecting anterior and posterior commissures, in the first few spontaneous breathes (delta VCA = inspiratory VCA minus expiratory VCA). We explored independent factors explaining the delta VCA with using backwards stepwise analysis.
Results and Discussion: VC phasically moved in accordance with respiratory cycles, and inspiratory VC abduction was endoscopically observed in 11 out of 27 children while mean inspiratory VCA did not differ from mean expiratory VCA (P= 0.819). Delta VCA varied from -19.2 to 32.7 degree and one subject met the outlier exclusion criteria. Age, end tidal carbon dioxide concentration (ETCO2), and effect site concentrations of remifentanil and propofol had P values smaller than 0.1 determined by univariate correlation analyses with delta VCA. Backwards stepwise analysis determined age (P<0.001) and ETCO2 (P=0.017) as independent variables explaining delta VCA (delta VCA = 5.0 + 0.25Age – 0.29ETCO2). Stridor sound was identified by a microphone within the anaesthesia circuit in 6 children. VC narrowing was observed in 4 of them whereas airway narrowing at the level of arytenoids without VC narrowing was observed in 2 of them. The stridor disappeared during the course of anaesthesia emergence and stable spontaneous respiration was established in all children.
Conclusions: Recovery of abduction movements of the vocal cords during emergence of anaesthesia is delayed in smaller children, and hypercapnia appears to augment the vocal cord narrowing.

4805

Mechanical ventilation through tracheostomy in critical patient: a consideration of the size of the tracheal cannulas

Cardozo Panoff M.[1], Blazquez Martin J.[1], Gonzalez-Suarez S.[1]
[1]*Hospital Universitari Vall d'Hebron - Barcelona (Spain)*

Background: The length of the two segments of the tracheostomy cannula (stomal and intratracheal segments), as well as the angle formed between both segments, should be selected for each patient according to their anatomy. However, an adequate selection of a tracheal cannula, not always guarantees a correct ventilation.
Case Report: A 78-year-old patient required double valve replacement. In the postoperative period, a percutaneous tracheostomy was performed due to an impossibility of progression in the weaning. On the 5th day of tracheostomy, a persistent air leak was seen through it. The 8 number of portex tracheostomy cannula was removed and the replacement for another one was not possible. Finally, a 6 number orotracheal tube was inserted at the level of the tracheostomy. During this procedure, a piece of the neck flange of the tracheostomy cannula was introduced into the airway, forcing the surgical extraction by bronchoscopy. After inserting the bronchoscope through the glottic opening, the tracheal tube was removed, and high frequency jet ventilation was performed. Once the foreign body was removed, and under direct vision by the rigid bronchoscope, an 8 number of portex tracheostomy cannula couldn't be introduced. A shyley tracheostomy cannula number 8 was inserted, but the length of this cannula was too short: the tip of the cannula exerted a lot of backward pressure onto the posterior tracheal wall, leading to a partial obstruction of the airway. Finally,the insertion of a tracheal tube size 6 in tracheostomy guaranteed an optimal ventilation.
Discussion: The edema, inflammation and emphysema around the stomal tissue increase the deep of the tracheal stoma and can make difficult to change the tracheal cannula and mechanical ventilation. In critical patients, Mallick recommended to place tracheostomy cannulas with an increase the stomal and intratracheal lengths, by approximately 1 cm. Also, the relation between the angle of the stoma segment and of the tracheal segment, should be greater than 110-120 degrees to provide a correct orientation of the intratracheal section of the cannula. Due to greater flexibility and length of orotracheal tube, its insertion at the level of tracheostomy, and ventilation provided through it, are usually successful.
Conclusion: The standard length of the tracheostomy cannulas has been designed for patients with normal neck; but, in critical patients, we should consider the placement of greater tracheostomy cannulas.

4515

Aspiration pneumonitis caused by povidine-iodine used for preoperative disinfection of oral cavity

Wang L. K.[1], Lin Y. T.[1], Chen J. Y.[1]
[1]*Chi Mei Medical Center - Tainan (Taiwan)*

Background: Povidone-iodine (PI) is an effective oral disinfectant, but it can induce aspiration pneumonitis (AP) once it enters lower airway (LA). We wish to report a case of AP after induction of general anesthesia (GA) for fixation of maxillofacial fractures.
Case Report: A 26-year-old male suffered right zygoma tripod and maxilla fractures from a traffic accident. He was sent to the operating room for fixation of fractures. After anesthetic induction and intubation with a 7.5# endotracheal tube (ETT), which was fixed at the left mouth angle at 24 cm, the surgeon assistant used 10% PI to disinfect the face. The anesthesiologist made room rounds, came back and noticed outward movement of the ETT for 2–3 cm. The nurse anesthetist was asked to aspirate the ETT cuff, move the ETT inward, fill the cuff and re-secure the ETT at 24 cm. Peak inspiratory pressure abruptly went up to 40 cm H2O after reinitiation of mechanical ventilation. Lung auscultation revealed diffuse rhonchi and wheezes. Some brownish liquid was suctioned from the ETT. In the anesthesiologist's hindsight, the surgeon assistant had used PI for facial and oral disinfection and poured the remaining PI into the oral cavity. To correct gradual desaturation (SpO2 down to 85%), normal saline lavage, ETT suctioning and administration of puffs of fenoterol into the ETT were done. SpO2 went up to 92% under FiO2 100%. The patient's mother agreed to proceed with the surgery and postoperative intensive care. The surgeon made facial and intra-oral buccal gingival incisions, reduced and fixed the fractures with plates. The patient's SpO2 remained at 98–100% under FiO2 80%. Postoperative chest X-ray showed patchy infiltrates/consolidations over bilateral lung fields. Intravenous antibiotic, diuretic and propofol were given. Weaning from ventilator succeeded 5 days later. The patient was discharged from hospital without lung sequelae.
Discussion: PI instillation into rat lungs resulted in atelectasis, edema and inflammation [1]. The usual reflex defenses that protect the LA are abolished during GA. AP can occur from leak of PI through an ETT cuff without air leakage [2]. In our case, entry of PI in the oral cavity into LA during reposition of EET caused AP.
References:
1. Cheong SH. J Anesth 2012;26:70–9.
2. Hitosugi T. Oral Maxillofac Surg 2019;23:507–11.
Learning points: To prevent AP, it is prudent to use minimum amount of PI for oral disinfection, and do oral suctioning before repositioning the ETT.

4453

Expected difficult airway in critical central airway obstruction. Pre-emptive ecmo cannulation as a rescue measure and awake fiberoptic intubation

Higuero F.[1], García-Hernandez S.[1], Fernandez-Riveira C.[1], Alonso-Chico A.[1], Varela-Cabo A.[1], Lisbona-Saez C.[1]
[1]*Fundación para la Investigación Biomédica Hospital General Universitario Gregorio Marañón - Madrid (Spain)*

Background: Central airway obstructions (CAO) represent a challenge to anesthesiologist as they may not be managed with any of the four conventional oxygenation techniques (mask ventilation, supraglottic airway devices, endotracheal tube and surgical airway). To date, difficult airway guidelines (DAG) still have not incorporated any recommendation regarding CAO scenarios. However, there is a growing evidence of the use of extracorporeal membrane oxygenation (ECMO) in the CAO scenarios, as they have already proved to give an adequate respiratory support in respiratory failure.
Case report: A 42 year old male is studied for class III/ IV dyspnea. CT scan reveals a large mediastinal mass causing almost complete tracheal obstruction. Flexible

bronchoscopy reveals a 90% inspiratory and almost 100% expiratory collapse. During the test the patient develops a severe episode of acute respiratory failure and inspiratory stridor. Regarding the high risk of impending airway obstruction emergency surgery for mass removal was indicated. Given a recently manipulated airway with a high risk of "can't intubate/ can't ventilate" and deeming the surgical airway impossible, venoarterial ECMO canulae were implemented previously to any airway manipulation. Everything was arranged to enter ECMO circulation if airway management was to fail. Under minimal sedation, fiberoptic awake intubation was achieved and an orotracheal coiled tube was correctly placed beyond the tracheal obstruction. Surgery underwent without incidences and patient was discharged to ICU. Mild tracheomalacy was revealed on the first postoperative day (POD) and ECMO canules were removed. The patient was extubated on POD 2 and discharged home on POD 6 with no complications.
Discussion and learning points: CAO may not be managed with any conventional oxygenation technique. This patients should be managed only in tertiary care institutions. ECMO may be a valuable tool in such scenarios. Venovenous ECMO may be a more suitable device for pre-emptive strategies. The degree of ECMO implementation varies among authors. Anticipation and planification are key to successful management of CAO, as emergent ECMO cannulation is associated with greater morbility and mortality. In the future ECMO may be involved in DAG.
References:
1. Malpas, G et al.(2018). The use of extracorporeal membrane oxygenation in the anticipated difficult airway: a case report and systematic review. Can J Anesth/ 65. 10.1007/s12630-018-1099-x.

6178

Obstructive Sleep Apnoea risk as predictor of difficult intubation among obese oral surgical patients

Klaric V.[1], Balaško A.[2], Povšić-Čevra Z.[1], Šimunić-Forić A.[1]
[1]Magdalena Clinic For Cardiovascular Diseases - Krapinske Toplice (Croatia), [2]University Hospital Centre Zagreb - Zagreb (Croatia)

Background and Goal of Study: Obesity, defined as body mass index (BMI)≥30 kg/m2 is a multisystem, chronic, proinflammatory disorder associated with a significant increase in perioperative complications. Obese patients undergoing oral surgery may provide a unique set of anesthestic challenges associated with airway management. The aim of the study was to evaluate obstructive sleep apnoea (OSA) risk as possible predictor of difficult intubation among obese patients scheduled for one day oral surgical procedures under general anesthesia.
Materials and Methods: This was an explorative single-center prospective observational study. 75 obese patients (30-65 year old and ASA II-III) undergoing oral surgery were enrolled. The risk for OSA determinated by STOP-BANG questionnaire, body mass index (BMI) and waist-to-hip (W/H) ratio was assessed. Difficult intubation was a priori defined as any intubation with > 2 attempts and/ or requiring alternative techniques: Mc Coy laryngoscope, Gum elastic Bougi, fiber bronchoscope or Bonfils and assessed by two independed experienced investigators. Receiver operating curve (ROC) analyses were performed to identify predictors of difficult intubation and their cut-off values.
Results and Discussion: Difficult intubation was observed in 15 (20%) patients (10.7% males, 9.3% women, p=0,72). High OSA risk (STOP-Bang ≥ 4) was reported by 56% (n=42) of the population (22,66%, n=17 women; 33,3%, n=25 males). ROC analysis showed that STOP-BANG criteria of above 3 had 93,33% sensitivity and 25% specificity in prediction of difficult intubation (area under the curve [AUC] = 0.559). The average (SD) BMI was 35.6 (5.6) kg/m2, with 42 males, and average (SD) W/H ratio was 1.1 (0.19) with no significant prediction of difficult intubation.
Conclusion: In our population of obese patients undergoing oral surgery we found that more than 3 STOP-BANG criteria had high sensitivity but low specificity in prediction of difficult intubation . We recommend routine assessment of OSA risk among obese patients during preoperative evaluation, especially in one-day oral surgery.

5781

Extubation strategies in patients with bilateral vocal cord paralysis after total thyroidectomy

Buriticá Aguirre A. M.[1], Aguilera Aguilera G. A.[1], Gloria Escobar S. D.[1], Sanchez Salamero S.[1], Ron Villalba Z.[1], Osorio Salazar E.[1]
[1]University Hospital Arnau de Vilanova - Lleida (Spain)

Background: Post-operative bilateral vocal cord paralysis (VCP) after thyroidectomy is rare (0 to 2.9%)1,2. We present a clinical case to analyze the extubation management in a patient with bilateral VCP after a total thyroidectomy.
Case Report: A 47-year-old woman without difficult airway criteria was scheduled for total thyroidectomy due to multinodular goitre with tracheal displacement and compressive symptoms. Preoxygenation and intravenous induction with propofol, fentanyl and lignoocaine was performed. She was intubated by fibrobronchoscopy using an electromyographic endotracheal tube. At the end of surgery, there was no response from both laryngeal nerves. Direct stimulation of the recurrent larynx nerve without cord response (Fig1). Guided fiberoptic bronchoscopy extubation was performed using a Cook airway catheter exchange and emergency tracheotomy materials were prepared by an ENT. The patient presented bilateral VCP in abduction position and extubation was done (Fig2). She was transferred to the post-operative ICU; after 24 hours dysphagia and aphonia persisted, however there was no respiratory distress.
Discussion: In patients undergoing thyroid surgery, Bilateral VCP associate with increased risk of morbidity and mortality in the extubation 2. In this case, we followed the extubation guidelines in high-risk patients according to Difficult Airway Society3. We were able to directly see the correct glottic pathway, checked for adequate ventilation (independent of the VCP). Thus, we obtained a safe extubation.
References:
1. Randolph, G. W.et al. Intraoperative electrophysiologic monitoring of the recurrent laryngeal nerve during thyroid and parathyroid surgery. The Laryngoscope 2017 127: 280-286.
2. Dhillon, V.K. et al. The incidence of vocal fold motion impairment after primary thyroid and parathyroid surgery for a single high-volume academic surgeon determined by pre- and immediate post-operative fiberoptic laryngoscopy. International Journal of Surgery 2018 Aug;56:73-78
3. Popat, M. Et al. Difficult Airway Society Guidelines for the management of tracheal extubation. Anaesthesia 2012 Mar;67(3):318-40.
Learning points: Neurostimulation monitoring contributed to the safety of the airway in tracheal extubation1. In patients without stridor or dyspnea, to check the position of the vocal cords during extubation in thyroid surgery could avoid a tracheotomy.

5373

Predictive factors for difficult airway management in patients undergoing maxillofacial reconstrutive surgery. A retrospective study

Pistiolas G.[1], Mitos G.[1], Sifaki F.[1], Gkiouliava A.[1], Chatzakis C.[1], Koraki E.[1]
[1]Pappanikolaou General Hospital - Thessaloniki (Greece)

Background and Goal of Study: Airway management in cases of cosmetic and functional maxillofacial surgery remains complicated for the anesthesiologist. The aim of this study is to identify the predictive factors of difficult airway management in patients presenting for maxillofacial reconstructive surgery, judged by the Cormack-Lehane (C-L) grade of direct laryngoscopy.
Materials and Methods: We conducted a retrospective cross-sectional study on patients with maxillofacial deformities requiring surgical intervention between January 2016 and December 2018 in General Hospital of Thessaloniki "Georgios Papanikolaou". We enrolled adult patients undergoing elective surgery for maxillofacial reconstruction. Patients who needed emergent airway management were exluded. The recorded data included demographic characteristics, Mallampati class and other airway related predictive factors. The primary outcome was the C-L grade of direct laryngoscopy using a Macintosh blade. Patients having Grade III and IV were classified as difficult airway cases. Statistical analysis was performed using SPSS (IBM Corp.2016 IBM Version 24.0).
Results and Discussion: In this 3 year period, 122 patients underwent maxillofacial reconstructive surgery in our Institution. Airway management included techniques such as direct laryngoscopy, fiberoptic intubation and use of Video Laryngoscopes. With the airway secured, direct laryngoscopy using a Macintosh blade was performed on all patients. Ninety one were identified as a C-L grade I, twenty five as grade II and six as grade III. Regression analysis did not reveal any significant predictive factor for a difficult airway. Comparing the descriptive statistics results to the general population, a higher percentage of Grade III patients seems to be present in our group. However, the sample size is small and thus, a definitive statement cannot be concluded. Further studies should be conducted to identify

whether there is indeed some correlation using a larger patient sample.
Conclusion: There was no statistically significant correlation between predictive factors for difficult airway and the C-L grade in adult patients who underwent elective maxillofacial reconstructive surgery in our Institution. Our intention is to keep collecting data in order to study a larger patient group for possible correlations.

5595

Perioperative airway management of mucopolysaccharidosis: A retrospective study

Tümer M.[1], Ankay Yılbaş A.[1], Debbag S.[1], Sarıcaoğlu F.[1], Canbay Ö.[1]
[1]Hacettepe University School of Medicine - Ankara (Turkey)

Background and Goal of Study: Mucopolysaccharidosis (MPS) is an inherited and progressive metabolic disorder associated with glycosaminoglycan aggregation in various tissues. Airway management is difficult in these patients due to facial deformities and mucopolysaccharide aggregation in nasopharynx. The aim of this study is to determine the problems in airway management of MPS patients undergoing surgery.
Materials and Methods: Following approval of the ethics committee, MPS patients who underwent surgery between 2015-2019 in our hospital were evaluated retrospectively.
Results and Discussion: The mean age of 23 patients undergoing 31 surgical procedures was 127.6±84.2 months, mean body weight was 24.9±17.6 kg. MPS VI (30%) and MPS IV (30%) were the most common MPS types. Orthopedic surgeries were the most common surgery type (29%). Difficult mask ventilation was not seen in any of the patients. Intubation was difficult in 10 patients (32%), eight of which were intubated with videolaryngoscopy (VL). One patient, scheduled for emergency tracheotomy, couldn't be intubated and operated under mask ventilation. One patient with limited neck extension due to narrowness of foramen magnum was intubated via awake fiberoptic bronchoscopy. There was no need for laryngoscopy in 5 patients (16.6%) because 3 had a tracheotomy and 2 were already intubated orally during admission to the operating room. VL was the most common intubation method (64.5%) of overall patients. In the postoperative period, 53.3% of patients were followed up in the intensive care unit (ICU). One patient was reintubated due to acute respiratory dysfunction during postoperative ICU stay. There were no other perioperative complications. Patients with difficult intubation were older than those without difficult intubation. However, this difference was not statistically significant (p=0.362). We attribute this to the low number of patients.
Conclusion: Anesthetic management could be challenging in many aspects in MPS patients. The risk of difficult intubation must always be considered due to macroglossia, short neck, hypertrophic tonsils and adenoids, kyphoscoliosis, immobile jaw, narrowed nasal passages and atlantoaxial instability. VL seems to be a safe method in MPS patients, however an experienced anesthesiology team with alternative plans should always be ready during perioperative management of these patients regardless of the choice of the equipment.

5097

HEAVEN criteria: prediction of difficult airway during in-hospital rapid sequence intubations

Schweizer T.[1], Hugger S.[1], Kaluza P.[1], Theiler L.[1], Greif R.[1], Airway Management
[1]Inselspital, Bern University Hospital - Bern (Switzerland)

Background and Goal of Study: Assessment of difficult airways in emergencies is an important competence and might prevent life-threatening complications. The HEAVEN criteria [1] were found valid to predict difficult airways during preclinical emergency intubations in a retrospective study. The acronym stands for Hypoxemia, Extremes of size, Anatomic abnormalities, Vomit/blood/fluid, Exsanguination/ anaemia, and Neck mobility issues. This pilot study aims to assess the feasibility of using the HEAVEN tool to predict difficult in-hospital rapid sequence intubation (RSI).
Materials and Methods: With Cantonal Ethics Committee approval and written informed consent from each patient we prospectively recorded the HEAVEN criteria during in-hospital RSI facilitated by videolaryngoscopy. Difficult intubation was defined as more than one intubation attempt or desaturation <93% SpO2 during RSI. Sensitivity, specificity, positive predictive value, and negative predictive value (NPV) were determined for first-attempt success.
Results and Discussion: This pilot study included 54 patients who underwent general anaesthesia with indication for RSI due to emergency surgery. The patients' median [IQR] age was 56.5 [38.5-70] years, BMI was 24 [22-26] kg/m2, and ASA physical status classification n (%) was: ASA 1: 7 (13), ASA 2: 21 (39), ASA 3: 15 (28), ASA 4: 10 (18), ASA 5: 1 (2). First attempt success rate was 94% without HEAVEN criteria and 90% with at least one criteria, overall success rate was 100%. NPV was higher than 92% for each of the HEAVEN criteria.
Conclusion: The high NPV of all HEAVEN criteria suggests that its absence rules out difficult intubation to a high degree. After this feasibility study, we plan a proper sized prospective study to validate the HEAVEN criteria as prediction tool for difficult RSI in in-hospital surgical emergencies.
References:
1. Kuzmack, E., et al., A Novel Difficult-Airway Prediction Tool for Emergency Airway Management: Validation of the HEAVEN Criteria in a Large Air Medical Cohort. J Emerg Med, 2018. 54(4): p. 395-401.

5049

The efficacy of hyomental distance ratio as a predictor of the difficult intubation

Glazniece Kagane Z.[1], Kagans A.[2], Grigorjevs S.[2], Ozoliņa A.[3], Mamaja B.[3]
[1]Riga east clinical university hospital Gailezers - Riga (Latvia), [2]Riga Eastern clinical university hospital Gailezers - Riga (Latvia), [3]Riga Eastern clinical university Hospital - Riga (Latvia)

Background and Goal of Study: In order to avoid complications, if intubation fails, it is essential to find a simple and reliable tool to predict difficult airway. There are a lot of airway assessment methods, but still the major concern is low predictability of commonly used airway assessment screening tests and high interobserver variabilities. Data about ultrasound as a predictor of difficult intubation are promising.The procedure of sonographic measurement of hyomental distance is easy to learn and takes two to three minutes to perform. The goal of this study was to find the sensitivity and specificity of hyomental distance ratio (HMDR) <1.2 as a predictor of difficult intubation (DI).
Materials and Methods: Prospective cohort study included 56 patients scheduled for elective surgery requiring general anesthesia and tracheal intubation in The Riga East clinical hospital Gailezers. Before the operation the patients had sonographically measured hyomental distance in neutral (HMDn) and extreme head extension (HMDe) positions. The HMDR was calculated by dividing hyomental distance in extreme head extension by hyomental distance in neutral head position. The primary outcome was the efficacy of HMDR for predicting the difficult laryngoscopy (Cormack Lehane grade 3,4). The CL grade was evaluated by experienced anaesthesiologist during larygoscopy. Statistical analysis was performed, using IBM SPSS 23.0.
Results and Discussion: The research included 56 patients, 28(50%) were males, 28(50%)-females. DI was present in 15(27%) patients. In DI group mean age was 51.3 (±11.3), in EL -53,9 (±14.5), BMI in DI goup was 34.3(±9.1) , in EI group 28.5(±5.7). Mean HMDn in DI group was 5.28±0.57cm, in EI group 5.04±0.5cm, mean HMDe in DI group was 5.9±0.56cm, in EI group 6.26±0.0.59cm, HMDR in DI group was 1.12±0.04, in EI group – 1.24±0.06. There was no statistically significant difference between the groups except for BMI and HMDR. In DI group 6 (40%) patients required 1 attempt, 6 (40%) - 2 attempts and 3(20%) required 3 attempts for successful intubation. Modified Mallampati score had sensitivity 66,7% and specificity 53,7%(p>0,05). HMDn>5.5 cm had sensitivity 40% and specifity 78%(p>0.05). HMDe≤5.3 had sensitivity 33.3% and specificity 95.1%(p<0.01). HMDR had sensitivity 86.7% and specificity 85.4%(p<0.01).
Conclusion: HMDR has high sensitivity and specifity in prediction of the difficult intubation.

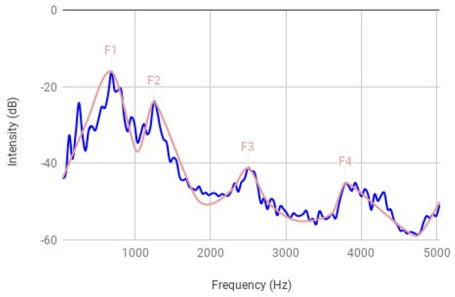
4755

Evaluation of the association between voice parameters and Mallampati classification

de Carvalho C.[1], Da Silva D. M.[2], De Orange F. A.[3]
[1]Universidade Federal de Campina Grande - Campina Grande (Brazil), [2]Hospital das Clínicas da UFPE - Recife (Brazil), [3]Instituto de Medicina Integral Professor Fernando Figueira - Recife (Brazil)

Background and Goal of Study: Difficult airway management still lacks an accurate predictor and subjective parameters such as the modified Mallampati test may hamper its prediction leading to misclassification. Objective measurements, on the other hand, have been shown to enhance the accuracy of any test. In this field, voice parameters have been proved to be associated with upper airway anatomy besides been deemed to predict difficult airway management. This way, some voice parameters such as formant frequencies (Figure 1) are supposed to improve, as

objective parameters, the preoperative airway assessment by better evaluating the upper airway anatomy. Therefore, we aimed at observing whether voice parameters would be associated with Mallampati classification so that they could improve the assessment of upper airway anatomy.
Materials and Methods: A prospective study with 453 patients scheduled for elective surgery under general anesthesia was performed. At transitional waiting hall before transport to the operating room, we collected data on sex, age, weight, height, ASA physical status, Body Mass Index, modified Mallampati test, and acoustic parameters from three phonemes (/a/, /i/, /u/). Uni and multivariable analyses were conducted. Two logistic regression models and their predictive performances were determined.
Results and Discussion: The main result was the association found between formant if5 (p=0.00) and modified Mallampati test. ASA physical status was also related to Mallampati classification as well as age. Obesity, sex, weight, height, and BMI did not show any association with the Mallampati test. The AUC for the regression model containing all formants together was 65.0%, whereas the AUC for the model containing only three formants (af2, af4, and if5) after a stepwise was 60.2%.
Conclusion: Voice formants are objective measurements associated with both upper airway anatomy and Mallampati classification. Such as, voice analysis may improve the upper airway assessment performed by the conventional modified Mallampati test.

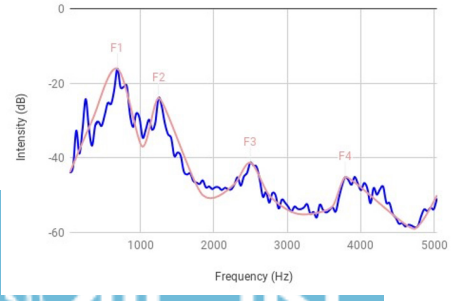


4469

Correlation between voice parameters and the number of intubations attempts: a prospective study

de Carvalho C.[1], Da Silva D.[2], De Orange F.[3]
[1]Universidade Federal de Campina Grande - Campina Grande (Brazil), [2]Hospital das Clínicas da UFPE - Recife (Brazil), [3]Instituto de Medicina Integral Professor Fernando Figueira - Recife (Brazil)

Background and Goal of Study: Predicting difficult airway management remains challenging so far. All predictors available to the present moment feature just a poor performance to anticipate problems over the airway manipulation. In this field, voice parameters have been proved to be associated with upper airway anatomy besides being deemed to predict difficult airway management. These conceptions led us to investigate the correlation between the formant frequencies (Figure 1) and the number of intubations attempts.
Materials and Methods: We performed a prospective study involving 453 patients who underwent elective surgeries under general anaesthesia with tracheal intubation. Before transporting the patients to the operating room, we collected their data on sex, age, weight, height, ASA physical status, Body Mass Index (BMI), and acoustic parameters from five phonemes (/a/, /e/, /i/, /o/, /u/). In the operating room, during the airway management maneuvers, the number of attempts to successfully allocate the orotracheal tube was noted. The Spearman correlation test was performed among the quantitative variables.
Results and Discussion: The number of intubation attempts were correlated to the formants ef2 (r=-0.123, p=0.016); of2 (r=0.097, p=0.037); and of4 (r=0.114, p=0.014). Age, weight, height, and BMI did not show any correlation to the number of intubations attempts.
Conclusion: Voice formants were correlated to the number of intubations attempts and may constitute an alternative tool for preoperative upper airway assessment.

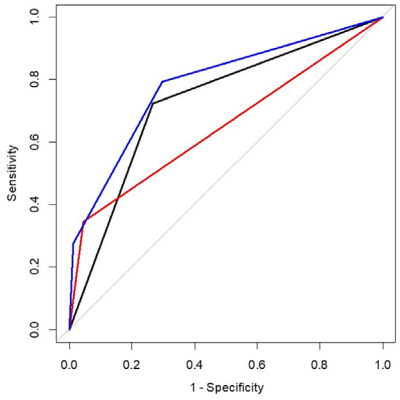


4468

Predictive value of combined Mallampati and Sternomental distance for difficult laryngoscopy: a prospective study

de Carvalho C.[1], Da Silva D.[2], De Orange F.[3]
[1]Universidade Federal de Campina Grande - Campina Grande (Brazil), [2]Universidade Federal de Pernambuco - Recife (Brazil), [3]Instituto de Medicina Integral Professor Fernando Figueira - Recife (Brazil)

Background and Goal of Study: Difficult airway prediction remains a challenging task as none of the predictors reported so far has featured satisfactory accuracy. Much of this poor accuracy may be due to the inability of predictors to assess the diverse anatomic structures involved in difficult airway management. This led us to investigate whether the Mallampati test, a parameter which assesses the upper region of the airway, along with the sternomental distance, a parameter which evaluates the lower region of the airway, would improve the preoperative airway assessment when bound together.
Materials and Methods: A prospective study with 453 patients scheduled for elective surgery under general anesthesia was performed. At transitional waiting hall before transport to the operating room, we collected data on sex, age, weight, height, ASA physical status, Body Mass Index, modified Mallampati test, and sternomental distance. In the operating room, after the induction of the anesthesia, the Cormack-Lahane classification was noted by the assistant anesthesiologist. Uni and multivariable analyses were conducted and three logistic regression models were obtained.
Results and Discussion: Mallampati classification (OR=7.17; p=0.000) and sternomental distance (SMD) (OR=11.08; p=0.000) were both associated with difficult laryngoscopy. The OR was 25.95 (p=0.000) when both Mallampati and SMD were indicative of difficult intubation. Three logistic regression models were evaluated (Figure 1) and their AUC defined as follows: Mallampati alone 72.88%; SMD alone 65.0%; Mallampati and SMD together 78.51%.
Conclusion: Mallampati test and sternomental distance have better predictive performance when evaluated together. Additionally, the chances of facing a real difficult airway are highly increased when both are indicative of difficulty.



5683

Known difficult airway with proposed laryngeal microsurgery: when normal-caliber fiberscope is not an option

Amaro S.[1], Moço R.[2], Torrinha S.[2], Gordillo I.[2]
[1]Hospital Prof. Dr. Fernando da Fonseca - Lisboa (Portugal), [2]Centro Hospitalar de Lisboa Ocidental - Lisboa (Portugal)

Background: The management of the known or suspected difficult airway (DA) often requires an awake intubation for greater safety. Awake fibreoptic intubation (AFOI) is considered the “gold standard” tool for managing the known DA, with recognized effectiveness and safety1. However, AFOI has some drawbacks such as its unfeasibility in some situations and limited availability2. In these cases, other strategies must be adopted to manage the known DA safely. We present a case of a known DA in which the AFOI was not possible and awake intubation with videolaryngoscopy (VL) was successfully used.
Case Report: A 45-year-old female, ASA II, with previous history of failed intubation was proposed for laryngeal microsurgery due to symptomatic Reinke's edema. Due to the unavailability of a small-caliber fiberscope at our hospital that fit the narrow lumen of microlaryngeal endotracheal tube, AFOI was not an option and the primary strategy was awake intubation with VL.

With the patient monitored, sedoanalgesia and topical anaesthesia of the upper airway were administered. After pre-oxygenation, laryngoscopy was performed with the C-MAC videolaryngoscope. The intubation was successful and intravenous general anesthesia was induced. After surgery, extubation occurred without incidents. In the postoperative period, the patient did not consider intubation a painful or traumatic event.
Discussion: Although AFOI is the first-line technique when managing known DA, awake intubation with VL is emerging as an alternative approach1. Actually, it has been proposed as a more accessible, easier and faster technique to perform than AFOI as VL is a more familiar tool1.In this patient, an awake intubation was mandatory. The absence of an small-caliber fiberscope made AFOI impossible to perform and forced us to adopt a different strategy. Awake intubation with VL was used with success, which highlights the importance of mastering different techniques to manage most cases of known difficult airway in a safe and effective manner. In sum, AFOI and awake intubation VL are not mutually exclusive techniques but are instead complementary strategies in the management of DA2.
References:
1. Ther Clin Risk Manag 14, 1955–1963 (2018).
2. Anaesthesia 73, 1058–1061 (2018).
Learning points: Awake intubation with VL might be a very useful tool in the management of known DA when fibroscopy is unavailable. Mastering a vast number of techniques is an important skill for any anesthesiologist.

5371

A retrospective review assessing the level of difficulty of airway management in Klippel-Feil syndrome: 6 years experience

Sriswasdi P.[1], Rattanaarpa S.[2], Cravero J.[1]
[1]*Boston Children's Hospital - Boston (United States),*
[2]*Siriraj hospital, Mahidol university - Bangkok (Thailand)*

Background: The anatomical characteristics of Klippel-Feil syndrome (KFS) have significant implications for airway management because of the potential for difficult intubation. The purpose of this study was to assess the difficulty of airway management in KFS patients.
Methods: After IRB approval, we performed a retrospective electronic chart review from 06/2012-06/2018. Intubation was categorized as "difficult" by the following criteria (1) more than 1 intubation attempt required by attending staff to secure the airway (2) management described by the anesthesia team as "difficult" (3) escalation to advanced intubation device after failed first DL attempt (4) advanced airway device such as video laryngoscopy (VL) or flexible fiberoptic scope (FF) as first intubation device. We compared the level of difficulty of airway management for each KFS who underwent multiple procedures and had more than 1 intubation at least 12 months apart during our study period. The "Change of airway difficulty level" was categorized as "easier" if their first airway management was easy and remain easy for every subsequence airway management; as "difficult" If their first airway management was easy but became difficult on subsequence airway management.
Results and Discussion: The demographic information and choice of airway management are shown in table 1.For those who underwent multiple procedures, the total operative numbers ranged from 2 to 27 procedures and the median was 4. We analyzed the change in the difficulty of intubation over the time of subsequent procedures in 25 patients. The "change of airway difficulty level with time" data from 21 patient is presented in table 2. Additional 4 patients had inconsistent trend.

Table 1: Patients' demographic data and choice of airway management

Parameter (85 cases, 251 procedures)	Single procedure (41 cases, 41 procedures) n (%)	Multiple procedure (44 cases, 210 procedures) n (%)
Gender (n, %)		
Male (51, 60%)	23 (56.1)	28 (63.6)
Female (34, 40%)	18 (43.9)	16 (36.4)
Age group (n, %)		
Toddler (<3 years) (57, 22.7%)	4 (9.8)	53 (25.2)
Preschool (3-5 years) (70, 27.9%)	7 (17.1)	63 (30)
School aged (6-12 years) (72, 28.7%)	8 (19.5)	64 (30.5)
Teenager (13-17 years) (34, 13.5%)	12 (29.3)	22 (10.5)
Adult (> 18 years) (18, 7.2%)	10 (24.4)	8 (3.8)
Choice of airway management (n, %)		
Mask (27, 10.8%)	2 (4.9)	25 (11.9)
LMA (32, 12.7%)	7 (17.1)	25 (11.9)
Direct laryngoscopy (128, 51%)	20 (48.8)	108 (51.4)
Video-assisted laryngoscopy (48, 19.1%)	7 (17.1)	41 (19.5)
Flexible fiberoptic (9, 3.6%)	5 (12.2)	4 (1.9)
FF through LMA (7, 2.8%)	0	7 (3.3)
Difficult intubation (n, %)	12/31 (39)	68/168 (40)

Conclusion: Our study suggest that most of KFS patient had manageable airway and there is no specific pattern for change of airway difficulty level with time.

5990

Expected Difficult Airway: The High Standard of Not Being Standard

Teles D.[1], Nogueira S.[1], Pires M. A.[1], Rodrigues A. M.[2]
[1]*Centro Hospitalar de Sao Joao - Porto (Portugal),*
[2]*Hospital Santa Maria Maior, EPE - Barcelos (Portugal)*

Background: Difficult Airway management is a challenge to the anesthesiologist since improper measures can have catastrophic consequences. Hence, although a thorough history, physical examination and preoperative planning are universal, recognition of patient anatomical and physiological variations as well as anesthesiologist expertise with different techniques make the assembly of the plan of action a unique affair. We report two cases of anticipated difficult airway.
Case Report: A 45-years-old female with an extensive Arterio-venous malformation (AVM) that spread through the nasopharynx, palate, tongue, mandible and neck, proposed for a total thyroidectomy with cervical ganglion dissection and a 5-years-old child with a macroglossia associated with a Beckwith Wiedemann Syndrome and Obstructive Sleep Apnea proposed for a partial glossectomy. In both cases was conducted a thorough preoperative assessment with a detailed history, physical examination and risk stratification. With all the information, an individual plan was established. In the day of surgery, the airway was managed with two different techniques, awake flexible fiberoptic-guided intubation in the first, and video-assisted laryngoscopy in the second. In both, intubation was successful at the first attempt. Both remained haemodynamically stable, without periods of oxygen desaturation during the entire surgical procedure. Emergence from anaesthesia occurred without complications. Postoperative period occurred in an intensive care unit without complications.
Discussion: The contrast between these two cases highlights the importance of adopting a strategy concordant with the patient needs, the anesthesiologist experience and the resources available. Literature have been consistently including video-assisted laryngoscopy in the approach of an expected difficult airway, although strong evidence is still lacking in pediatric anesthesia practice.1,2
References:
1. Moore, A. & Schricker, T. Awake videolaryngoscopy versus fiberoptic bronchoscopy. Curr. Opin. Anaesthesiol. 32, 764–768 (2019).
2. Russo, S. G. & Becke, K. Expected difficult airway in children. Curr. Opin. Anaesthesiol. 28, 321–326 (2015).
Learning points: The good outcome and absence of complications in both approaches is a strong reminder that what constitutes a high standard practice is not a standard approach but an adaptive one.

6411

What language are we speaking in emergency airway management?

Kidd L.[1], Wood N.[2], Webster S.[2]
[1]*North Bristol NHS TRust - Eastleigh (United Kingdom),*
[2]*Gloucestershire NHS Trust - Gloucester (United Kingdom)*

Background and Goal of Study: A unified and multidisciplinary approach is advocated in emergency airway management. We aimed to explore the language that would be preferentially used by anaesthetists, anaesthetic nurses and operating department practitioners (ODPs) and surgeons in our UK-based hospital.
Materials and Methods: Between May and Oct 2019, an online survey was distributed to surgical and anaesthetic trainees and consultants, and to anaesthetic nurses/ODPs. Specific questions related to the terminology for performing or asking for help with an emergency Front of Neck Airway, as well as perceived availability and preference of emergency airway equipment.
Results and Discussion: The survey generated 64 responses from anaesthetic team members, comprising of 36 anaesthetists and 27 anaesthetic nurses/ODPs. Of the anaesthetists, 16 were consultants There were 49 responses from surgeons. The most represented surgical specialities orthopaedics (n=14) and general surgery (n=13). Amongst the anaesthetic team (anaesthetists and anaesthetic nurses/ODPs) the most familiar terms associated with a colleague asking for help with emergency airway access were "can't intubate, can't oxygenate", "front of neck" and "emergency front of neck access". Within the surgical cohort the three most familiar terms were "cricothyroidotomy", "tracheostomy" and "emergency surgical airway". Amongst anaesthetic team members, 90.1% (58) had received training in performing eFONA. And 50% had received training or practised this within the past year. By contrast, only 42% of surgeons stated they had received training in performing eFONA. Only 38% of surgeons were familiar with the 'blade/bougie/tube' technique compared with 96% of anaesthetists. Only 53% of anaesthetic team members and 12% of surgeons knew we had an eFONA kit (scalpel/bougie/tube) in the anaesthetic room of every theatre in our trust.
Conclusion: We are clearly not speaking the same language. There was a discrepancy between Anaesthetists, Anaesthetic nurses/ODPs and surgeons – any

of whom could be called to assist in an emergency. A unified and multidisciplinary approach is not a new aspiration and should be within our grasp. We are developing local anaesthetic team teaching, in addition to undertaking a training programme targeting consultant surgeons in our DGH as well as the surgical trainees rotating within our region.

6202

Tracheal intubation in the ICU: Is it more difficult the first intubation or the reintubation? A prospective, observational study

Otero Gómez P.[1], Park S. H.[1], Bolón Villaverde A.[1], Gude García C.[1], Baluja González M. A.[1], Taboada Muñiz M.[1]
[1]Hospital Clinico Universitario de Santiago de Compostela - Santiago de Compostela (Spain)

Background and Goal of Study: Tracheal intubation (TI) is a procedure frequently performed in the intensive care unit (ICU). The TI in ICU is associated with higher incidence of complications, difficult intubation and likely have second or more intubations during the stay. The main objective of this study was to compare the incidence of complications and physiologic changes during the TI on the first and the last intubation. Secondary objective was to compare the rate of difficult intubation.

Variable	First TI (N: 82)	Last TI (N: 82)	p- value
Procedural complications			
Hypotension <80 mmHg	20 (24%)	20 (24%)	1
Hypotension <65 mmHg	12 (15%)	10 (12%)	1
Hypoxia <90%	21 (26%)	21 (26%)	1
Hypoxia < 85%	13 (16%)	8 (10%)	0.86
Bronchoaspiration	2 (2%)	1 (1%)	1
Esophageal intubation	1 (1%)	1 (1%)	1
Modified Cormack-Lehane score			
1	45 (55%)	46 (56%)	0.86
2a	13 (18%)	9 (11%)	
2b	15 (18%)	29 (24%)	
3	7 (8%)	7 (8%)	
4			
Difficulty of intubation			
No difficulty	55 (67%)	45 (55%)	0,65
Mild	11 (13%)	23 (28%)	
Moderate	13 (16%)	13 (16%)	
Severe	3 (4%)	1 (1%)	
Vasopressor pre-TI	35 (43%)	24 (29%)	0.65
SatO2 pre-TI			
80-89%	22 (27%)	20 (24%)	0.86
<80%	2 (2%)	5 (6%)	

Materials and Methods: This is a prospective, observational study, including 82 patients intubated more than once in our ICU between January 2015 and September 2019. After each TI, the intubating provider completed a data collection form, including patient details, pre-induction physiology and organ support, details of the intubation procedure, and immediate complications associated.
Results and Discussion: There was no difference in number of complication presented in the first and the last intubation (Table 1). Complications recorded were: hypotension, Hypoxia, Esophageal intubation and bronchoaspiration. The difficulty of intubation also presented with no difference, classified using Cormack-Lehane score and operator-defined scale (easy, mild, moderate, or severe). The result differ from the study of Elmer et al. where they found that the reintubation was associated with higher rate of complications despite that there was no difference in Cormack-Lehane score1. They considered that the increase in number of complication was due to worsening of patient's clinical state with time. In our study, we found no changes in physiologic conditions which could explain the discrepancy in the result.
Conclusion: In our ICU patients needing repeated tracheal intubations, the incidence of complications and technical difficulty of intubation were similar during the first intubation compared to reintubacion.
References:
1. Elmer et al. Reintuabtion in critically ill patients: procedural complications and implications for care, Critical Car (2015) 19:12.

6118

Anesthetic consideration for stent management of central airway obstruction

Olarte Luis J. T.[1], Pinzón Lozano L. J.[2], Troncoso Prada E.[3], Valero Bernal J. F.[2]
[1]Universidad Nacional de Colombia - Bogotá (Colombia),
[2]Universidad Nacional de Colombia - Bogotá (Colombia),
[3]Instituto Nacional de Cancerología - Bogotá (Colombia)

Background: Stent management is the first choice for central airway obstruction in a patient with advanced cancer who is not a candidate for surgery (1). However, the appropriate approach of upper airway obstruction secondary to thyroid cancer and anesthetic management are controversial. The tracheal compression and deviation are not uncommon, so stent placement can be a challenge to the anesthesiologist, who shares airway with neumologist, must keep airway control, normoxia, normocapnia and avoid central airway obstruction or stent migration.
Case report: 92-years male without pathological history with anaplastic T4NXM1 thyroid carcinoma, stage IVB, with mediastinal and pulmonary involvement, with secondary central airway obstruction programmed for self-expanding metallic stent placement in trachea. The procedure was done with spontaneous ventilation with FiO2 50%, sedoanalgesia with titrated infusion of dexmedetomidine. At the passage of flexible fibrobronchoscope was observed an extrinsic compression in middle third of trachea with 50% obstruction of lumen, was placed the guide and the coated self-expanding stent were passed and after dilatation was observed expanded stent in the right position without complications.
Discussion: For tracheal stent placement in the predicted difficult airway, it is preferred to maintain spontaneous ventilation, avoiding muscle relaxation and positive pressure ventilation, to keep airway control and decrease the risk of bronchoaspiration, for what is used flexible fibrobronchoscope (1). Inhaled anesthetics should not be used to prevent operating room contamination and ensure constant anesthetic administration. Dexmedetomidine, as a sedative, with respiratory pattern and EEG similar to those of natural sleep, with analgesic properties (2) is the ideal agent to achieve suitable conditions for stent placement, maintaining spontaneous breathing. The oxygen should be adjusted to the minimum tolerable while maintaining adequate fresh air flow, always having on hand auxiliary devices in case of difficult oxygenation and ventilation.
Conclusion: The anesthesiologist should avoid muscle relaxation, positive pressure ventilation and inhaled agents; dexmedetomidine is a safe and effective anesthetic strategy when airway management is difficult due to severe tracheal stenosis.
References:
1. Indian journal of anesthesia, 2013; 57(6), 617.
2. Journal of anesthesia, 2015; 29(2), 292-294.

5665

Application of the Vortex tool for emergency doctors, is it an option in guiding difficult airway management?

Vieira M.[1], Quintas D.[2], Leite Neto G.[2], Bezerra A.[1], Macedo Q.[1], Arcanjo F. S.[1]
[1]Santa Casa De Misericordia De Sobral - Sobral (Brazil),
[2]Universidade Federal Do Amapa - Macapa (Brazil)

Background and Goal of Study: The emergency doctor is the professional who has contact with acutely ill patients, eventually in imminent risk of death. The decisive, effective, and timely airway management in an emergency can reduce morbidity and mortality. The difficult airway (DA) is estimated in 20%. The Vortex approach is predominantly graphical and simple, ideal to be used in high risk and time critical situations of an airway emergency. This research will provide data for the academic-scientific environment, which may act to mitigate airway morbidity and mortality. Its main objective is to verify if the application of the Vortex tool to emergency doctors.
Materials and Methods: A quantitative and qualitative research, classified as an actional, descriptive and cross-sectional research applied in the auditorium of the São Camilo and São Luiz Hospitals in Macapá - AP, submitted and approved by the Research Ethics Committee of the Federal University of Amapá. Each participant has received and signed the Consent Form. Target audience: Doctors of the emergency department on call in Macapá-AP, in January of 2018 who voluntarily participated in the research and attended a lecture about DA and the Vortex tool. A pre-test was applied, followed by the presentation of the Vortex tool and its application in a DA facing situation, and a post-test. The scenario 1 corresponded to the situation of "I do not intubate, do not ventilate", the second corresponded to the situation of "I do not intubate and do not ventilate with a mask valve device" and the third one to "I do not intubate but I ventilate with a mask valve device". Descriptive and inferential

statistical methods were applied. The comparison between the pre-test and post-test evaluations were performed by a chi-square test, with alpha significance level = 0.05 for rejecting the null hypothesis. The statistical processing was performed using the following softwares: Statistical Analysis Model and BioEstat 5.3 version.
Results and Discussion: The presentation of the Vortex tool demonstrated to be a key element in the process of taking right decisions for the scenarios questioned, as there was a highly significant statistical change (p <0.0001 *) in the answers for the 3 scenarios.
Conclusion: This study found that the instruction of emergency doctors about the vortex tool showed to be effective in guiding the management of VAD.

5363

Two types of emergency airway after oral maxillofacial surgery

Taura S.[1], Tsukamoto M.[2], Yokoyama T.[1]
[1]Kyushu University - Fukuoka (Japan),
[2]Kyushu University Hospital - Fukuoka (Japan)

Background: In clinical practice, we may encounter postoperative emergency airway after oral maxillofacial surgery. These cases may include not only narrowing of the airway due to severe swelling, but also much bleeding into the pharynx. Immediate intubation should be required in such cases, but there were no structured methods for it. In addition, some anesthetics and/or analgesics may be necessary to reduce stress, which may cause panic reaction and/or serious problems in cardiovascular condition. Children may be impatient of fully awake intubation.
Case report: We experienced 15 unexpected emergency airways for these 5 years after oral maxillofacial surgery. Three patients of oral cancer resection were intubated again after surgery because of hemorrhage. One of them (67-yrs, male) complained of dyspnea after oral cancer resection. SpO2 drastically dropped and cyanosis was observed. Orotracheal intubation using fiberscope was tried first. The glottis, however, could not be found due to much bleeding. Orotracheal intubation was succeeded by Pentax Airway Scope (Pentax-AWS) which equips useful suction port. Another 2 cases of oral cancer resection were also reintubated orotracheally after surgery by using Pentax-AWS also because of postoperative bleeding. Remaining 12 cases were reintubated after surgery because of serious swelling of the airway due to infectious condition. Pentax-AWS was used in one case, and McGRTH was used in 2 cases. Other 9 cases of serious swelling were intubated using fiberscope. Fourteen patients received some anesthetics or analgesics. In addition, 5 of them received rocuronium, but other 10 patients were reintubated under spontaneous breathing.
Discussion: Emergency airway after oral maxillofacial surgery is divided into two types; one is caused by poor view field in the pharynx due to much bleeding, and caused by narrowing of the airway due to tissue swelling. Fiberscope is useful device for narrow airway, but not suitable for bleeding cases. In addition, we have to consider to use anesthetics or analgesics to reduce patient's stress.
References:
1. Takashi A. Strategies for difficult airway management-the current state is not ideal. J Anesth. 2013;27:157-160.
Learning points: Postoperative bleeding into the pharynx is a matter of concern especially after oral cancer resection. Fiberscope may be not suitable for this type of emergency airway. We recommend to prepare Pentax-AWS for emergency airway with bleeding into the pharynx.

5200

The airway management in accidental tracheal extubation in the prone position: A simulation study

Ishii A.[1], Yamamoto N.[1], Miyashita T.[1], Goto T.[2]
[1]Department of Anesthesiology, Yokohama City University Hospital - Yokohama (Japan), [2]Department of Anesthesiology, Yokohama City University Medical Center - yokohama (Japan)

Background and Goal of Study: Accidental tracheal extubation in the prone position is a rare but life-threating event. Many case reports have described successful airway management in this situation, but comparison of airway devices has seldom been performed. This study is aimed to reveal the best airway management device in prone patients.
Materials and Methods: Based on sample size calculation, 24 anesthesiologists were enrolled (12 board certified (BC) anesthesiologists and 12 residents). An intubation simulation manikin (HeartSim, Laerdal, Norway) was placed in the prone position and its head was fixed to an operation table with 3-point skull pins and head holder devices (MAYFIELD, Integra Life Sciences Corporation, USA).Each participant tried airway management with 4 devices (laryngeal mask (LMA): Proseal (Teleflex, USA), Macintosh direct laryngoscope and a stylet (MAC), Airway Scope (AWS) (Nihon-koden, Japan), fiberscope (FB) LF type V (Olympus, Japan) in the randomly assigned order from 24 different orders. The time from the start of airway management to the first successful ventilation through the inserted device was measured for each airway device and was defined as the success time. The success times for the four different airway devices were compared by survival analysis (Wilcoxon's test) at the significance level of p< 0.0083. The comparison between BC anesthesiologists and residents was also performed by Cox proportional hazard model. Data were shown as median (95% confidence interval)
Results and Discussion: The median success times (95% confidence intervals) of the LMA, AWS, MAC and FB were 35.5 (24.0-60.0), 96.0 (75.0-163.0), 146.0 (106.0-250.0) and 166.5 (123.0-213.0) seconds, respectively. The LMA was significantly faster than other three devices (p < 0.001). There were no significant differences among other three devices. Although BC anesthesiologists had significantly more experience of clinical use of AWS and FB than residents, board certification was not a significant factor of the success time.
Conclusion: Our results suggest that LMA should be considered the first-line airway device in accidental tracheal extubation in the prone position, regardless of whether board certified anesthesiologists or residents perform airway management.

6134

Tracheomalacia risk and perioperative care safety case report

Dias R.[1], Salvador S.[1], Cavaleiro C.[1]
[1]Centro Hospitalar do Porto - Porto (Portugal)

Background: Patients with large goiters are at risk of developing post-thyroidectomy tracheomalacia (PTTM) secondary to long-standing extrinsic tracheal compression with loss of tracheal cartilage rigidity[1].
Case Report: A 76-yr-old man scheduled for thyroidectomy due to a huge goiter. Clinical findings were dysphagia, hoarseness and increased mass growth in the previous 6 months. Physical examination revealed a cervical mass with tracheal displacement. Cervical sonography showed a 64x78x130 mm mass on the left thyroid lobe. Preoperative care included airway evaluation (AE) with cricothyroid membrane (CTM) identification, explanation of fiber optic intubation (FBO), use of postoperative CPAP device and availability of intensive care postoperatively. A multimodal general anaesthesia under ASA standard, BISTM and neuromuscular blockade monitoring was conducted. After identification of CTM, remifentanil infusion was started and topical lidocaine was applied. Patient was intubated under FBO with a reinforced 6.5 cm tracheal tube. Intubation was hampered by edema of the supraglottic structures. The thyroidectomy procedure was uneventful. After surgery a cervical and thoracic X-ray were performed to assess the alignment of glottis. Fiberscope was reintroduced to identify tracheal wall collapse and extubation was performed with the patient awake. No further complications were noted.
Discussion: Studies indicate as predictive factors for PTTM: longstanding goiter, retrosternal extension, tracheal deviation, difficult endotracheal intubation, preoperative recurrent laryngeal nerve palsy and thyroid cancer[1]. Most of the described predictors are positive in this case and loss of airway patency was considered when determining the tracheal extubation. The assessment of the trachea and its alignment prior to extubation may help in predicting the risk of postoperative airway obstruction and guiding a safe strategy.
References:
1. Findlay JM, Sadler GP, Bridge H, Mihai R. Post-thyroidectomy tracheomalacia: minimal risk despite significant tracheal compression.Br J Anaesth 2011; 106 (6):903-6.
Learning points: Importance of airway examination in order to predict and eventually manage post-operative complications such as PTTM. The described clinical report supports that the risk of PTTM exists and a safe perioperative care includes AE with CTM identification, FBO, use of postoperative X-ray image, use of CPAP devices and availability of intensive care postoperatively.

6055

Induction of anesthesia in patients with cleft lip and palate, our experience

Tasevski L.[1], Trambulova J.[1]
[1]*University Clinic for Maxillofacial Surgery - Skopje (Republic of North Macedonia)*

Background and Goal of Study: Cleft lip and palate are the most common developmental abnormalities of the face. This type of malformation can represent a challenge for airway management due to possible difficult mask ventilation and intubation. The goal of our study is to show our experience in induction of anesthesia depending of the cleft palate and lip abnormality.
Materials and Methods: The study, which took place in period of three years, included 40 patients aged from 3 to 12 months old. They were divided in four groups according to the malformation they had: group 1 – isolated cleft lip deformity, group 2 – cleft lip and palate unilateral right deformity, group 3 – cleft lip and palate unilateral left deformity, group 4 – bilateral cleft lip deformity. The induction of anesthesia in the first group of patients who had only isolated cleft lip deformity was performed by inhalational induction of anesthesia with sevoflurane in oxygen 100%, in the other three groups the induction was performed with awake intubation and the cleft palates were packed with small gauze roll to avoid the tendency of the laryngoscope to fall into a wide gap. After securing the airway the anesthesia was maintained with volatile anesthetic agent, and intraoperative analgesia was provided with fentanyl.
Results and Discussion: Airway management problems in infants with cleft lip and palate were first recognized by Magill many years ago. In our study, taking in consideration the abnormality of the face and airway malformation, every patient was regarded as a possible difficult intubation. In patients with isolated cleft lip malformation we did not had problems with mask ventilation, so we performed inhalational induction with sevoflurane. Mask ventilation in patients with combined cleft lip and palate can be difficult because it interferes with the normal upper airway anatomy, therefore during ventilation we have turbulent flow which causes inefficient ventilation which in turn leads to desaturation and hypoxia, therefore awake intubation was performed. There was no failed intubation recorded during the study.
Conclusion: The methods we used of induction in anesthesia were the safest way of securing airway in patients with cleft lip and palate.

5840

Effectiveness and safety of nasotracheal intubation with gum elastic bougie in two patients undergoing mandibular orthognathic surgery

Bairaktari A.[1], Diakomi M.[2], Trantzas P.[1], Tzima C.[3], Sofianou A.[3]
[1]*General Hospital of Attica KAT - Kifissia, Athens (Greece),*
[2]*General Hospital of Attica "KAT" - Kifissia, Athens (Greece),*
[3]*General Hospital of Attica KAT - Kifissia, Athens (Greece)*

Background: Nasal intubation is the most common method for giving anesthesia in intraoral, oropharyngeal and maxillofacial surgeries.(1) Knowledge of the relevant anatomy is essential as it gives an idea about the pathway of the endotracheal tube and the complications encountered during its insertion.(2)
Case Report: We describe a technique of nasotracheal intubation using gum elastic bougie in two patients with Cormack –Lehane IIβ scheduled to undergo elective maxillofacial operation under general anesthesia and neuromuscular blockade, without predicted difficult airway. We used regular endotracheal tube, gum elastic bougie, Magill forceps and laryngoscope with Macintosh or Mccoy blade. Lubricants and vasoconstrictors were applied to the nasal passages before the introduction of the elastic bougie and endotracheal tube. Firstly, we performed direct laryngoscopy (vision of Cormack –Lehane IIβ), then we decided to insert an elastic bougie into the naris and once it was beyond the nasopharynx, we advanced it with the Magill forceps below the glottis under direct vision. The endotracheal tube was railroaded over the bougie into the airway, after which the device was removed. Nasotracheal intubation was performed successfully in both cases without any serious adverse effect. Only an episode of epistaxis was observed in one of the patients, which was easily managed.
Discussion: A thorough knowledge of the anatomy and the advent of newer devices have abolished the negative effect of blindness of nasotracheal intubation. (2) We believe that the above –described technique should be adopted in patients with unexpected difficult airway presenting for nasotracheal intubation.
Learning points: In case of unexpected difficult intubation, nasotracheal intubation can be carried out successfully with the use of gum elastic boogie.

References:
1. Prasanna D, Bhat S. Nasotracheal Intubation: An Overview. J Maxillofac Oral Surg. 2014 Dec;13(4):366-72. doi: 10.1007/s12663-013-0516-5. Epub 2013 May 1. Review.
2. Chauhan V, Acharya G. Nasal intubation: A comprehensive review. Indian J Crit Care Med. 2016;20(11):662–667. doi:10.4103/0972-5229.194013

4513

CANCRUM ORIS (NOMA) and the Airway challenges in Children, A Humanitarian experience

Rajaleelan W.[1]
[1]*University of Toronto - Toronto (Canada)*

Background: NOMA (cancrum oris) is an exclusive disease of childhood characterized by ulcerative necrosis of the maxillo-facial structures, affecting up to 1,40,000 children annually. It is fatal in 80-90% of cases in the acute setting. Survivors are left with disfiguring maxillo-facial deformations that make airway manipulation for reconstructive surgery very challenging.
Methodology: Over two interventions of Medicines Sans Frontiers(OCA) mission at the NOMA hospital for children, Sokoto, Nigeria, 16 patients, with chronic sequelae of NOMA, underwent maxilla-facial reconstructive surgery. Each patient posed significant airway challenges due to anatomic malformations, trismus, and restricted neck movements. Lack of preoperative imaging and limited resources added to the challenge. We were able to surmount these with the use of a three tier hierarchical plan – plan A (intended airway management strategy), plan B (secondary management strategy), and plan C (surgical access to the trachea).
Results: Preoperative work up included measuring thyromental, sternomental, and inters incisor distances, neck movements, and mouth opening. Of the 16 patients in this series, 14 were intubated using plan A. Two required deployment of plan B and none required plan C. We predominantly used fibre- optic and nasal intubation for these patients.
Conclusions: Maxilla-facial reconstructive surgery for NOMA poses a huge challenge to the anesthesiologists, especially in children. Adequate planning, screening, and assessment of the airway with primary, secondary, and back up plans are crucial. With this strategy in place “cannot intubate, cannot ventilate “situations can be handled during an emergency. Psychological and nutritional rehabilitation is essential prior to surgery.

4658

Let there be light: Tracheostomy assisted by fiberoptic light through endotracheal tube

Núñez S.[1], Gil J. M.[1], Parrilla L.[1], Domínguez M.[1]
[1]*Hospital de la Santa Creu i Sant Pau - Barcelona (Spain)*

Background: Surgical tracheostomy is based on the tissue dissection of neck structures in order to perform an ostomy on the trachea to establish a definitive permeable airway. Sometimes this procedure may become difficult for many reasons: anatomical distortion due to tumoral invasion or fibrosis caused by radiotherapy.
Case report: We present a 72 year-old male diagnosed with vocal cord tumor, receiving multiple surgical neck, currently undergoing local radiotherapy. The patient was admitted to the Emergency department with shortness of breath and stridor. Flexible endoscopy was performed by the Otorrinolaringologist on duty observing local progression with partial obstruction of the upper-airway. Emergent surgical tracheostomy was indicated. Light remifentanil sedation and topic xylocaine was implemented to perform awake fiberoptic intubation under spontaneous breathing (spray-as-you-go technique with lidocaine 2%) with a 6.0mm ringed endotracheal tube. Surgery was extremely difficult to perform due to high fibrosis and de-structuring of local anatomy. Without any progress, trachea couldn’t be located by surgeons, increasing iatrogenic risk. Being the fiberoptic bronchoscope at the operating room, we proposed to turn off the surgical lights and illuminate through the endotracheal tube, allowing the visualization of the tracheal rings by trans-illumination at 4 centimeters from midline. Surgery was conducted from then on without incidents. Posterior bibliographic research on Pubmed was fulfilled, finding the references below about similar cases.
Discussion: Oropharyngeal cancer may obstruct airway by: external tracheal compression, intra lumen extension or bilateral vocal cord paralysis. Patients with rapidly progressive masses or with stridor clinic may be candidates for urgent surgical tracheostomy that could be difficult due to distortion of adjacent tissues. Fiberoptic bronchoscope is an important part of the difficult intubation equipment. Its use as a location guide of trachea by trans-illumination is a novel and poorly described function in the literature that may help during surgery.

References:
1. Mehta K. Innovative use of the fiberoptic bronchoscope. Indian J Med Paediatr Oncol. 2012

2. Mishra N. A case of Fiberoptic bronchoscopy used as innovative aid for life saving in difficult surgical tracheostomy patient. Korean J Anesthesiol. 2019
Learning points: Novel use of fiberoptic bronchoscopy as a guide of trachea during difficult tracheostomy.

5121

The median effective dose (ED50) of intravenous oxycodone depending on sex and age for attenuation of intubation-related hemodynamic responses

Kim S. H.[1], Jung K. T.[2], So K. Y.[2]
[1]*Chosun University Hospital - Gwangju (South Korea),*
[2]*Chosun University - Gwangju (South Korea)*

Background and Goal of Study: The various opioid interventions have been used to attenuate intubation-related hemodynamic responses (IRHRs). The preoperative oxycodone administration may be expected the preemptive effect on prevention or attenuation of IRHRs. However, the pharmacokinetics of oxycodone have a somewhat different effect depending on age and sex. Therefore, we calculated the 50% and 95% effective doses (ED50 and ED95) of oxycodone, depending on age and sex, which could attenuate all IRHRs.
Materials and Methods: Patients were allocated to one of 6 groups; 1) male between 20 to 40 year old (group YM), 2) male between 41 to 65 year old (group OM), 3) male between 66 to 80 year old (group EM), 4) female between 20 to 40 year old (group YF), 5) female between 41 to 65 year old (group OF), 6) female between 66 to 80 year old (group EF). First patient in each group injected oxycodone 0.1 mg kg-1 slowly (over 2 min) 20 min before intubation. One min after intubation, we investigated whether all changes of IRHRs were ≤ 20%, which was defined as the "success", or not as the "failure". The subsequent patient received the next oxycodone dose, which was decreased or increased with an interval of 0.01 mg kg-1, depending on the "success" or "failure" of the previous patient, respectively. We performed the Dixon's up-and-down method until we obtained eight crossover points as crossover from "failure" to "success".
Results and Discussion: The calculated ED50 [mean (95% CI) mg kg-1] was 0.089 (0.078-0.100), 0.156 (0.147-0.166), 0.134 (0.109-0.158), 0.109 (0.101-0.116), 0.101 (0.097-0.106), and 0.091 (0.081-0.101), in groups YM, OM, EM, YF, OF, and EF, respectively. The calculated ED50 in group YM was significantly lower than that in groups OM, EM, and YF ($P < 0.001$, $P = 0.026$, $P = 0.034$, respectively). The calculated ED50 in group OM was significantly higher than that in groups YF, OF, and EF ($P < 0.001$). The calculated ED50 in group EM was significantly higher than that in group EF ($P = 0.035$).The predictive oxycodone ED50 and ED95 (mg kg-1) with probit regression were estimated as 0.080 and 0.133, 0.153 and 0.181, 0.161 and 0.332, 0.101 and 0.183, 0.098 and 0.108, and 0.080 and 0.147 in groups YM, OM, EM, YF, OF, and EF, respectively.
Conclusion: Higher ED50 and ED95 of oxycodone is required in male with increasing age, but it is not clear in female. In addition, ED50 and ED95 of oxycodone is higher in male under 65 year old, but in female over 66 year old.

5311

Ideal Length of the Nasotracheal Tube Considering Nasotracheal Tube Size

Kim H. J.[1], No H. J.[1], Kim H. J.[1]
[1]*Yonsei University College Of Medicine - Seoul (South Korea)*

Background and Goal of Study: Most of the clinically available nasotracheal tubes(NT) are pre-bent and have markings around the vertex of tube (proximal marking), resulting in pre-determined depth of tube insertion. Since the tip-to-proximal marking length of the NT is fixed and increases with the increment of its internal diameter, there is a problem of whether the selected NT in accordance with individual nasal cavity size guarantees the proper length. The purpose of this study was to investigate 1) ideal NT length and 2) evaluating the adequacy of the NT depth in accordance with nasal cavity size in Korean men and women.
Materials and Methods: This prospective observational study was performed in 137 patients aged 20 to 70 years scheduled for elective surgery under general anesthesia requiring nasotracheal intubation from September 2017 to December 2018. After anesthetic induction, the largest size of nasopharyngeal airway that enters nasal passages with mild resistance was recorded as nostril size. Using flexible bronchoscopy, nostril-to-carina and nostril-to-vocal cord lengths were measured. We defined the ideal nostril-to-UCB (upper cuff border) /tip length as [(nostril-to-vocal cord + 2 cm)] and [(nostril-to-carina length – 3 cm)], reflecting borderline for ensuring minimum distance between NT (UCB, tip) and vocal cord and carina, respectively. We examined whether nostril size (i.e. maximal airway size) can be predicted by patients' characteristics (age, gender, height, weight, etc.) and whether the NT (Mallinckrodt TaperGuard/Medtronic, and PORTEX/Smith Medical) chosen according to nostril size would satisfy both ideal NT length.
Results and Discussion: Overall, 137 patients completed the study. Only 'gender' was independently associated with 'nostril size' in the multivariate analysis. 6.5 in males and 6.0 in females are the maximum size of nasopharyngeal airway that enters in 100% of cases with mild resistance or less. NT size selection by gender (6.5 for men, 6.0 for women) ensures proper NT location of 86% and 62% in men, women respectively when using PORTEX. In the case of the Mallinckrodt TaperGuard, the fraction located at the ideal location is considerably smaller than that of the PORTEX.
Conclusion: Nostril size is largely determined by gender. PORTEX has an advantage over an ideal location over Mallinckrodt TaperGuard, and it is necessary to produce NT with shorter UCB-to-tip and longer 'proximal marking-to-UCB' lengths.

5836

Airway management during the emergency reoperations of the thyroid gland due to bleeding – a single centre experience

Burgic A.[1], Weiniger C.[2]
[1]*National Cancer Research Center of Serbia - Belgrade (Serbia),*
[2]*Telaviv Sourasky Medical Center - Telaviv (Israel)*

Background and Goal of Study: Bleeding in the area of the neck after the thyroid gland operation can be a life-threating complication due to the danger it poses on the airway management. It can lead to the compression of the trachea, reduction of the tracheal lumen or tracheal dislocation, presence of blood in the airway, clinically significant oedema of the epiglottis, pharyngeal wall and the vocal cords. The aim of this study was to present the experience of our centre with complications due to bleeding after thyroid gland operations.
Materials and Methods: A retrospective study was conducted at the National cancer research centre of Serbia from January 2015 to March 2019. Medical records of all the patients who had a thyroid gland operation in this period were analysed, the data were processed by the methods of descriptive statistics. Assessment of difficult laryngoscopy was performed using the Cormack-Lehane (CL) score while difficult intubation was evaluated using the American society of anaesthesiologists criteria.
Results and Discussion: In the study period 2572 patients had a thyroid gland operation in our centre, 20 (0.78%) of them had a reoperation due to bleeding. Reoperated patients were 30-78 (57.75 ± 15.03) years old, 70% were women, 30% men. 3 (15%) of these patients underwent initial operation due to the malignant tumour of the thyroid gland, 2 due to papillary carcinoma and 1 due to anaplastic. Reoperation was performed most frequently due to the presence of the hematoma and increased drainage (20%). 18 patients had a CL score of 1 or 2. 2 (10%) patients developed difficulties of speaking and breathing, 1 (5%) of these patients had to have the sutures removed at bedside before being transferred to the operating room and anaesthesiologist reported difficult laryngoscopy (CL score 3) – but no difficult intubation. Difficult laryngoscopy (CL score 4) and difficult intubation occurred in 1 (5%) case due to laryngeal oedema, which was successfully resolved using a small lumen tube. During the operation, diffuse soft tissue bleeding was identified as the cause for reoperation in 10% of the cases, diffuse bleeding associated with bleeding from capillary vessels in 25% of the patients, while bleeding from arteries and veins caused 65% of the reoperations.
Conclusion: Although thyroid gland surgery is a common and well-known procedure and the complications due to bleeding are not very frequent, when they occur they may endanger the airway management and should never be underestimated.

6295

An unusual management to a premature newborn difficult airway

Afonso J. P.[1], Lopes L.[2], Carvalho F.[1], Cardoso H.[1], Moura F.[1]
[1]*Centro Hospitalar Tâmega e Sousa - Penafiel (Portugal),*
[2]*Centro Hospitalar Tâmega e Sousa - Penafiel (Portugal)*

Introduction: Neonatal endotracheal intubation can be very difficult,because neonatal airways are smaller and more anterior than the airways of older children and adults.1
Case report: 26-year-old woman with monochorionic and biamniotic twin pregnancy(ASA II,2G1P1A)turned to the emergency department in preterm labor(25weeks and 0days). It was started tocolysis and pulmonary maturation. Cesarean operation occurred and both fetuses were female, Apgar 2/4/8,the first one weighed 650g and the second one 700g.The first one had a difficult airway with grade 4 Cormack-Lehane. Three unsuccessful attempts were performed by three different persons (one neonatologist and two anesthesiologists),with direct laryngoscopy and an endotracheal tube size 2.0 mm.It was suggested by a nurse in the room to use a Kirschner wire, an orthopedic surgery material, as endotracheal tube stylet(figure 1).The endotracheal tube was inserted with caution to avoid laryngeal injury and after the passage through the epiglottis, the Kirschner wire was extracted. It was confirmed the position of the tube with auscultation and symmetric thoracic expansion. The second fetus presented with grade 1 Cormack-Lehane and was intubated with one attempt.
Discussion: A stylet may be helpful increasing the rigidity and curvature of a very flexible endotracheal tube, however, there is an associated risk of airway damage. Available stylets are suitable for use with tubes of 2.5 mm internal diameter or greater.1 At this case, the use of a Kirschner wire as endotracheal tube stylet allowed a successful intubation in a difficult neonatal airway Despite this risk of laryngeal injury, the emergency of this situation justified the use of a stylet. This is an example of effective team communication and resource utilization, by anesthesiologists, neonatologists, nurses and surgeons
Learning points: Sometimes, the lack of available material becomes a problem, mainly in emergency situations. We can verify that Kirshner wire can be used as an endotracheal tube stylet for endotracheal tubes size 2.0mm. The team work and other non-technical skills assume a vital part in clinical competency.
Bibliography:
1. O'Shea JE, O'Gorman J, Gupta A, Sinhal S, Foster JP, O'Connell LAF, Kamlin COF, Davis PG. Orotracheal intubation in infants performed with a stylet versus without a stylet. Cochrane Database of Systematic Reviews 2017.

6275

Bilateral Myositis Ossificans of masticatory muscles: Fiberoptic Intubation saves the day

Relvas F.[1], Pato R.[1], Gouveia C.[1]
[1]*Centro Hospitalar de Lisboa Central, Hos - Lisboa (Portugal)*

Background: Myositis Ossificans is characterized by nonneoplastic, heterotopic bone formation within a muscle. Myositis ossificans of masticatory muscles is rare. The most common clinical finding is progressive limitation of motion in the mandible leading to trismus. Airway management can be challenging, requiring an extensive knowledge and training.
Case Report: A 37-year-old female patient, ASA I, with clinical diagnosis of trismus due to Bilateral Myositis ossificans of masticatory muscles secondary to orthodontic infection, was scheduled for bilateral temporomandibular articulation bone tissue excision. Physical examination showed total incapacity for mouth opening with permanent inter-incisive occlusion. No other difficult airway predictive signs were observed. Routine preoperative tests were normal. Airway management was carefully discussed and awake fiberoptic nasotracheal intubation was planned. In preparation for the procedure, the patient was made aware of the steps involved and reassured that safety and comfort would be optimized. Topical airway anaesthesia was achieved by spraying 2% lidocaine in the nasal and oropharyngeal mucosa. Phenylephrine was applied to limit bleeding of the nasal mucosa. Fiberoptic intubation was successfully accomplished followed by induction of general anaesthesia. Total intravenous anaesthesia (TIVA) was used with adequate hemodynamic stability and surgery proceeded uneventfully. At the end of surgery a 2,5cm inter-incisive distance was achieved. After neuromuscular blockade was reversed with sugammadex, the patient was extubated and moved to the postanaesthesia care unit, where she remained stable.
Discussion: Fiberoptic intubation is an effective technique for establishing airway access in patients with anticipated difficult airway, particularly due to trismus. Patient preparation is key to allow safe and comfortable airway management. In this case, awake fiberoptic intubation was the obvious first choice for airway management and shows how vital is adequate training in this field. A thorough knowledge of a difficult airway algorithm is essential for a successful outcome.
References:
1. Karaali, S - Myositis Ossificans Traumatic of the Medial Pterygoid Muscle After Third Molar Tooth Extraction: A Case Report and Review of Literature. - J Oral Maxillofac Surg. 2018 Nov.
Learning Points: Patient preparation is key to allow safe and comfortable airway management, when awake fiberoptic intubation is the only safe option.

6181

How a routine fine-needle thyroid biopsy can turn into an anesthetic emergency outside the operating room

Brás A.[1], Martins M.[1], Coimbra L.[1], Coroa M.[1], Barbosa H.[1]
[1]*Centro Hospitalar Vila Nova de Gaia/Espinho - Vila Nova de Gaia (Portugal)*

Background: Ultrasound guided-fine needle aspiration is widely accepted as the gold standard for the evaluation of thyroid nodules. Regarded as a safe approach, massive hematoma is an extremely rare complication, resulting in severe airway compromise and an anesthetic challenge (1).
Case Report: We report a case of a 72-year-old woman, ASA II, with medical history of non-insulin-dependent type 2 diabetes, hypertension, dyslipidemia and thyroid nodules. She was submitted to thyroid fine needle aspiration biopsy. Patient was readmitted 3 hours later complaining of cervical swelling with pain and discomfort when breathing. Her anterior neck was swollen and tender. CT-scan suggested a cervical anterolateral hematoma, with slight tracheal deviation to the right side and no apparent tracheal compression. She was referred to urgent carotid angiography at interventional radiology suite. After discussing with otorhinolaryngology team and according with difficult airway algorithm, it was decided orotraqueal intubation with videolaryngoscope in spontaneous ventilation. The procedure occurred without complications.
Discussion: Anesthesiologists face challenges in practicing in remote areas. New locations, inadequate monitoring devices, and poor assisting staff can compromise the quality of patient care (2). Neck hematoma can be a rapidly progressive illness, leading to a fast and severe airway obstruction and life-threatening emergency. This case highlights a rare surgical complication with compromised airway and when the decision of orotraqueal intubation in a safe environment should be weighted.
Learning points: In order to reduce the likelihood of adverse outcomes, prompt consideration of difficult airway algorithm can be lifesaving in emergency situations (3). Additionally, the discussion with otorhinolaryngology team denotes the multidisciplinary approach to a safe and successful procedure.
References:
1. Polyzos, S. A. & Anastasilakis, A. D. Clinical complications following thyroid fine-needle biopsy: A systematic review. Clin. Endocrinol. (Oxf). 71, 157–165 (2009).
2. Metzner, J., Posner, K. L. & Domino, K. B. The risk and safety of anesthesia at remote locations: The US closed claims analysis. Curr. Opin. Anaesthesiol. 22, 502–508 (2009).
3. Malhotra, S. Practice Guidelines for Management of the Difficult Airway. Pract. Guidel. Anesth. 127–127 (2016). doi:10.5005/jp/books/12644_18.

6138

Oral awake tracheal intubation in a patient with severe trismus with a homemade cannula. A case report

Marqués Asín F. J.[1], Villanueva Mena-Bernal J. A.[1], Carvajal Nuñez M. V.[1], Fernandez López A.[1], Ontanilla López A.[1]
[1]*University Hospital Virgen Macarena - Sevilla (Spain)*

Background: Awake tracheal intubation (ATI) is gold standard in airway management for predicted difficult airway. (1) We have many options of ATI (bronchoscopy, videolaryngoscopy, tracheostomy) but in cases of limited mouth opening, insertion of oropharyngeal cannulas, laryngeal masks and laryngoscopes may be impossible and nasal bronchoscopy approach may be more appropiate. There are situations that nasal route for intubation is not advised and must consider other option.
Case Report: 76 year old male, presented for mitral valve replacement. The patient had personal history of mandibular fracture in childhood with severe trismus (<15 mm), Sleep Apnea Syndrome, arthrosis with limited cervical mobility, so he gave consentiment for awake intubation. We used nasal oxygen and performed airway topicalisation with nebulised lidocaine, mucosal atomiser and patient gargling,

and "spray as you go" technique during bronchoscopy. Minimal sedation with remifentanil (0,05 mcgr/kg/min) was applied to increase tolerance. We could not use a bronchoscopy cannula due to the limitation in oral opening so we used a "5 ml cut syringe" homemade cannula. We achieved intubation with a tube size 6.0 through the syringe and after confirmed correct placement, induced anaesthesia. The surgery was carried out and the patient was extubated in postoperative period without incident.
Discussion: The nasal route was a good option but nasal septum deviation and risks associated to the technique made us change. The undesirable effects of nasal vasoconstrictors in cardiac patients, trauma of nasal mucosa and bleeding risk during heparinization in cardiac surgery, and the risk of bacteremia with nasal route may be important in valvular heart diseases. Tracheostomy was not considered as initial option due to associated complications like risk of surgical wound infection and mediastinitis. For all this, we decided oral approach, but trismus prevented the insertion of conventional endoscopy cannula, so we used a cut syringe as a cannula.We were able to adapt the size of the cannula to patient´s characteristics.
References:
1. Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. I.Ahmad et al. Anesthesia Nov 2019 (https://doi.org/10.1111/anae.14904).
Learning points: The route for tracheal intubation should take into account anatomy and surgical access. The option of use a homemade cannula is available anywhere and allows us to adapt in size and adjust it to the patient.

6031

Failed tracheal intubation in a patient with mucopolysaccharidosis type II

Cho A.[1]
[1]*Soonchunhyang University Bucheon Hospital - Bucheon (South Korea)*

Background: Mucopolysaccharidosis are rare lysosomal storage diseases resulting from defects in lysosomal enzymes involved in degradatin of glycosaminoglycans. Different mucopolysaccharidosis are caused by different enzyme deficiencies. The anesthetic complications are related to the organs involved. Patients with mucopolysaccharidosis are rare, and few anesthetists encounter such patients.
Case Report: A 13 years old boy diagnosed mucopolysaccharidosis II was scheduled for extraction of deciduous tooth. He had mental retardation. The pre-operative examination revealed he had a short neck, macroglossia, and limited neck movement. Difficult airway was anticipated, we prepared various intubation devices. Anesthesia induced by thiopental 150 mg, and succinylcholine 10 mg was injected. Anesthesia was maintained with 2.5 vol% Sevoflurane in 100% Oxygen. First endotracheal intubation attempt was conducted with 5mm tracheal tube by direct laryngoscope, but failed. Second endotrachel intubation attemtp was conducted with 4.5mm trachel tube by video laryngoscope, then I-gel LMA was inserted. However, respiratory obstruction was observed immediately. Next endotrachel intubation attempt was conducted with 4.5 mm tracheal tube by flexible fiberoptic scope, but failed. Patient's spontaneous ventilation was recovered, and we decided to start surgery under spontaneous ventilation. A total surgery time was 4 minutes.
Discussion: Airway management is the major problem for patients with mucopolysaccharidosis. If patient's cooperation is possible, awake intubation using flexible fiberoptis scope is safe choice. In the case of short-term surgery, anesthesia with mask ventilation and if regional anesthesia is indicated, consider actively. Along with standardization of new mucopolysaccharidosis therapy options, the need for anesthesia in high-risk cases will increase in the near future, for which anesthesiologists must be prepared.
Reference:
1. Walker RWM et al. Anaesthesia and mucopolysaccharidoses. A review of airway problems in children. Anaesthesia 1994; 49: 1078-1088.
Learning Points: Patients with mucopolysaccharidosis are rare, and few anesthetists encounter such patients. Communication with surgeon is an important key for safe anesthesia in such patients.

6020

Endotracheal tube displacement in patient with maxillofacial trauma: a case report

Burgos Santamaría A.[1], Aznar P. T.[1], Alonso Mateo M.[1], Pizarro Calderón A. G.[1]
[1]*Hospital General Universitario Gregorio Marañón - Madrid (Spain)*

Background: According to the Advanced Trauma Life Support (ATLS) recommendations, an effective airway management is imperative. Severe injuries in maxillofacial region can complicate early airway management of trauma patients. Establishing a definitive airway as well as the frequent reevaluation of airway patency is necessary1.
Case Report: A 20-year-old man was transferred to Gregorio Marañón Hospital after being found in the street under suspicion of having been run over. The patient was hemodynamically stable, intubated. Pulse-oximetry and end-tidal carbon dioxide were measured. Normal peak inspiratory pressure was found in mechanical ventilation. Physical examination revealed a scalp injury, normoreactive right pupil and unexplorable left pupil by a large orbital hematoma. Cranial and thoraco-abdominal CT were performed (Figure 1):

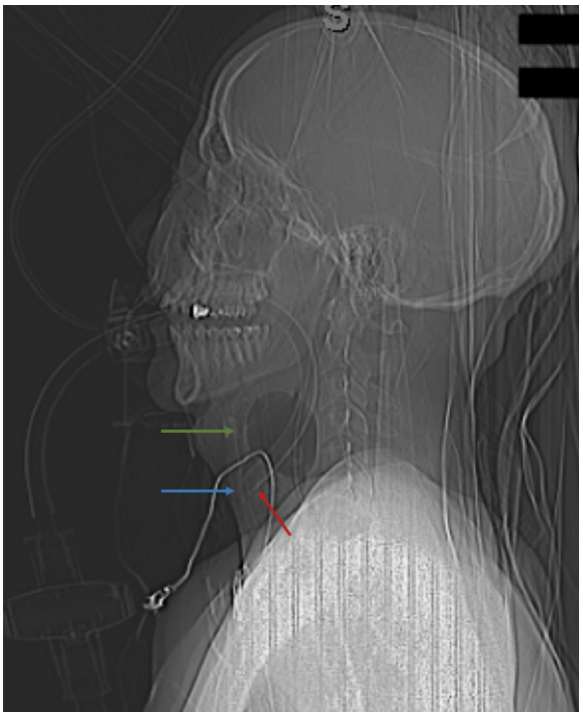


Figure 1: Endotracheal tube tip impacted in the anterior commissure of the glottis (blue arrow). Dilation of the pharyngo-laryngeal air space (green arrow). Ventilation by Murphy's orifice (red arrow).

Owing to the large facial edema, the patient was transferred to the operating room together with Otolaryngology in order to replace the endotracheal tube under fiberoptic bronchoscope.
Discussion: Endotracheal intubation is expected to be difficult in patients with maxillofacial trauma. After securing the airway, frequent reevaluation of airway patency, oxygenation and ventilation is essential. Fiberoptic intubation is an effective technique for establishing airway access in patients with difficult airways. Fiberoptic bronchoscope was essential in this case.
References:
1. Ahmad, I., El-Boghdadly, K., Bhagrath, R., Hodzovic, I., McNarry, A.F., Mir, F., O'Sullivan, E.P., Patel, A., Stacey, M. and Vaughan, D. (2019), Difficult Airway Society guidelines for awake tracheal intubation (ATI) in adults. Anaesthesia. doi:10.1111/anae.14904.
Learning points: Early airway management is crucial in trauma patients and could be challenging in patients with maxillofacial injuries. Fiberoptic intubation remains the gold standard technique for difficult airway management.

5753

Anesthetic concerns for an Ivor-Lewis esophagectomy in a patient with tracheostomy: A Case Report

Stratigopoulou P.[1], Analitis A.[1], Kalogiannis E.[1], Papamichail K.[2], Michalinos A.[3], Schizas D.[3]
[1]Laiko General Hospital of Athens, University of Athens, Greece - Athens (Greece), [2]Department of Anesthesiology, Sotiria General Hospital - Athens (Greece), [3]First Department of Surgery, National and Kapodistrian University of Athens, Laikon General Hospital, - Athens (Greece)

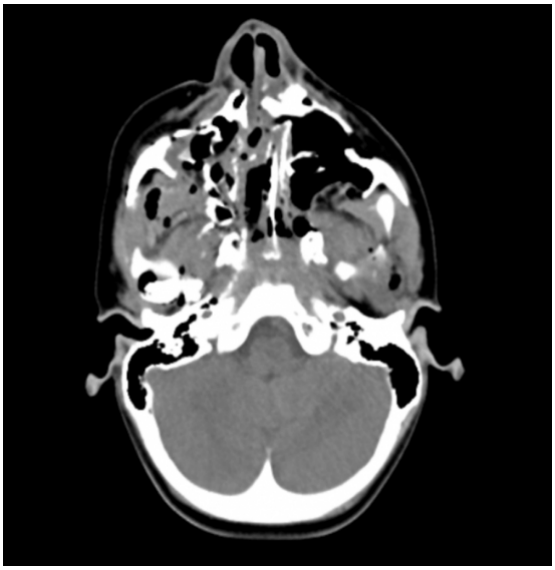
Background: A tracheostomy is a specific condition in which one-lung ventilation (OLV) may be uniquely challenging.
Case report: A 66yo, male, ASA-PS III patient (BMI=41kg/m2) presented for an elective Ivor-Lewis esophagectomy for esophageal adenocarcinoma.Medical history included hypertension, obesity, diabetes mellitus, hypothyroidism, COPD and a total laryngectomy, with permanent tracheostomy.Anesthetic plan included general anesthesia combined with thoracic epidural analgesia.The first intubation was attempted using a left 41F(95mm) double-lumen tube (DLT) for tracheostomized patients (Rüsch Tracheoparts, Teleflex).Isolated OLV was not satisfactory upon auscultation nor when confirming tube position by fiberoptic bronchoscope (FOB).A second unsuccessful attempt was made with a smaller (85mm) DLT. Ultimately, a tracheostomy tube (Rüsch N9, Teleflex) and a bronchial blocker (EZ-blocker) were successfully used.During airway manipulations, manual ventilation with 100% oxygen was achieved with an infant mask securing the stoma.Total duration of anesthesia was 8 hours (3 hours of OLV). After restoration of spontaneous respiration, the tracheostomy tube was removed. The patient experienced no postoperative complications and was discharged home on POD10.
Discussion: Correct placement of the bronchial cuff of the Tracheopart DLT in the left bronchus, using FOB guidance, led to placement of the tracheal cuff at the tip of the stoma, making fixation of the tube unreliable.Intraoperative dislodgement of this device due to unreliable fixation was reported in four cases and attributed to the fixed size and length of the device. 1 The Tracheopart tube is available in 3 sizes: 75mm (up to 165cm height), 85mm (165-175cm) and 95mm (above 185cm).The only plausible explanation for the discrepant fit of DLT in our case could be that the correct size for our patient's height(175mm) lied between 85mm-95mmm.
Learning points: It is imperative that alternate airway plans are carefully considered when dealing and planning OLV in tracheostomized patients. The primary goal should be patient's safety.Careful selection of devices/equipment based on patient's airway anatomy and the experience of the anesthesiologist involved are essentials for successful OLV in such cases.
Reference:
1. Masamune T, Matsukawa T, Ookawa I, et al, Double-lumen tracheostomy tube (Tracheopart) used in two patients for one-lung ventilation under general anesthesia. Masui 2014;53:1418-1420.

5624

Challenges in airway management of a child with maxillofacial trauma: a case report

Panoska A.[1], Boncanoska Panovska S.[1], Micunovic L.[1], Donev L.[1]
[1]University Clinic of Anesthesia, Reanimation and Intensive Care – Skopje - Skopje (Republic of North Macedonia)

Background: Playground related injuries in children account for 56% of all trauma cases in this population, while 10% of those are severe fractures of cranial and facial bones,dislocations and brain damages that require medical assistance. Single facial fractures in children account for 72% while multifacial fractures for 28%.
Case Report: A 12 year old patient was admitted in hosptal with a swollen face and bleeding after a traumatic injury caused by a swing. CT scan showed no evidence of brain damage,but severe multiple facial fracture with anteroposterior dislocation. He was immediately transfered in the operating room with TA=115/45,HR=95,SaO2=95%.Patient in a chair sitting position was induced in anesthesia with ketamin 1mg/kg, blood was aspirated from oropharynx and direct laringoscopy following intubation with bougle and endotracheal tube 5.5mm was performed. Anesthetics used were propofol 2mg/kg,fentanyl 2mcg/kg,rocuronium 0.6mg/kg,remifentanyl 0.1-0.2mcg/kg/min and sevoflourane 1.0MAC.Tranexamic acid and corticosteroids were given intraoperatively. Central venous catheter was placed through v.carotis interna and invasive blood pressure monitoring was obtained through a.radialis. Tracheotomy was done and the operation ended with anterior and posterior nasal packing along with fixation of maxilla and mandibula. Hemodynamic stability persisted during the whole procedure with a proper fluid management including blood transfusions and plasma,as well as continuous monitoring of the metabolic state by gas analysis and appropriate mechanical ventilation.
Discussion: Management of multi facial injuries is extremely challlenging and needs multidisciplinary approach. Upper airway obstruction caused by maxillofacial trauma often leads to threatened airway and high risk for potential tracheotomy.Maxillofacial injuries when accompained with blood impeding the airway trigger nausea and vomiting, increasing the risk of pulmonary aspiration(1). Therefore,securing the airway is the most challenging part that requires skilled techniques and full anesthesiologic equipment.
References:
1. Anson et.al Menagement of maxillofacialtrauma in emergency:An update of challeges and controversies.



5488

A case of difficult intubation in a patient with vallecular cyst: a case report

Ocmen E.[1], Özkan B. G.[2], Çakir Çetin A.[1]
[1]Dokuz Eylül University Hospital - Izmir (Turkey), [2]Dokuz Eylul University Hospital - Izmir (Turkey)

Background: Vallecular cyst is usally coincidentally encountered during general anesthesia and often cause difficulty in intubation. This case reports a patient with no prior history of intubation, diagnosed with a vallecular cyst.
Case Report: 71-year-old male patient applied to hospital with difficult breathing. During preoperative examination, the patient's mounth opening and mucosa were normal, Mallampathy score was 3 with normal neck range of motion. The patient had a diffused irregular hypertrophic lesion that extends across the wings of the nose. Laryngeal examination using a flexible laryngoscope reveal a vallecular cyst expanding and rendering the vocal cord non-visible. In the operation room, the patient was routinely monitored for vitals. After 2 mg of midazolam, 40 mg and 100 mg iv titres of ketamine and propofol respectively was used for induction. Spontaneous breathing was maintained. Attempts to intube the patient using a video laryngoscope (VL) was unsuccessful as we could not gain access to the vocal cord due to the size of the vallecular cyst. Nasal fiberoptic intubation was also unsuccessful as the vallecular cyst span as far as the posterior aspect of the vocal cord. Using VL blade for visualization as well as a retractor, the cyst was retracted, the larynx was visualized and successfully intubated with nasal fiberoptic endoscope. At the end of the operation the patient was successfully extubated
Discussion: VL and fiberoptic intubation are commonly used for cases including pediatric cases marked as difficult intubation1. But in some cases, a combination of different visualization techniques may be required, especially in patients with large supraglottic masses that may impede intubation2. In this case we used a combination of VL and nasal fiberoptic endoscopy to simultaneously manage the airway as well as endotracheally intubate the patient.
References:
1. Kondo I, Kobayashi H, Suga Y, Suzuki A, Kiyama S, Uezono S. Effect of availability of video laryngoscopy on the use of fiberoptic intubation in school-aged children with microtia. Paediatr Anaesth. 2017;27(11):1115-9.
2. Brenman S, Gupta S, Tseeng S. Successful Retrograde Intubation After Failed Fiberoptic Intubation and Percutaneous Cricothyrotomy. J Emerg Med. 2017;53(4):550-3.
Learning points: In some cases alternative technics, like combination of two devices, may be usefull for successful intubation.

5483

Tapia's syndrome after orotracheal intubation: A case report

Coto C.[1], Baeza L.[1], Williams A.[1], Pérez C.[1], López J. M.[1], García-Cabo P.[1]
[1]*Hospital Universitario Central de Asturias - Oviedo (Spain)*

Background: Tapia's syndrome is a rare condition defined by signs and symptoms associated with unilateral lingual as well as vocal cord paralysis caused by extracranial compression of the hypoglossal nerve (XII) and the recurrent laryngeal branch of the vagus nerve (X). Most cases appear as a complication of airway manipulation after any type of surgery, most commonly after tracheal extubation. The inflated cuff or different head positions during the procedure can lead to a compression of the larynx or pharynx that can damage nerves in this area. Most cases recover in 4-6 months spontaneously suggesting neuroapraxia, nerve damage secondary to compression injuries.
Case Report: We present a case of a 34 year-old female patient with no relevant medical history, scheduled for mammoplasty surgery. The operation was performed under general anaesthesia and orotracheal intubation. During the procedure, after changing the position of the patient's head, an episode of desaturation and elevation of airway pressure was observed. The reposition of the tube, alveolar recruitment maneuvers and bronchodilators were required with the following recovery of the arterial oxygen saturation. The perioperative course was otherwise uneventful. On the first postoperative day, the patient reported dysphonia, dysphagia and lingual paralysis. A complete neurological examination revealed unilateral lingual and left cord paralysis. A head and neck MRI was performed to exclude central nervous injury, showing no pathological findings. A fibreoptic laryngoscopy revealed unilateral lingual and left vocal cord paralysis. Diagnosis of Tapia's syndrome was performed.
Discussion: We postulate that either an unnoticed compression of the endotracheal tube or the inflated cuff or the change in the position of the patient´s head might have been the source of the unilateral nerve compression that was observed. Both anesthesiologists and surgeons should be aware of this postoperative complication in patients reporting dysphagia and dysphonia after tracheal extubation. The diagnosis was based on a complete head and neck neurological examination and imaging test, both essential to exclude central causes.

Transfusion, Haemostatis and Thrombosis

4718

Role of thromboelastometry to predict postoperative hemostatic complications in patients undergoing cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (hipec)

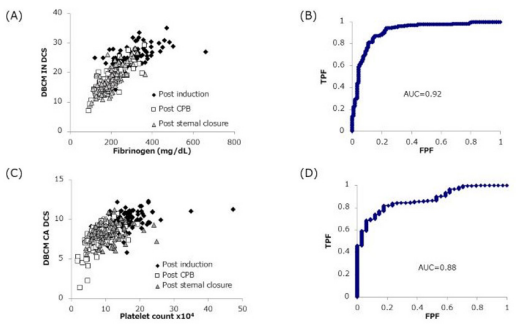
Sanahuja Blasco J. M.[1], Valverde S.[2], Rivas N.[2], Suñe M.[2], Blasi A.[3], Balust J.[2]
[1]*Hospital Clinic of Barcelona - Barcelona (Spain),*
[2]*Hospital Clínic de Barcelona - Barcelona (Spain),*
[3]*Hospital Clínic de Barcelona and IDIBAPS - Barcelona (Spain)*

Background and Goal of Study: Cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (HIPEC) is an aggressive procedure associated with profound alterations in hemostatic system leading to perioperative transfusion, thrombotic events and increased morbimortality. We aimed to correlate thromboelastometry (TE) parameters after surgery with bleeding and thrombotic complications in patients undergoing HIPEC.
Materials and Methods: All patients submitted to HIPEC from March until September 2019 at the Hospital Clinic of Barcelona were prospectively included. Intraoperative management was homogeneously carried by a dedicated team assuring homogeneous hemodynamic monitorization, fluid policy, coagulation management, transfusion thresholds and surgical technique. Thromboelastometry was performed at the end of procedure in all patients. Enoxaparin 40 mg/day was given as a thromboprofilaxis from 8 hours after surgery until 4 weeks after discharge. Thrombotic and bleeding complications were recorded. Patients were followed up to 3 months after surgery; at that time, computerized axial tomography was performed and assessed for incidental thrombosis.
Results and Discussion: Twenty four patients were included during this period, 8 were men, age 66(57-72) years , ASA (I-II-III) 1/20/3, respectively. Avarage surgical time was 229 minutes. Follow up was completed in 13 patients. There wasn´t intraoperative transfusion however, 6 patients (24%) experienced postoperative bleeding, 3 of them (12%) needed re-intervention, and 1 died (4%), because of uncontrolled non-surgical bleeding in the context of multiorganic failure. No thrombotic events were observed. Thromboelastometry values were in the normal range in all patients. Interestingly, a trend to hypercoagulability with shorter coagulation time (CT) (58(54-63) sec vs 64 (59-68) p=0,05), and higher maximum clot firmness (MCF) (72 (63-73) mm versus 65 (63-67) mm, p= 0,07), was observed in those patients who bled vs those who didn´t.
Conclusion: In the present cohort, thromboprophylaxis was efficient avoiding postoperative thrombotic complications. Preliminary thromboelastometry data suggests that an excessive activation of coagulation may be implicated in the pathophysiology of postoperative bleeding in patients undergoing HIPEC. This finding needs to be confirmed in larger series.
References:
1. Hurdle H. CJA 2017 64(11) 1144-1152.

4907

Estimation of plasma fibrinogen level and platelet count using dielectric blood coagulometer in patients undergoing cardiovascular surgery: single center prospective observational study

Uchida T.[1], Yamamoto Y.[1]
[1]*Tokyo Medical and Dental University - Tokyo (Japan)*



Background and Goal of Study: Dielectric blood coagulometer (DBCM) is a coagulation test, based on measurement of dielectric permittivity change, which reflects aggregation and deformation of blood cells and fibrin polymerization during coagulation process. In this system, dielectric clot strength (DCS) are measured as variables reflecting clot strength respectively. This study was designed to evaluate a performance of a prototype DBCM (SONY IP&S, Inc., Tokyo, Japan).
Materials and Methods: Patients undergoing cardiovascular surgery are studied. Blood samples are collected (1) after induction of anesthesia, (2) after the termination of CPB and protamine administration, and (3) after the sternal closure. We evaluated 2 assays: (A) CA as a test initiated by calcium supplementation, (B) IN as a test initiated by ellagic acid and calcium. We studied correlation between the variables from DBCM and those from laboratory test. Spearman's correlation coefficient (Rs) was assessed in the correlation analyses, and receiver operating curve (ROC) analyses were performed as evaluations of test performance. Statistical significance was defined as $P < 0.05$.
Results and Discussion: One hundred patients were included, IN DCS showed strong correlation with fibrinogen by Clauss method (Rs=0.83, P<0.001, FigA), and CA DCS showed strong correlation with platelet counts (Rs=0.66 P<0.001, Fig B)). Area under the curves of ROC analyses were 0.92 to detect plasma fibrinogen levels >200mg/dL from IN DCS Fig C, and 0.88 to detect platelet counts >60,000/mm3 from CA DCS Fig D.
Conclusion: DBCM showed acceptable performance for the evaluation of fibrinogen concentration, and platelet count in patients undergoing cardiac surgery. Further large sized clinical trials are needed to establish clinical usefulness of DBCM.
Acknowledgements: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

5157

The use of viscoelastic techniques in the management of cirrhotic or septic patients undergoing invasive procedures allows to save blood-components transfusion without observing hemorrhagic complications

Fernandez Colorado A.[1], Barquero M.[1], Martínez J.[1], Saez C.[1], Juncà S.[1], Gasulla A.[1]
[1]Hospitat Parc Tauli Sabadell - Sabadell (Spain)

Background and Goal of Study: Septic and cirrhotic patients often present prolonged coagulation tests. Fresh frozen plasma and/or platelet transfusions may be administrated to these patients undergoing invasive procedures in order to minimize the risk of bleeding, despite routine coagulation tests do not predict an obligated bleeding risk. Blood-components transfusion is associated with an increased risk of morbidity and mortality, especially when not indicated. Rotational thromboelastography (ROTEM®) provides a more comprehensive global coagulation assessment, measuring clot formation, strength and stability. Its use may avoid unnecessary blood product transfusion for this type of patients.
Materials and Methods: A retrospective study including 290 septic and 230 cirrhotic patients admitted to the emergency room or hospitalization area at Parc Tauli Hospital (Sabadell, Barcelona) since 2011 to beginning 2019, having PT alteration or platelet deficiency and undergoing invasive procedure. A thromboelastometric analysis (EXTEM/FIBTEM tests) was performed prior to the procedure to estimate coagulation and bleeding risk, conditioning the need or not of previous transfusion. Results and Discussion: The 520 patients collected, all presenting INR/PT prolongation and/or thrombocytopenia, underwent invasive procedures such as central venous catheter, tracheotomy, surgical intervention, lumbar puncture, epidural catheter or interventional radiological procedures; without previous transfusion guided by normal CT (coagulation time) estimated by ROTEM®. No case was in need of frozen plasma nor platelet transfusions, only isolated cases of thrombocytopenia and fibrinogen deficit were in need of fibrinogen administration. No overt bleeding was observed.
Conclusion: This study reveals that cirrhosis and sepsis present in most cases normal thromboelastometry results meaning good hemostatic competence, fact that sometimes does not correlate with routine coagulation tests. The ROTEM® guided approach may reduce administration of fresh frozen plasma or platelets without increasing bleeding risk, being considered a safe clinical practice.

5195

Massive postoperative hemorrhage after elective radical prostatectomy

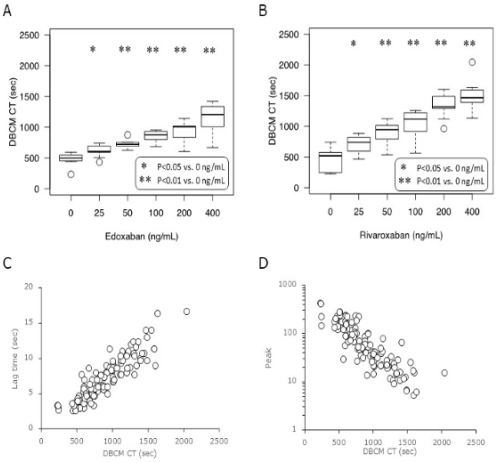
Montero Saiz O.[1], Madrid Vázquez L.[2], Aragonés Quintanero L.[2], Aguado Laiglesia I.[2], Ibañez Lorente C.[2], Muñoz Alameda L. E.[2]
[1]University Hospital Fundacion Jimenez Di - Madrid (Spain),
[2]University Hospital Fundacion Jimenez Diaz - Madrid (Spain)

Background: Massive bleeding is a frequent entity that is associated with high morbidity and mortality. Nowadays there is a lack of consensus in the diagnostic criteria, management guidelines, and treatment aim of this condition.
Case Report: A 56-year-old male with a personal history of hypertension, non-insulin-dependent diabetes mellitus and prostate tumor, who is intervened on a scheduled basis for laparoscopic radical prostatectomy. After surgery, the patient is transferred to the critical care unit (CCU) where he develops hypotension refractory to fluid therapy and vasoconstrictor bowling, with anemization of 3 points in less than 30 minutes, so it is decided to perform urgent laparatomy. The massive hemorrhage protocol is activated and the patient is connected to the rapid fluid transfuser. Hemoderivatives are administered early (including 20 units of packed red cells, 4 units of fresh plasma, 2 units of platelets and fibrinogen concentrates), in addition to the simultaneous correction of hypovolemia and requiring perfusion of norepinephrine and adrenaline boluses. In addition, tranexamic acid, prothrombin complex, calcium and bicarbonate are administered. After several hours of surgery, bleeding from the surgical site, and the left epigastric artery is managed and the patient is transferred to the CCU.
Discussion: Evaluation of the extent and severity of bleeding is important in clinical examination together with the application of prediction scales for massive transfusion. It is important to highlight the need of training teams involved and periodically evaluate their compliance and effectiveness. We also need clear protocols for the management of hypothermia, replacement of volemia, hypotensive resuscitation and damage containment surgery, monitoring of vollemia, administration of hemocomponents and hemostatics.
References:
1. Llau J.V, Acosta F.J, Escolar G et al. Multidisciplinary consensus document on the management of massive haemorrhage (HEMOMAS document) Med Intensiva.2015;39(8):483–504.
2. McQuilten Z. K, Crighton G, Engelbrecht S et al. Transfusion Interventions in Critical Bleeding Requiring Massive Transfusion: A Systematic Review. Transfusion Medicine Reviews, 29(2), 127–137.
Learning points: Being aware of the possibility of massive hemorrhage in laparoscopic prostatectomy, early diagnostic and correct management of this condition. Would a thromboelastography have changed the management of the case?

5337

Evaluation of dielectric blood coagulometer as a point of care test for measurement of anticoagulation potential caused by direct oral anticoagulants

Uchida T.[1], Yamamoto Y.[1], Sato Y.[1], Takahashi M.[1]
[1]Tokyo Medical and Dental University - Tokyo (Japan)



Background and Goal of Study: Dielectric blood coagulometry (DBCM) is a coagulation test based on the measurement of dielectric permittivity change, which reflects aggregation/deformation of blood cells and fibrin polymerization in coagulation process. The purpose of this study is to evaluate correlation between

clotting time measured by DBCM (DBCM CT) and the thrombin generation of the blood supplemented with direct oral anticoagulants (DOACs) using a prototype machine of DBCM (SONY IP&S, Inc., Tokyo, Japan). We also evaluated a correlation between DBCM CT and DOAC concentration.
Materials and Methods: Whole blood samples are collected in sodium citrate tubes from 10 volunteers. Edoxaban and rivaroxaban was added to make blood samples with concentration of 25, 50, 100, 200 and 400 ng/mL. Low dose tissue factor and calcium were added to measure DBCM CT. Plasma was isolated from same samples, and they are used in evaluation of thrombin generation using calibrated automated thrombogram (CAT). Kruskal-Wallis tests were performed for multiple comparison, and the difference between the samples with or without DOACs were analyzed by Steel tests as post-hoc analyses. Spearman's correlation test was performed to analyze correlation between DBCM CT and the variables measured by CAT analyses. Statistical significance was defined as $P < 0.05$.
Results and Discussion: DBCM CT was prolonged by supplementation of edoxaban and rivaroxaban (Fig A, B). The samples supplemented with DOACs showed significantly longer DBCM CTs than those from samples without DOACs. Both lag time and peak measured in CAT analyses showed significant correlation with DBCM CT (Fig C, D; Rs=0.87, P<0.001 for edoxaban; Rs=0.91, P<0.001 for rivaroxaban).
Conclusion: DBCM CT showed significant correlation with variables reflecting thrombin generation under FXa inhibition caused by DOACs. These results suggest potential for clinical usefulness of DBCM as a point of care test to evaluate anticoagulation induced by DOACs.
Acknowledgements: This work was supported by the Cooperation Program by TMDU and Sony IP&S, Inc.

5770

Hemostasis system evaluation by the rotary thrombolastometry method with the module of impedance agregometry in newborn children with congenital heart disease.

Dibin D.[1], Rybka M.[1], Lomakin M.[1], Loseva A.[1], Yudin G.[1], Shcherbak A.[1]
[1]A.N. Bakulev National Medical Research Center of Cardiovascular Surgery - Москва (Russia)

Background and Goal of Study: "Open heart" surgery in newborn children is carried out using a cardiopulmonary bypass and accompany the severe hemodilution condition. It aggravates by prolonged contact with a foreign surface in various temperature conditions- hypothermia. The aim of our study was to identify functional changes in platelets after cardiopulmonary bypass in newborn children. We applied the ROTEMplatelet module to assess platelet aggregation ability in infants with congenital heart disease to evaluate the effect of hemostatic therapy with platelet concentrate and identify patients with high thrombogenic risk who require specific antithrombotic therapy, such as heparin-induced thrombocytopenia. Materials and Methods: The hemostasis system was examined by integrated test for evaluating the blood coagulation system ROTEMdelta and ROTEMplatelet (impedance aggregometry module) - determination of platelet aggregation activity in a native blood sample. Between July and November 2019 40 newborn children and infants undergone "open heart" surgery in A.N. Bakulev National Medical Research Center of Cardiovascular Surgery were examined for basic ROTEMdelta indicators. A platelet aggregation with thrombin activation was completed from the remaining whole blood sample mixed with sodium citrate, i.e. the TRAPTEM test in the ROTEMplatelet module.
Results and Discussion: The method of integral assessment of the hemostasis system using the classic ROTEMdelta platform answered standard questions about transfusion or shunting blood products need, otherwise it indicated the absence of indications for their use. The study of platelet aggregation in this patient's category showed the cardiopulmonary bypass influence on platelet functionality. Aggregation ability decreasing correlates with the cardiopulmonary bypass duration and the depth of hypothermia. If transfusion of platelet concentrate was carried out, an assessment of platelet aggregation indicated their functionality in the blood of the recipient.
Conclusion: Given the novelty of the ROTEMplatelet method, it deserves attention, discussion, and consideration of the obtained results, especially in individual clinical cases.

5788

Fibrinolysis detection by the next generation cartridge-based viscoelastic analysers TEG® 6s and ROTEM® Sigma: An in vitro comparison

Dias J.[1], Shafizadeh E.[2], Leiriao J.[2], Hartmann J.[2]
[1]Haemonetics S.A. - Signy-Avenex (Switzerland),
[2]Haemonetics Corporation - Boston (United States)

Background and Goal of Study: Hyperfibrinolysis is a critical component of coagulopathy with poor outcomes if not diagnosed and treated early. Successful hemostasis management requires close monitoring of fibrinolysis and its treatment with anti-fibrinolytics. The study objective was to explore and compare the fibrinolysis detection capabilities of the new cartridge-based viscoelastic hemostatic analyzers (VHA) under controlled conditions.
Materials and Methods: TEG®6s and ROTEM® Sigma analyses were performed in duplicate on whole blood samples from 10 healthy volunteers spiked with 8 different concentrations of tPA (0-140ng/ml). Fibrinolysis was measured with the TEG®6s at 30 minutes after maximum amplitude (LY30) for RapidTEG® (CRT) and Kaolin (CK) assays and with the ROTEM® Sigma at 30 minutes after clotting time (LI30) for INTEM and EXTEM assays. Device relationships to tPA were studied in linear or nonlinear models and measurement variances were studied with Bland-Altman analyses.
Results and Discussion: Both analyzers showed a monotonic relationship with increased tPA concentrations in log-logistic four parametric models. The tPA concentrations with >90% expected probability for detection of tPA induced lysis versus no-tPA control or reference range were respectively: 62.4ng/ml or 71.7ng/ml for CK.LY30, 84ng/ml or 89.2ng/ml for CRT.LY30, 100.7ng/ml or 100ng/ml for EXTEM.LI30, and 110.9ng/ml or 114.6ng/ml for INTEM.LI30. For the lower tPA concentrations of 20, 40 and 60ng/ml the lysis prediction sensitivity versus reference range were 61.4%, 69.2% and 78% for CK.LY30, 54.3%, 63.3% and 72% for CRT.LY30, 47.9%, 55.8% and 67% for EXTEM.LI30 and 33.6%, 39.2% and 47% for INTEM.LI30, respectively. In comparison, current commonly used VHA-guided thresholds for fibrinolysis treatment correspond to ~80ng/ml or higher. Both devices had specificity levels >85% at most studied concentrations. Finally, the variance of measurements ranged from 1.6% (CRT.LY30) and 3.7% (CK.LY30) for the TEG®6s to 11.9% (EXTEM.LI30) and 15.8% (INTEM.LI30) for the ROTEM® Sigma.
Conclusion: Important differences were found between the fibrinolysis detection capabilities of the new VHA analyzers. The clinical importance of these findings needs to be further investigated. VHA-guided fibrinolysis treatment algorithms could potentially be improved to reflect the sensitivity of the new VHA analyzers.

5794

Comparison of low-frequency piezoelectric thromboelastography (LPTEG) data of patients with benign prostate hyperplasia between fasting and non-fasting groups in the preoperative period

Tarabrin O.[1], Suslov O.[1], Sukhonos R.[1]
[1]Odessa National Medical University - Odessa (Ukraine)

Background: Benign prostatic hyperplasia (BPH) is a common problem for elderly men that negatively affect quality of life and results in medical intervention. Despite the latest European recommendations about perioperative fasting, the majority of anaesthesiologists in Ukraine prefer nil per os (NPO) tactic for at least 12 hours before surgery. NPO for prolonged period may cause the hypercoagulability. The target of this study was to demonstrate the effects of water deprivation on hemostasis system in the cohort of elderly patients with BPH by LPTEG readings.
Materials and Methods: Participants were ≥70 y.o., underwent transrectal ultrasound-guided prostate biopsy from September 2018 till September 2019 to confirm the diagnosis of BPH. LPTEG data were collected twice before the procedures from the patients, who did not receive any antithrombotic or anticoagulant treatment: on the admission and 1±0.43 hour previous to the surgical procedure. The patients (n=64) were blindly divided into two groups: group A (n=31) was represented by the patients, who were allowed to drink clear fluids in volume 100-300 ml until 2 hours previous to the operation; group B (n=33) was represented by the patients, who underwent NPO tactic 12±2.3 hours previous to the operation.
Results: Blood coagulation constants checked by LPTEG were: Intensity of contact coagulation (ICC), Intensity of coagulation drive (ICD), clot maximum density (MA) and fibrinolytic activity - Index of retraction and clot lysis (IRCL). We received a slight increase of all measurements in both of the groups on the admission: ICC by 13.13 ± 8.56%, ICD by 22.43 ± 10.93%, MA by 44.11 ± 19.31%, IRCL by 61.18 ± 31.18% above the norm. Before the surgical procedure LPTEG has shown such results: in group A – changes in ICC by 12.13 ± 6.11%, ICD by 18.87 ± 5.04%, MA by 43.51 ± 18.81%, IRCL by 64.02 ± 26.22% above the norm similar to those at the admission; in group B we found a moderate increase in all the measurements - ICC

by 26.01 ± 7.21%, ICD by 39.67 ± 13.57%, MA by 64.07 ± 21.81%, IRCL by 76.88 ± 42.97% above the norm.
Conclusion: The present study demonstrates changes in LPTEG data due to water deprivation, which leads to the dynamic stress state of haemocoagulation system. It can be avoided by the optimization of pre-operative patient's fluid intake. Further studies should be conducted to create an optimal thromboprophylaxis treatment regimen in case of different pre-operative fasting tactics.

5981

Coagulation parameters associated with fibrinogen concentrate and cryoprecipitate for treating bleeding patients in Pseudomyxoma Peritonei surgery: results from the prospective, randomised, controlled Phase 2 FORMA-05 study

Roy A.[1], Sargant N.[1], Solomon C.[2], Kruzkhova I.[2], Knaub S.[2], Mohamed F.[1]
[1]Basingstoke and North Hampshire Hospital - Hampshire (United Kingdom), [2]Octapharma AG - Lachen (Switzerland)

Background and Goal of Study: Cytoreductive surgery (CRS) with hyperthermic intraperitoneal chemotherapy for pseudomyxoma peritonei (PMP) can be associated with excessive bleeding and acquired fibrinogen deficiency. Maintaining adequate levels of coagulation proteins, including plasma fibrinogen concentration, during CRS helps control haemostasis. FORMA-05 compared efficacy and safety of human fibrinogen concentrate (HFC) vs cryoprecipitate for bleeding patients with acquired fibrinogen deficiency undergoing CRS for PMP. This sub-analysis explores the patient coagulation profiles intraoperatively and postoperatively.
Materials and Methods: FORMA-05 was a single-centre, prospective, randomised, controlled Phase 2 study. Patients undergoing PMP surgery with predicted intraoperative blood loss ≥2 L received either HFC (4 g) or cryoprecipitate (2 pools of 5 units, approximately 4.0–4.6g fibrinogen), repeated as needed. Plasma fibrinogen concentration (measured using Clauss assay) and FIBTEM A20 were measured hourly intraoperatively, while Factor (F) XIII, FVIII, von Willebrand Factor (VWF) levels and endogenous thrombin potential (ETP) were measured every two hours. Post-surgery, all parameters were measured at 6, 12, 24, and 28 hours, and 10 days.
Results and Discussion: The full analysis included 45 patients on either HFC (n=22) or cryoprecipitate (n=23). The intraoperative and postoperative changes in ETP, FXIII, FVIII and VWF are shown in Table 1. For FIBTEM A20 (intraoperatively) and fibrinogen concentration (intraoperatively and postoperatively), the mean numerical values appeared higher with HFC than cryoprecipitate. Activated partial thromboplastin time, prothrombin time and platelet count were maintained throughout surgery in both treatment groups.

Parameter	Treatment group	Baseline Mean (SD)	Intra-operative 2h after surgery start, Mean (SD)	Intra-operative 6h after surgery start, Mean (SD)	End-of-surgery Mean, (SD)	2 days after end of surgery, Mean (SD)	10 days after end of surgery, Mean (SD)
Endogenous thrombin potential (nmol/L/min)	HFC	1514.5 (430.6)	1673.5 (340.1)	1310.7 (171.2)	1225.4 (220.7)	1263.44 (176.9)	1426.16 (260.4)
	Cryoprecipitate	1639.1 (339.1)	1690.2 (320.2)	1260.7 (342.2)	1346.4 (243.6)	1385.6 (301.6)	1357.0 (349.5)
Factor XIII (IU/dL)	HFC	121.86 (27.32)	80.09 (27.60)	53.31 (16.16)	55.28 (22.28)	48.05 (16.86)	65.54 (18.58)
	Cryoprecipitate	115.55 (29.52)	71.63 (23.63)	60.27 (15.26)	62.97 (13.42)	50.60 (13.44)	65.00 (14.31)
Factor VIII (IU/dL)	HFC	152.21 (53.61)	155.50 (90.60)	130.70 (50.14)	121.89 (54.50)	278.84 (57.74)	313.88 (84.16)
	Cryoprecipitate	136.73 (40.90)	123.61 (50.68)	120.63 (48.36)	116.99 (39.50)	242.78 (54.59)	331.19 (102.22)
Von Willebrand Factor Antigen (IU/dL)	HFC	144.43 (65.58)	144.07 (61.05)	145.01 (50.99)	138.52 (54.51)	253.97 (59.91)	320.41 (88.32)
	Cryoprecipitate	140.95 (49.59)	137.56 (52.21)	167.56 (52.61)	174.21 (56.23)	260.46 (72.54)	301.54 (92.71)

Conclusion: The FORMA-05 coagulation parameters analyses showed broad overlaps between HFC and cryoprecipitate, with satisfactory maintenance of the clot quality parameters, FXIII concentrations and thrombin generation parameters in both treatment groups.

5929

Early administration of tranexamic acid in hip fracture reduces transfusion requirements

Larranaga L.[1], Martinez S.[1], Arroyo R.[1], Vallés J.[1], Robles M.[1], Álvarez J.[1]
[1]Parc de Salut Mar - Barcelona (Spain)

Background and Goal of Study: In hip fracture, blood loss occurs as a consequence of both the fracture and the surgery. Red blood cell (RBC) transfusion is frequent, but secondary effects and risks have to be assumed. Lastly, tranexamic acid (TXA) has been recommended as a efficient therapy to reduce blood transfusions during surgery. On the other hand, a big part of the bleeding has the origin in the fracture itself. The goal of this study is to evaluate the effect of TXA early administration at the diagnosis of femur fracture over the transfusion requirements.
Materials and Methods: In a double blind prospective study, the patients with hip fracture were randomly assigned to receive TXA (iv, 1g) or placebo at the hospital admission. Demographic parameters, type of fracture, hemoglobin changes and transfusion requirements were register from admission until the fourth postoperative day. Estimation of bleeding from variation of hemoglobin and anthropometric parameters was calculated. Thromboembolic events were also registered. T-test was used for quantitative variables and Chi-square test for qualitative variables.
Results and Discussion: After a year of recruitment, a preliminary analysis of results was made. Sixty-five valid cases were included: 32 patients treated with TXA and 33 with placebo. Groups were similar in sex, age, body mass index, proportion of intracapsular/extracapsular fractures and preoperative hemoglobin.

Table 1. Main results	Tranexamic acid (n= 32p)	Control (n=33p)
Transfused patients all period (n)	12	17
RBC transfused all period (n)	23	31
Transfused patients preoperatory (n)	2*	8*
RBC Transfused preoperatory (n)	2*	9*
Estimated preoperatory bleeding mL (m/SD)	404 (368)	496 (419)
Estimated total bleeding mL (m/SD)	1585 (1478)	1975 (1643)

Table 1. *p<0.05(statistical significance).
Conclusion: Early administration of TXA at diagnosis reduces the need of blood transfusion as well as the number of RBC transfused in preoperative period. These are preliminary results, and a greater sample has to be analyzed for definitive conclusions.
Acknowledgements: Sergi Giraldo.

6278

Discrepancy between conventional laboratory tests and thromboelastography (teg) for the management of hemostasis in a septic patient: a case report

González Del Pozo I.[1], Vullo A.[1], Martín Oropesa R.[1], Ramos Cerro S.[1], Diaz Viudes A.[1], Navarro Suay R.[1]
[1]Hospital Central de la Defensa Gomez Ulla - Madrid (Spain)

Background: Thromboelastography (TEG) is a viscoelastic hemostatic assay that measures the global viscoelastic properties of whole blood clot formation, showing a functional perspective on the entire coagulation process. The use of TEG has been evaluated for cardiac surgery and the emergency control of bleeding after trauma and during postpartum haemorrhage (1). We report a case of a patient with sepsis who presents alterations of INR with TEG within normalization.
Case Report: A 34-year-old patient was diagnosed with xanthogranulomatous pyelonephritis that conditioned a chronic sepsis and was scheduled for nephrectomy surgery. In the preoperative evaluation, anemia of chronic disorders (non-iron deficiency) was observed with baseline hemoglobin 9 g/dL and an INR of 1.57 that did not improve with vitamin K, so fresh frozen plasma (FFP) was prescribed 10 ml/kg before the start of the intervention. After transfusion of FFP, an INR of 1.5 was maintained, so a TEG (ROTEM® delta, Werfen) was performed in which we did not find alterations in the INTEM, EXTEM, FIBTEM and APTEM that suggested a prohemorrhagic state. The intervention was carried out with an intraoperative bleeding of 400mL aproximately, hemodynamic stability and transfusion of two red blood cell concentrates with hemoglobin of 8.6 g/dL at the end. In the immediate postoperative period, the alteration of the INR was maintained without alteration of the TEG or bleeding complications.
Discussion: The agreement between conventional laboratory tests, such as INR, and TEG is poor and it remains uncertain what type of coagulation test best reflects the risk of intraoperative bleeding (2). Apart from the use of TEG for cardiac surgery, bleeding after trauma and postpartum hemorrhage, it can be used in situations where we need additional information on the coagulation status of our patients.
References:

1. National Institute for Health and Care Excellence. Detecting, managing and monitoring haemostasis: viscoelastometric point-of-care testing (ROTEM, TEG and Sonoclot systems). NICE Diagnostics Guidance. 2014:1-60.
2. Ågren A, et al. Thromboelastography (TEG®) compared to conventional coagulation tests in surgical patients–a laboratory evaluation. Scand J Clin Lab Invest. 2013: 214-20.
Learning points: TEG offers a point-of-care application that provides quickly results and has the potential to improve standards of patient care in our patients.

6292

Massive hemorrhage protocol survey in five spanish hospitals: what knowledge is there?

Felipe Correoso M.[1], Cueva L.[1], Anaya R.[1], Batalla A.[1], Díaz R.[1], Gine M.[1]
[1]Hospital Santa Creu i Sant Pau - Barcelona (Spain)

Background and Goal of Study: Massive hemorrhage protocols (MHP) has been designed to deliver predetermined blood product component ratios in an early and coordinated manner to control massive hemorrhage (MH). The implementation of MHP improves the prognosis but its non-compliance increases mortality. The protocol allows the professionals involved to optimize resources and follow an algorithm with specific circuits or procedures that adapt to the local conditions of each center. The objective of this survey was to evaluate the degree of knowledge in 5 different Spanish hospitals,identify the aspects with more unknowledge and propose corrective actions to improve MHP compliance.
Materials and Methods: An anonymous online survey was carried out by doctors and nurses staff,where high complexity surgeries and trauma patients are managed. All have MHP since 2011. The survey had 6 sections with 26 questions. 20 of them with multiple choice/single answer and the other 6 asked about the personal experience. 1. Logistics and organization. 7 questions. 2. Criteria of activation and deactivation. 4 questions. 3. Content / preservation of blood components. 4 questions. 4. Prescription and administration of blood components. 3 questions. 5. Lab tests. 2 questions. 6. Personal experience. 6 questions.
Results and Discussion: A total of 281 surveys were answered. The area that had the highest participation was the surgical area (49%) followed by intensive care unit (25%). Section with the highest success rate was Lab tests (87%) followed by Criteria of activation and deactivation(78%). The section with less success was Prescription and administration of blood components(58%) and Content/ preservation of blood components(55%). In the personal experience section,it's noteworthy some services involved in the treatment of MH are unaware of key points of the care protocol and blood banks demand more leadership and communication during MTP activation while clinicians think that the activation of MHP is orderly and well led.
Conclusion: There is an acceptable but not sufficient or uniformknowledge of the MHP and it is necessary to improve coordination between teams involved in MH. After the results we have made an update of the MHP, an informative session in our hospital, we have made a check-list to remember all action recommended after MTP activation and we designed a compliance study of the MHP.

6099

The impact of blood components transfusion on the survival rate of liver transplant patients

Colacio D.[1], Rodrigues Nascimento J. C.[1], Castelo Branco Chaves V.[1], Guerra Lucena Matias Alencar L.[1], Araújo Lopes Júnior L.[1], Moreira Feitosa Rodrigues F. H.[1]
[1]Hospital Geral de Fortaleza - Fortaleza (Brazil)

Background and Goal of Study: Orthotopic liver transplantation (OLT) is a complex surgical procedure and has historically been linked to excessive blood loss and the need for transfusion of large quantities of blood products. Numerous reports established a link between transfusion of blood products and mortality or morbidity during OLT. The aim of the present study was to evaluate the one-year mortality rate of liver transplant patients related to red blood cell (RBC) and to fresh frozen plasma (FFP) transfusion, and to evaluate the correlation between blood components transfusion and mortality.
Materials and Methods: The prospective and observational study was conducted at the General Hospital of Fortaleza, Brazil including 178 patients undergoing OLT from October 2014 to December 2017, of both genders, aged 18 years and older. Mortality analysis was related to transfusion of either: up to 3 RBC and more than 3 RBC, and to transfusion of up to 3 FFP and more than 3 FFP.
Results and Discussion: From the 178 patients, 109 were transfused with up to 3 RBC's, with an average of 1.19 per patient and had a mortality of 26.60%, while 69 received transfusion of more than 3 RBC's, with an average of 7.75 and had a mortality of 39.13%, with statistical significance (P = 0.0252). Between the same 178 patients, 144 were transfused with up to 3 FFP's, with an average of 0.85 units per patient and had a mortality rate of 27.08%, while 34 received transfusion of more than 3 FFP's, with an average of 4.15 units per patient and had mortality of 50.00%, presenting statistical significance (P = 0.0053). There was a statistically significant positive correlation of mortality between RBC and FFP transfusion (ρ = 0.665; P <0.0001) and between RBC and prothrombin complex transfusion (ρ = 0.586; P <0.0001). It is demonstrated that the impact of blood transfusion is independent of other well-known predictors of surgical blood loss and post-transplant survival, such as: prior abdominal surgery, renal failure, other comorbidities, and severity of liver disease; in agreement with others reviews. Suggesting that intraoperative transfusions are an independent risk factor for patient survival after TOF
Conclusion: On this analysis, one-year survival was significantly higher in patients receiving up to 3 RBCs and also those who received up to 3 FFPs, reinforcing that blood transfusion is an independent risk factor for mortality.

5442

Does anemia severity affect outcomes of patients undergoing Radical Cystectomy within an Enhanced Recovery After Surgery programme?

Castellarnau Uriz S.[1], Espinosa J.[1], Sierra P.[1], Sabaté S.[1], Hernando D.[1]
[1]Fundacion Puigvert - Barcelona (Spain)

Background and Goal of Study: Anemia has been associated with an increase of morbidity and mortality in many diseases, including bladder cancer. The aim of this study was to determine if the severity of preoperative anemia affects Radical Cystectomy (RC) outcomes within an Enhanced Recovery After Surgery (ERAS) protocol.
Materials and Methods: Data were prospectively collected from 145 consecutive patients enrolled in the ERAS protocol who underwent RC from November 2016 to November 2019 . Based on the classification of anemia severity as defined by the World Health Organization, patients without anemia were compared to those with mild anemia and to those with moderate to severe anemia. The primary outcomes were postoperative complications and transfusion rates. The secondary outcome measure was length of stay (LOS). Mann-Whitnay U test and Fisher exact test were used to compare quantitative and qualitative variables respectively.
Results and Discussion: Of the 145 patients, 45 patients (31%) were identified to be anemic. 27 patients (18.6%) had moderate to severe preoperative anemia and 18 patients (12.4%) had mild preoperative anemia. Patients with moderate to severe preoperative anemia had more complications than the mild anemia group (85.2% vs 55.6%). In addition, patients with mild anemia had shorter LOS as compared to those with moderate to severe anemia. Blood transfusion requirements were statistically significantly less in the no anemic group (17%) and in the mild anemia group (33.3%) compared to the moderate and severe anemia group (59.3%). It was also demonstrated that patients who received blood transfusion had a statistically significant longer hospital stay compared to patients without transfusion (14.5 vs 9 days, p 0.0012).
Conclusion: Our results suggest that even within an ERAS protocol, preoperative moderate to severe anemia is associated with worse clinical outcomes. Preoperative optimization of hemoglobin in patients with moderate to severe anemia should be an important part of the ERAS programme. Our Hospital has a preoperative iron infusion protocol for optimizing anemia prior RC surgery.

4412

The association between allogeneic blood transfusion and recurrence of non-small-cell lung cancer after surgical resection: A propensity score analysis of 1,859 patients

Tai Y. H.[1], Wu H. L.[2], Mandell M.[3], Tsou M. Y.[2], Chang K. Y.[2]
[1]Taipei Medical University Shaung Ho Hosp - New Taipei City (Taiwan), [2]Taipei Veterans General Hospital - Taipei (Taiwan), [3]University of Colorado Health Sciences Center - Aurora (United States)

Background and Goal of Study: Whether allogenic blood transfusion adversely affects recurrence and survival after lung cancer resection remains controversial. Previous studies are flawed with insufficient sample size and incomplete

considerations of important confounders. We aimed to evaluate the relationship between perioperative use of allogeneic blood transfusion and oncological outcomes after lung cancer resection.
Materials and Methods: Patients undergoing curative resections for stage I through III non-small-cell lung cancer at a medical center between 2005 and 2015 were collected and evaluated through May 2017. Postoperative disease-free and overall survival were measured using Cox regression models with inverse probability of treatment weighting (IPTW) to balance observed covariates in the sequential cohort of patients receiving an incremental amount of blood. Restricted cubic spline functions were used to characterize dose-response effects of the amount of transfusion on cancer recurrence and mortality.
Results and Discussion: A total of 1,859 patients were analyzed with a median follow-up time of 42 months (interquartile range 24.9 – 71.9); 214 (11.5%) of them received red cell transfusions during or within 7 days after surgery. Perioperative blood transfusion was associated with early cancer recurrence (IPTW adjusted HR: 1.73, 95% CI: 1.52 – 1.96, $p < 0.001$) and greater all-cause mortality (IPTW adjusted HR: 2.38, 95% CI: 1.98 – 2.86, $p < 0.001$) after lung cancer resection. A non-linear dose-response association was noted between the amount of transfusions and recurrence or all-cause mortality, which is important in understanding the mechanism of transfusion-related immune modulation.
Conclusions: Allogeneic blood transfusion was an independent risk factor for recurrence and death after resections for non-small-cell lung cancer. The non-linear relationship between transfusion amounts and recurrence risk is crucial in clarifying the mechanism of transfusion-related immune modulation. Our results justify minimizing uses of transfusions in lung cancer resection.

5276

Prehabilitaion and patient blood management during colorectal cancer surgery

Novikov S.[1], Ploshchenko Y.[2], Kyryllova L.[1], Frolov K.[1], Havrysh K.[1], Klygunenko O.[2]
[1]State Establishment Dnipro multi-field clinical hospital 4 - Dnipro (Ukraine), [2]State Establishment Dnipropetrovsk medical academy MOH of Ukraine - Dnipro (Ukraine)

Background and Goal of Study: The worldwide trend towards the use of blood replacement in surgery with significant blood loss. There are many complications of blood transfusion and without the use of alternatives risks cannot be prevented. We used new blood management strategies with erythropoiesis stimulants for the prehabilitation of patients in colorectal surgery. The goal of the study was to improve the outcome anesthesia, reducing risks and complications in patients with two different perioperative blood management strategies.
Materials and Methods: 50 patients were divided into 2 groups due to blood management strategy: in 1 group (n = 25) we used 10,000 IU the epoetin-alpha (erythropoietin) with Iron (III) oxide 1mg/kg 5,3 days prior to the surgery and intraoperatively. Haemotransfusions were not planned in this group. In the 2 group (n = 25) were scheduled to blood transfusion based on intraoperatively blood loss (RBC:FFP to 1:1). The baseline hemoglobin and hematocrit level was not different in both group (118±3 g/l; erythrocytes 4.7±0.5 G/l, Ht - 37±3%). Monitoring of red blood carried out 6, 12, 24, 48 and 72 hours after surgery. Restrictive infusion tactics were chosen for all patients. A sternal puncture and ultrastructural examination was performed intraoperatively.
Results and Discussion: All patients of 1 group showed an increase in hemoglobin by 17-19% from baseline. 24 patients (96%; $p < 0.05$) tended to decrease hemoglobin 6, 12, 24 hours after surgery by an average of 13-15%. Further restoration to the initial level after 48 hours, and even increase above by 10-12%. At the same time, the hematocrit remained constant nearly of 2-3% from the initial. In patients in group 2, no significant decrease of red blood was observed, due to intraoperatively transfusion of erythrocytes. Anemia was observed in 17 cases (68%) to 48 hours after surgery, requiring additional blood transfusion. After 72 hours hemotransfusion were not necessary. In sternal bone marrow punctate in 1st group there was activation of erythrocyte proliferation in 24 (96%; $p<0.05$) cases (normoblast level was 20 ± 2%) versus 12 ± 1% level of normoblastes in 2 group with moderate activity of erythrocyte proliferation.
Conclusion: Prehabilitation with blood management strategy allows to maintain adequate hemoglobin level without blood transfusion, and complications associated with haemotransfusion.

5586

Implementation impact of a patient blood management program in primary total hip and knee arthroplasty, an uncontrolled before-after study

Drudis Morell R.[1], Torra Riera M.[2], Colomina Morales J.[2], Villalba Mir P.[2], Sanchez Villegas J. M.[3], Montero Matamala A.[4], Patient Blood Management in Orthopedic Surgery
[1]Hospital Universitari Santa Maria.GSS - Lleida (Spain), [2]Hospital Universitari Santa Maria. GSS - Lleida (Spain), [3]Banc de Sang i Teixits. HUAV . - Lleida (Spain), [4]Hospital Universitari Arnau de Vilanova - Lleida (Spain)

Background and Goal of Study: Total hip and knee arthroplasty are a high prevalence surgery with significant blood loss that often implies the need of an allogeneic blood transfusion with its well-known risks. Patient Blood Management (PBM) is a combination of strategies in order to reduce the transfusions in patients undergoing surgery and have proved to be effective in elective orthopaedic surgery. The objective of this study is to know the impact of implementing a PBM program on transfusion rates in primary total hip and knee arthroplasty.
Materials and Methods: In January 2014 administration of an intraoperative dose of Tranexamic Acid unless contraindicated began and one year later the full PBM Program was implemented treating all patients with preoperative haemoglobin under 13mg/dl to raise it, intraoperatively with the administration of two doses of Tranexamic Acid unless contraindicated and careful haemostasis of the surgical field and postoperatively transfusion threshold at 8 gr/dl of haemoglobin was settled except particular medical circumstances and giving a second blood bag only if necessary. All patients who had a primary total knee or hip arthroplasty from January 2012 to September 2019 were included. Before the PBM program implementation, transfusion rates were obtained by reviewing all medical records and comparing them with the blood bank records. Since the PBM program began, data was recorded on the number of: patients involved, patients transfused, bags of blood used, patients treated for preoperative haemoglobin optimisation and complications.
Results and Discussion: Since January 2014 a total of 2.051 patients were involved in the PBM program implementation. The percentage of transfused patients decreased from 37.6% in 2012 to 20.5% in 2014 (when administration of Tranexamic Acid began) and after to 5% in 2018-2019 and the number of blood bags from 43.1 bags / 100 patients in 2014 to 8,5 bags / 100 patients in 2019
From 2015 to 2019, a 18,02% of patients were treated to optimize the haemoglobin level without any complications secondary to the treatment. These results have made us change our blood reserve policy, reserving it only in patients with tranexamic acid contraindicated or those in which the haemoglobin has not been optimized.
Conclusion: Implementation of a PBM program in elective orthopaedic surgery is safe and leads to an important decrease in transfusion rates.

5589

Transfusion ratio and hemoglobin levels in a perioperative blood management program for hip and knee artroplasty

Torra M.[1], Drudis R.[1], Marco G.[1], Triquell X.[1], Panadès M.[2], Del Pozo D.[1]
[1]Hospital Santa Maria - Lleida (Spain), [2]Banc Sang i Teixits Hospital Universitari Arnau de Vilanova - Lleida (Spain)

Background and Goal of Study: Rates of blood transfusion after primary arthroplasty have fallen precipitously since blood management strategies have been instituted. A perioperative blood management program (BMP) for knee and hip arthroplasty has been progressively implemented in our hospital since 2015. At that time, the transfusion rate was 14,5%, while on 2018 it was reduced to 4,4%.
As our goal of study both the preoperative hemoglobin levels and transfusion rates obtained with different treatments (iron vs. erythropoietin) were analyzed. We also analyzed whether patients with preoperative anemia using the World Health Organization's (WHO) criteria, had a poorer response to the treatment.
Materials and Methods: We analyzed retrospectively our data from 2018, and 358 patients underwent knee and hip arthroplasty. One of the preoperative goals in our BPM was to improve the level of hemoglobin up to 13g/dl. Forty seven patients (13%) were treated: sixteen patients (34%) received endovenous iron, and thirty-one (66%) additional erythropoietin (EPO). Cyanocobalamin and folate were also administered in both of the groups when its deficiency was detected. We used Chi-square, Fisher's exact test, to find out if transfusion rates and the level of preoperative hemoglobin achieved, differed between different treatments. We also analyzed if hemoglobin levels achieved were lower in anemic patients.
Results and Discussion: Sixteen patients in the EPO group (50%) and five in the iron group (31%) achieved a preoperative hemoglobin level of 13g/dl. Differences

were not satistically significant (NS). In the EPO group, 11% of patients required transfusion vs. 33% in the group of patients treated with just iron (NS). Only 29% of patients who met the WHO anemia criteria reached hemoglobin levels ≥ 13g/dl. In contrast, 58% of patients without anemia, achieved the hemoglobin levels proposed in our program ($p<0.05$).
Conclusion: We conclude that whichever treatment we use in our BPM, patients reach a similar preoperative hemoglobin level, and are at a comparable risk of perioperative transfusion. Our data also indicate that patients who meet WHO's anemia criteria, respond more poorly to stimulating hematopoietic strategies, and are more prone to continue with low hemoglobin levels despite proper treatment when compared with patients who do not meet these criteria.

5620

Anemia profile study of patients undergoing urological surgery with potential bleeding risk and the benefits of applying a PBM program

Junca Marti S.[1], Saez C.[1], Barquero M.[1], Fernandez A.[1], Serrano M.[1]
[1]Parc Tauli University Hospital - Sabadell (Spain)

Background and Goal of Study: Patients undergoing urological surgery with potential bleeding risks are usually subject to hematuria and secondarily to iron deficiency and anemia. Anemia and blood transfusions during the perioperative period have also been proved to worsen morbidity outcomes and mortality rates. Today, Patient Blood Management (PBM) programs are highly recommended in perioperative environments, which consist of a multimodal approach strategy based on the patient in order to diminish anemia and blood transfusion ratios. Due to the proven benefits of PBM programs, Hospital Parc Tauli started administering this program in 2018 to urology patients undergoing surgery. A preoperative anemia study was completed, and those patients with anemia were treated. The purpose of this study was to evaluate the result of implementing a PBM program by analizing the anemia characteristics and the transfusion rate.
Materials and Methods: A retrospective, observational analysis of all patients undergoing urological surgery during 2017 and 2018 was completed. Blood transfusion requirements and hemoglobin levels were recorded in both groups and iron metabolism was only recorded in 2018. All this data was compared in different patient diagnoses and surgeries.
Results and Discussion: During 2017 a total of 398 patients were analyzed. In this sample, 32.7% of patients had anemia before surgery, however no data about iron metabolism was collected. During 2018 a total of 315 patients were analyzed. In this year, 23.8% of patients had anemia before surgery, 34.1 % of that 24% was related to iron deficiency, 32.9% was related to anemia of chronic disease and 20% was related to mixt anemia. Larger discrepancies were observed in specific diagnoses, where 58% of patients undergoing cystectomy had anemia before surgery. Comparing both groups before (2017) and after (2018) the implementation of PBM program, a tendency of the reduction of the requirement of blood transfusions was observed, although due to the small sample the differences were not statistically significant.
Conclusion: The study reveals that patients undergoing urological surgery with potential bleeding risk show a high incidence of anemia. Therefore, the implementation of a PBM program would be justified, having a great importance the preoperative treatment of iron deficiency.

5625

Patient Blood Management Program in Urology: Audit of 2nd Pillar

Nave P.[1], Saraiva R.[1], Paulino A.[1], Pereira I.[1]
[1]Centro Hospitalar Lisboa Norte - Hospital Santa Maria - Lisbon (Portugal)

Background and Goal of Study: Patient Blood Management (PBM) is a quality improvement programme in transfusion medicine involving recommendations used in all perioperative period. In our hospital an Urology PBM programme regarding inpatient surgery was launched in 2015. In 2018 we have audited electronic database respecting the second PBM pillar and compared it with 2015 internal audit results.
Materials and Methods: From the internal electronic database that monitorizes PBM implementation for inpatient Urology Surgery we aleatorized 95 patients of each year (13.1% of the total procedures in 2015, 15,7% in 2019). In the preoperative period were audited the number of anemic patients admitted to the operating room, the number of transfused patients in this period and the number of transfused patients with anemia on admission to the operating room. Intra-operatively were evaluated the median hemoglobine value before tranfusion, number of patients transfused and the number of units transfused per patient. Postoperative were considered median hemoglobine post transfusion.
Conclusion: The implementation of a PBM programme for inpatient urology surgery resulted in significant reduction in the number of patient transfused and number of units per patient transfused even though the cut off limiar for transfusion and the number of anemic patients presented to surgery was higher in 2018. This was attributed to a more effective hemorrhagic surgical control and an efficient hemostasis management. There was a significant optimization of the number of Type and Screen to transfusion.

5839

Transfusion of stored red blood cells exacerbates renal ischemia reperfusion-induced hepatic injury

Baek J.[1], Jee D.[1]
[1]Yeungnam University Hospital - Daegu (South Korea)

Background and Goal of Study: Renal ischemia reperfusion (RIR) causes injuries not only in the kidneys themselves, but also in distant organs, including the liver. Transfusion of stored red blood cells (SRBCs) has been shown to prime neutrophils and monocyte-macrophage system. In this study, we investigated whether RIR-induced hepatic injury is exacervates by transfusion of SRBCs.
Materials and Methods: After Institutional Animal Care and Use Committee approval, male Sprague-Dawley rats weighing between 275 and 325 g were included in this study. Rats were randomly divided into three groups (n=18): sham operation (Sham); RIR only (Control); transfusion of SRBCs (15% of estimated blood volume, via tail vein) started at 1 hour after the end of renal ischemia (TF). Pooled allogeneic packed red blood cells, collected from 3 rats and stored for 2 weeks, was used for transfusion. Ischemia of both kidneys was induced for 1 hour and reperfusion was allowed for 24 hours. Then, blood (for BUN, creatinine, AST, and ALT) and liver tissue (for mRNA expression of HO-1, NGAL, TNF-a, and IL-6 by RT-PCR with densitometry) were obtained for analysis.
Results and Discussion: Serum levels of BUN and creatinine were increased in Control or TF vs. Sham, as a result of RIR ($P < 0.05$). Serum levels of AST and ALT were were also increased in Control or TF vs. Sham ($P < 0.05$). TF had more severe hepatic injury than Control, as indicated by serum AST and ALT ($p < 0.05$). The hepatic mRNA expression of antioxidant enzymes such as HO-1 and NGAL was increased in TF, compared to Control or Sham ($p < 0.05$). However, the hepatic mRNA expression of TNF-a and IL-6 was no statistical differences among the three groups.
Conclusion: Transfusion of SRBCs exacerbates RIR-induced hepatic injury without triggering hepatic inflammatory responses. The mechanism of the hepatic injury may be oxidative stress.

6091

The impact of MELD values on transfusion need during liver transplantation

Araujo Lopes Junior L.[1], Praciano A. M.[1], Rodrigues Nascimento J. C.[1], Bezerril Cipião Fernandes M.[1], Nepomuceno Barros L.[1], Da Silva Costa A.[1]
[1]Hospital Geral de Fortaleza - Fortaleza (Brazil)

Background and Goal of Study: Liver Transplantation (LT) surgery is complex with large bleeding risk, especially in patients with prior upper abdominal surgery, portal hypertension and severe coagulation disorder. Therefore, use of blood products is necessary in most LTs. MELD is a score that assesses the severity of hepatic disease, currently being the score used for including patients in the waiting list for LT. The objective of this work is to assess if high MELD values is associated with bigger consumption of blood products in the intraoperatory and postoperative of LT.
Materials and Methods: The study was performed with 178 patients transplanted into the HGF's LT service, dividing them into two groups (MELD ≤ 25 and MELD > 25), assessing the amount of intraoperative and postoperative blood products used - red blood cells concentrate (RBCC), platelet concentrate (PC), fresh frozen plasma (FFP), cryoprecipitate (CRYO), prothrombin complex (PCC) and fibrinogen concentrated (FC).
Results and Discussion: Of this population, 118 patients had MELD ≤ 25 and 60 patients had MELD> 25. The average use of blood products (RBCC, PC, CRYO, PCC and FC) was significantly larger ($p <0.05$), in patients with MELD > 25. Except the use of FFP that has not presented significance between the groups.
Conclusion: This study found that in those patients with MELD> 25, there was

greater consumption of blood products and may further aggravate morbidity and mortality in this population.

5806

Rivaroxaban withdrawal and rebound thrombosis in patient with atrial fibrillation: A Case report

Lee H. J.[1]
[1]*Eulji hospital - Seoul (South Korea)*

Background and Goal of Study: Rivaroxaban, the novel oral anticoagulants (NOACs) are increasingly used in patients with non-valvular atrial fibrillation for the prevention of stroke and systemic embolism.
Case Report: A 71-year-old woman with the medical history of obesity, hypertension, hyperlipidemia, atrial fibrillation and transient ischemic attack, was scheduled for both total knee arthroplasty. She took rivaroxaban 20mg once daily for 2 years ago. She stopped rivaroxaban for 5 days before surgery and there was no bridging anticoagulation. She had combined spinal epidural anesthesia. 4 hours after the surgery, she was unresponsive to the stimulus and seemed to be sleeping. Neurologic examinations were carried out immediately, and her mental status was stupor. The left arm could be lifted in the painful stimulation, right arm did not react and both legs could not be accurately evaluated due to the surgery. Immediately performed brain MRI and MRA (Fig 1, 2) showed infarction in middle cerebral artery and internal carotid artery territory. She received intra-arterial thrombolysis as an emergency and aspirin 100mg was administered as an antiplatelet drug. 4 days after the operation, the patient recovered consciousness but remained right hemiplegia and severe dysarthria.
Discussion: In our case, her intrinsic stroke risk was high, so oral anticoagulation treatment was recommended. Though the researches and clinical data with rivaroxaban and other novel oral anticoagulant agents are limited, it might be important to know their individual risk factors and the potential rebound hypercoagulability after cessation of rivaroxaban, especially in high-risk patients. In patients with high risk for stroke, careful consideration should be given to minimize the duration of interruptions, and it could decrease the incidence of stroke in patients with atrial fibrillation.
Learning points: We should be aware of the risk of rebound hypercoagulability after cessation of rivaroxaban, especially in high-risk patients. In patients with high risk for stroke, careful consideration should be given to minimize the interruptions to decrease the incidence of stroke in patients with atrial fibrillation.

4536

Impact of non-factor haemophilia therapy on standard laboratory assays

Pekrul I.[1], Spannagl M.[1], Moehnle P.[1]
[1]*Ludwig-Maximilians University Hospital - Munich (Germany)*

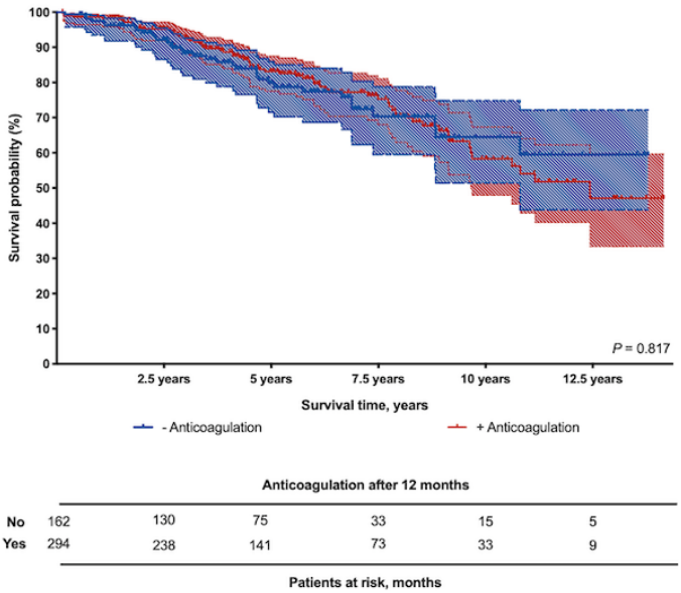
Background and Goal of Study: Improved therapy options in patients with haemophilia A (PWHA) has led to normalization of life expectancy, leading however to an increasing number of surgical procedures in these patients' lifetimes. A novel antibody treatment strategy challenges factor VIII substitution.1 Treatment with currently approved bispecific antibody compound Emicizumab (emi), Hemlibra® may replace factor substitution but leads to effects on standard laboratory assays (SLA) not related to the therapeutic effect or plasma concentration.2 Development of new laboratory routines is therefore urgently needed to specifically measure the therapeutic effect of the new compound especially in perioperative and/or emergency situations.
Materials and Methods: EC approval was not sought for this presentation of anonymised data derived from measurements in routine blood specimens. Due to its structural and functional differences, emi exerts distinct effects on aPTT-based assays, as it does not require activation by thrombin.3 In our cohort of PWHA, we switched three patients from FVIII concentrates to emi therapy regimen. We (1) demonstrate their laboratory course in SLA, (2) the influence of emi on different laboratory assays. Furthermore, we (3) implemented laboratory surveillance of emi drug level (modified one stage FVIII assay) and (4) tested for FVIII activity (after co-administration of FVIII concentrates) in the presence of emi (bovine chromogenic FVIII assay (CSA)).
Results and Discussion: aPTT normalized within few days after first administration (aPTT 85sec -> 35sec [25-42sec]; although we detected sub-therapeutical plasma levels of emi (10.5µg/ml [35-80µg/ml]. But even at therapeutical levels of emi there is no complete restoration of coagulation. aPTT-based single factor (FVIII, FIX, FXI, FXII) one stage assays (OSA) showed falsely high results in the presence of emi. Measurement of co-administered FVIII activity was reliably possible in bovine CSA as emi does not bind to bovine forms of FIXa, FX.
Conclusion: Correct interpretation of SLA, OSA and CSA for PWHA receiving emi, is demanding and requires high expertise for patient safety in trauma or in even elective surgery situations.
References:
1. Mahlangu, J et al. (2018) NEJM 379 (9), S. 811–822.
2. Müller, J et al. (2019) Thromb Haemost.
3. Sampei, Z et al. (2013) PloS one 8 (2), e57479.

4659

Discontinuation of oral anticoagulation therapy is safe after successful surgical biatrial ablation or pulmonary vein isolation for atrial fibrillation: A prospective follow-up study

Lauritzen D.[1], Onat M.[1], Christensen R.[1], Jensen H.[1], Heiberg J.[1]
[1]*Aarhus University Hospital - Aarhus N (Denmark)*

Background and Goal of Study: Atrial fibrillation (AF) is the most prevalent arrhythmia worldwide. Pulmonary vein isolation (PVI) and biatrial ablation are common surgical treatments for this condition with the main purpose of reobtaining sinus rhythm. A potential benefit is entirely at the discretion of the physician and patient, and that is whether or not to stop the oral anticoagulation therapy (OAT). This is an important question as the bleeding risk associated with OAT is not negligible. The aim of this study therefore was to compare the outcome after either continuation or discontinuation of OAT following surgical correction for AF.
Materials and Methods: In this prospective follow-up study, patients who underwent treatment for AF either by PVI or biatrial ablation were included. Patients were followed up at 3 and 12 months postoperatively, and OAT was discontinued if a 5-day Holter monitoring showed sinus rhythm, if the CHADS2 score≤2, and if no other indications for OAT were present. However, all patients with CHADS2 score>2, spontaneous contrast in the left atrium, and absence of T-waves continued OAT regardless of rhythm status. At 12 months, patients were divided in an OAT-group, which still received OAT, and in a nonOAT-group, in which OAT had been discontinued.
Results and Discussion: Between 2004 and 2016, a total of 456 consecutive patients were included of which the nonOAT-group consisted of 162 patients and the group receiving OAT consisted of 294 patients. Survival analysis revealed no difference between the two groups (p=0.817) (Fig. 1). Mean postoperative survival time for the nonOAT-group was 6.1±3.1 years compared to 6.2±3.4 years in the OAT-group (p=0.708). No differences were found when comparing major adverse cardiac or cerebral event (MACCE) between the two groups (nonOAT-group=13 patients vs. OAT-group=26 patients, p=0.899). There were no differences in demographics and pre-operative risk factors between the two groups.
Conclusion: It is safe to terminate OAT following PVI or biatrial ablation based in the abovementioned criteria.



4806

May-Hegglin anomaly and anaesthesia

Orozco Vinasco A. C.[1], Vicente Orgaz M.[1], Gholamian Ovejero S.[1], Sánchez Zamora P.[1], García Rueda A.[1], Márquez Garrido G.[1]
[1]Hospital Severo Ochoa - Leganes (Spain)

Background: May-Hegglin anomaly (MHA) is a rare autosomal dominant congenital disorder, which results from the mutation of MYH9 gene that encodes a protein expressed in platelets and other tissues. Patients exhibit varying degrees of thrombocytopenia, giant platelets and characteristic inclusion bodies in granulocytes. Clinical manifestations depend mostly on platelet count (PC).1
Case Report: A 48 years old male, ASA III, was transferred to our institution for tibial plateau fracture repair. He had MHA diagnosed due to familiar history. Despite known low PC, he had not had haemorrhagic events nor needed any transfusions. Blood tests at admission showed a PC of 3 x109/L lacking aggregation; the rest of the investigations were within normal range. After urgent haematological consultation, the patient was scheduled on the next morning, as he was haemodinamically stable. Haematologists recommended transfusion of 2 platelet pool before surgery. Preoperative PC was of 66 x109/L. A balanced anaesthesia was carried out. Intubation was rescued with Glidescope® since Cormack grade was III. Tranexamic acid 1 g was administered prior to deflation of tourniquet. Surgery was uneventful. Postoperative PC was of 60 x109/L, so an ultrasound guided femoral nerve block was performed. The groin area was closely monitored to rule out haematoma. Patient did not require any other blood products during hospital stay and was discharged home on 5th postoperative day.
Discussion: In general terms a PC of 50 x109/L are considered haemostatic.2 Transfusion in inherited trombopathies is controversial and should be used cautiously, as it can lead to sensitisation. A threshold for transfusion in this setting has not yet been established and the decision must be made case by case. In our case the patient had not received any blood products before and the PC was extremely low. Peripheral nerve blocks in compressible areas can be helpful.
References:
1. Muzannar AM, et al. Epidural anesthesia for labor and delivery in a patient with May-Hegglin anomaly: a case report. Local Reg Anesth. 2017;10:53–58. doi:10.2147/LRA.S125811.
2. Estcourt LJ, et al. Use of platelet transfusions prior to lumbar punctures or epidural anaesthesia for the prevention of complications in people with thrombocytopenia. Cochrane Database Syst Rev. 2018;4(4):CD011980. doi:10.1002/14651858.CD011980.pub3.
Learning points: The anaesthesiologist should be familiar with therapeutic approach of inherited thrombocytopenias.

5047

Acute pulmonary thrombosis in the early recovery of ambulatory septoplasty

Perello Cerdà L.[1], Soto Ejarque J. M.[1], Alonso Gómez A.[1], Abreu Paradell S.[1]
[1]Hospital d'Igualada - Igualada (Spain)

Background: Thromboembolic events are quite rare in pacients submitted to ambulatory surgey (1) with an estimated incidence of 0.04% (2).In our hospital,for day case surgeries,thromboembolic prophylaxis is only prescribed in high risk procedures (vascular or orthopedic).
Case Report: 64 years old male scheduled for septoplasty in daycase surgery. ASA II.BMI 33,81kg/m2. Ex-smoker. Hypertension under medical treatment and pulmonary nodes, non-specific in PET-scan. Basal oxygen saturation of 87%, 95% with preoxygenation.Normal auscultation.Monitorizing NIBP, HR, EtCo2, Sat O2.Surgery proceeded without complications,but patient had persistent low saturation, despite increasing fiO2 and recruitment manoeuvres.After reversal of neuromusculade blockade he was successfully extubated and transfered to PACU area (ventimask 36% for Sat O2 92%), and then to the ambulatory area, breathing room air, Sat 89%. He remained calm, without dyspnea. Before discharge, he presented sudden dyspnea,central cyanosi and syncope,without thoracic pain. Intrahospitalary emergency team was quickly activated, detecting cardiac arrest,asistolya, and starting advanced cardiopulmonar ressucitation.The patient recovered pulse and under clinical suspicion of pulmonary thromboembolism,an angio CT scan was performed,confirming a massive thrombosis of both pulmonary arteries. D dimer 10970 ng/ml (N <500). Despite fibrinolysis with rTPA he presented a new cardiac arrest (asystolia) and finally died, 1hour after clinical presentation.
Discussion: There is not enough evidence about thromboembolic prophylaxis after ambulatory surgery (1). Most of the patients have a prompt mobilisation and intake after surgery. New scores need to be developed for a better assessment of the thromboembolic risk in the ambultory patients.
References:
1. Samama CM, Afshari A, for the ESA VTE Guidelines TAsk Force. European guidelines on perioperative venous thromboembolism prophylaxis. Eur J Anaesthesiol 2018 35:73-76.
2. Engbaek J, Bartholdy J, Hijortso NC. Return hospital visits and morbidity within 60 days after day surgery: a retrospective study of 18736 day surgical procedures. Acta Anesthesiol Scand 2006;50:911-919.
Learning points: Can we adopt the Caprini score in the ambulatory surgery? Should we administer thromboembolic prophylaxis in all high risk patients independently of the type of surgery? when we should start it?

5218

Perioperative haemostatic management of a case with terminal polycystic liver disease with rotational thromboelastometry

Stefanovic D.[1], Bilali P.[1], Tzima M.[1], Panteleou K.[1], Katsanoulas K.[1], Katsika E.[1]
[1]Hippokrateion General Hospital Thessalon - Thessaloniki (Greece)

Background: Polycystic liver disease (PLD) is a rare genetic disorder due to embryonic ductal plate malformation of the intrahepatic biliary tree. Several PLD entities are recognized in adults: polycystic liver disease associated with autosomal dominant polycystic kidney disease ADPKD – PCLD, polycystic liver disease associated with autosomal recessive polycystic kidney disease ARPKD – PCLD, isolated polycystic liver disease (autosomal dominant disease) and Von Meyenburg Complexes or multiple biliary hamartomas. Large multiple cysts obstructing hepatic vein outflow give rise to symptoms & signs such as abdominal pain, hepatomegaly, ascites and lead to progressive hepatic failure and coagulation disorders.
Case Report: A 45 y old woman with a 10y history of ADPKD, stable chronic renal failure and hypothyroidism was admitted. Cysts enlargement started in 2016, growing ever since up to exceptionally huge size. Abdominal pain & distension during the last 1,5 months, 13kg gain in 15 days were prominent symptoms. She was referred to our hospital for further management, after 10L ascites removal in a local facility. On examination, she suffered from dyspnoea and was in very poor general state. Her abdomen was extremely overdistended, with palpable liver. CXR presented bilateral pleural effusions. Lab tests showed Hbg 8,7g/dl, WBC 12000/mm3, PLTs 140000/mm3, PT 12.6s, APTT 47.0s, INR 1.12, urea 148mg/dl, serum creatinine 3,19mg/dl. Intra-abdominal pressure was 30 mmHg. She underwent a 5 hour laparotomy for cyst aspiration and extended hepatectomy. Multiple enlarged cysts occupied nearly the three fifths of the liver. Point-of-care (POC) haemostatic monitoring, revealed a hypercoagulative state. Baseline/intraoperative ROTEM® values: CTINTEM 217/217s, CTEXTEM69/59s, MCFEXTEM 70/70mm, MCF FIBTEM 30/21mm. Apart from 2 PRBCs units transfusion no other blood product/factor concentrate was necessary.
Discussion: Patients with PLD appear more hypercoagulopathic, due to elevated fVIII after endothelial activation and/or injury and low protein C after decreased hepatic biosynthesis and increased consumption.
References:
1. Chandok N. Polycystic liver disease: a clinical review. Ann Hepatol. 2012;11(6):819–26.
2. Lantinga MA et al. Evaluation of hepatic cystic lesions. World J Gastroenterol. 2013;19(23):3543–54.
Learning points: POC rotational thromboelastometry is a rapid viscoelastic assay, useful for perioperative haemostatic management even in rare diseases.

5501

Approximation of emicizumab plasma levels in the absence of dedicated assays. A practical approach

Pekrul I.[1], Giebl A.[2], Calatzis A.[1], Grützner S.[2], Spannagl M.[1]
[1]Ludwig-Maximilians University Hospital - Munich (Germany), [2]Augsburg University Clinic - Augsburg (Germany)

Background and Goal of Study: Emicizumab (EMI) is a bispecific antibody mimicking the function of activated factor VIII (FVIIIa), which is used for bleeding prophylaxis in hemophilia A (HA). EMI - unlike FVIII - does not require activation for its procoagulant activity, which leads to a very strong effect in the aPTT and the one stage FVIII assay (OSA). Therefore both assays are oversensitive towards EMI. To overcome this problem a dedicated EMI assay was developed, which is based on the OSA, using a higher sample dilution than the standard FVIII assay. This assay is available in hemophilia centers. In situations where patients need emergency medical care in centers other than dedicated hemophilia centers, a method to assess the EMI plasma level based on a widely available assay would be desirable. The goal was to develop and validate a method for approximation of

EMI based on the OSA assay.
Materials and Methods: 28 anonymized left-over samples from routine coagulation analysis from HA patients with (n=23) and without (n=5) emicizumab treatment were analyzed. The EMI concentration was determined using the available standard assay (R2 Diagnostics, Haemochrom Diagnostica GmbH, Essen, Germany). In addition FVIII activity was determined using the OSA following a sample pre-dilution of 1:8 in saline. The FVIII assays were determined in two different laboratories using the Siemens BCS (and respective Siemens reagents) and Werfen ACL TOP (and respective Werfen reagents) analyzer systems.
Results and Discussion: EMI determination in patients on EMI therapy provided levels of 8-94 µg/ml (mean+-SD: 43+-25µg/ml). In patients without EMI therapy EMI levels of 0-1 µg/ml were reported. Standard FVIII assays revealed >200 % FVIII in 14/23 (Siemens) respectively in 20/23 (Werfen) samples under EMI therapy. The determination of the 1:8 diluted samples provided FVIII activities which correlated excellently to the EMI levels (Siemens: r=0.99, FVIII%=0.79*EMI level/Werfen: r=0.99, FVIII%=0.88*EMI level).
Conclusion: The determination of the widely available FVIII OSA in samples diluted by 1:8 in saline might provide an attractive option to approximate the EMI plasma level when a dedicated assay for EMI is not available. The FVIII activity levels in the diluted samples correlated with the EMI concentration and were on average just 12% (Werfen) or 21% (Siemens) lower than the EMI levels reported by the standard assay.

5642

Pre-operative adquired von Willebrand Syndrome related with extracorporeal membrane oxygenation and Heart Trasplantation: Utility of intraoperative treatment with human von Willebrand Factor

Rubio I.[1], Méndez E.[1], Lara A.[1], Rábago G.[1], Lecumberri R.[1], Hidalgo F.[1]
[1]Clinica Universidad de Navarra - Pamplona (Spain)

Background: Von Willebrand factor (VWF), a glycoprotein that takes part in primary and secondary hemostasis, contributes to platelet adhesion and aggregation and is a carrier protein for coagulation factor VIII. VWF is synthesized in endothelial cells and platelets and metabolized by ADAMTS13. Inherited von Willebrand syndrome (VWS) is the most common hemostasis disorder with an increased bleeding risk. Adquired von Willebrand syndrome (aVWS) is less common (1-5% of VWS) though its prevalence is unknown due to its underdiagnosis. AVWS is associated to autoimmune diseases or hypothyroidism. Also with increased shear stress (altered blood flow), such as extracorporeal membrane oxygenation (ECMO) or left ventricular assist devices (LVAD), with a reported prevalence of 100% and up to 50% with relevant bleeding episodes. A high index of suspicion is needed to diagnose aVWS and must be confirmed with Lab tests such as VWF:Ag (normal or low), low VWF/RCo (VWF:RCo/VWF:Ag ratio <0.7), low VWF multimers and VWF fragments.
Case report: We present a 69 year-old woman who suffered an acute myocardial infarction and developed a cardiogenic shock requiring ECMO support as a bridge to heart transplant(HT). Four weeks after ECMO, she presented a massive psoas hemorrhage that required hemoderivatives, stopping anticoagulation (AC) and antiaggregation (AA) therapies and embolization. Three days later AC was restarted however, 2 weeks after, she presented a new bleeding. Besides the past history of recent ECMO support and hypothyroidism, VWF:RCo/VWF:Ag ratio was <0.7, thus she was diagnosed of aVWS. During HT, 16 red blood cell concentrates, 6600cc fresh frozen plasma and 5 platelet pools were transfused guided by viscoelastic test(ROTEM). We administered intraoperatively tranexamic acid(4g), fibrinogen(4g), prothrombin complex(2000IU) and human VWF (WILLFACT® 9000IU). Nine months after HT she does normal life.
Discussion: Patients with LVAD or ECMO develop very frequently (up to 100%) aVWS, an underdiagnosed disease with relevant bleeding disorders in 50% of the cases. A high index of suspicion is needed to diagnose aVWS which must be confirmed by Lab tests. Intraoperative use of human VWF is safe and effective for treating hemorrhagic complications related to aVWS.
References:
1. Hohenstein K et al.Hamostaseologie 2019;39:S1-92.
Learning points: AVWS has to be taken into account in patients with risk factors. Use of human VWF is safe and effective reducing hemorragic complications

5722

Anesthetic management of living-donor renal transplantation without platelet transfusion in a patient with macrothrombocytopenia using thromboelastometry

Higashi M.[1], Yamaura K.[2]
[1]Fukuoka University - Fukuoka (Japan), [2]Kyushu University - Fukuoka (Japan)

Background: Epstein syndrome is a MYH9-related disorder characterized by healing loss and macrothrombocytopenia with renal failure, which often needs renal transplantation. Most of these patients received platelet transfusion, but we report a case of patient undergoing living-donor renal transplantation without platelet transfusion using thromboelastometry.
Case Report: A 22–year old man with Epstein syndrome was scheduled to undergo living-donor renal transplantation. The peripheral blood examination revealed a platelet count of 37 × 109 /L with giant platelets. Anesthesia was induced with fentanyl, propofol, and rocuronium, and maintained with isofulurane and remifentanil. In addition to standard laboratory coagulation test including platelet counts, thromboelastometry (ROTEM®, TEM international GmbH, Munich, Germany) was monitored. Intraoperative laboratory data of coagulation were platelet counts, 0.0 (uncounted) -17 × 109 /L by automatic blood cell counter and 28-31 × 109 /L by microscopy; fibrinogen, 256 mg/dL. EXTEM of thromboelastometory was normal. The estimated blood loss was 150 g during operation and the patient had no bleeding complication without platelet transfusion.
Discussion: There is no consensus for the safety value of platelet counts for surgery in these MYH9-related disorders' patients. The safety platelet counts for living-donor renal transplantation with macrothrombocytopenia were above 100 × 109 /L with platelet transfusion based on several case reports1,2. Thromboelastometry is measured by whole blood and platelets are also involved in this measurement, but platelets aggregation ability cannot be measured. However, it is reported that this was acceptable in clinical use for platelet deficiency.3 In the present case, α, clotting time, maximum clotting formation in EXTEM and FIBTEM were normal, which suggested that coagulation ability and function via activated platelets were normal. In addition to this, according to the absence of bleeding tendency at surgical field, we did not transfuse platelets even when platelets counts were 26-33 × 109 /L during perioperative periods and 38-72 × 109 /L during POD1-4.
References:
1. Transplant Proc 2014;46:654-656.
2. Clin Transplant 2010;24:31-34.
3. Anesth Analg 2015;121:868-878.
Learning points: Platelet transfusion could be avoided in patients with macrothombocytopenia by monitoring of thromboelastometry.

6282

Improving patient safety: developing user-friendly national algorithm for the management of massive bleeding

Jumić A.[1], Karmelić D.[1], Tucic I.[1], Habijanec B.[2], Šitum I.[1], Moguš M.[1]
[1]University Hospital Center Zagreb - Zagreb (Croatia), [2]University of Zagreb, Faculty of Humanities and Social Sciences - Zagreb (Croatia)

Background and Goal of Study: One of the most challenging situations in anesthesia are massive bleeding cases. In Croatian hospitals, young anesthesia residents are often first responders to such emergencies. Algorithms are a useful tool for promoting correct decision making, especially where point-of-care devices (POC) are available, and not all doctors know how to interpret this results fast and act accordingly. During 2019., a team of Croatian anesthesiologists, hematologists and transfusion specialists were developing a national algorithm for the management of patients with massive bleeding, based on up-to-date guidelines adapted to local circumstances. Two algorithm branches have been developed; first one for clinical setting in which POC devices (ROTEM and Multiplate) are available, and second, when those are unavailable.
Materials and Methods: Algorithm was tested on a group of anesthesiology residents (N=38) in different phases of their training at the University Hospital Centre Zagreb. Examinees were given two clinical cases involving massive bleeding (patient with ruptured abdominal aortic aneurysm (AAA), and polytraumatized patient whose resuscitation was guided with POC device).They had to answer multiple-choice questions regarding the management of these cases twice: first time without the algorithm, and the second time with the algorithm provided, with 5 minutes in between to study the algorithm for the first time.
Results and Discussion: Results showed significant main effect for the administration of the algorithm ($p < 0.001$), with an increase from 3.74 to 7.29 points (out of 8) in case with ruptured AAA, and for polytraumatized patient case an

increase from 3.63 to 6.89 points. There were no significant differences in scores achieved before or after the administration of algorithm for different cases based on previous experience with ROTEM, Multiplate or the year of residency. Results of the study imply that the algorithm is user-friendly. It therefore reliably guides clinical approach based on up-to-date guidelines and contributes to patient safety in the setting of massive bleeding, regardless of previous clinical experience of the provider.

6261

Management of anesthesia on a patient with factor X deficiency

Vicol A. M.[1], Chacon Sal R.[2], Deiros Garcia C.[2], Guenaga Vaqueiro O.[2], Firescu R.[3], Masdeu J.[1]
[1]*Consorci Sanitari Integral - Barcelona (Spain),*
[2]*Consorci Sanitari Integral - Sant Joan Despi, Barcelona (Spain),*
[3]*CHU Ambroise Pare - Mons (Belgium)*

Background: Factor X(FX) or Stuart Power factor deficiency is amongst the rarest of the inherited coagulation disorders. There is limited research on patients undertaking surgery, therefore we describe the anesthetic management for a mild FX deficiency during total knee arthroplasty.
Case Report: An 85 year old female patient with a history of obesity, essential hypertension, laryngeal dystonia, atrial fibrillation and depressive syndrome was diagnosed with FX deficiency (39% levels) on the basis of family history. No treatment was administered in previous surgeries because they were minor procedures and did not incur major bleeding. In the last hematological evaluation the levels of FX were 50% (normal values 50-150%), the activated partial thromboplastin time (aPTT) was 1.1 (normal value 0.8-1.2) and the prothrombin time (PT) was 1.3 (normal values 0.8-1.2). A femoral and sciatic nerve block was performed in pre-op, followed by a general anesthetic by laryngeal mask. There were no intraoperative incidents. Time of limb ischemia was 100minutes. No major bleeding was detected after the tourniquet was deflated or in the next 24hours. The patient was discharged on the 4th day post-op.
Discussion: Inherited FX deficiency is autosomal recessive, with heterozygotes most often remaining asymptomatic or having only mild bleeding tendency; homozygote individuals may experience hemarthrosis, recurrent epistaxis and menorrahagia. It is characterized by prolongation of PT, aPTT and russel viper venom time, with normal bleeding and thrombin time, as well as decreased levels of FX antigen or FX activity. Knight el al. reported that 35-50% levels of FX during surgery and up to 20% postoperatively are needed to achieve correct hemostasis. The treatment of FX deficiency must be individualised and includes fresh frozen plasma, prothrombin complex concentrate and factor X concentrate. In our case, the preoperative FX levels didn't require treatment and there was also no significant bleeding in the first 24hours post-op, therefore we decided to only closely follow signs of bleeding and the coagulation test.
References:
1. Sinha Isolated Factor X Deficiency.IJA 2006 13(2).
Learning points: We believe that careful monitoring of blood coagulation and personalized treatment, based on the severity of the FX deficiency and the complexity of the surgery, in addition to a multidisciplinary approach can greatly decrease any complications that may occur.

6419

Management of patient with undiagnosed coombs positve auto immune hemolytic anaemia coming for an emergency blunt trauma surgery

Krishna A.[1]
[1]*Cegmas-Daya Hospital - Thrissur (India)*

Introduction: Pretransfusion testing is an essential serological test to protect the recipient from hemolysis and provide compatible blood product. Although all products are crossmatched in same cases, compatible products may not be available. Autoimmune hemolytic anemia (AHA) is caused by the presence of non-specific and identifiable antibodies that react with antigens on the surface of red blood cells.
Case report: A 48-year old male patient previously healthy, without any history of prior transfusions or anesthetic-surgical procedures was scheduled for exploratory laparotomy for a BLUNT INJURY ABDOMEN. Focused assessment with Sonography in Trauma (FAST) scan was found to be positive, which indicated hemoperitoneum, thus the patient was shifted immediately to the operating room. Fluid resuscitation was done using two wide-bore intravenous (IV) cannulas. The patient was intubated uneventfully . Controlled fluid resuscitation to a mean arterial pressure (MAP) of 55–60 mmHg was targeted.At around 1.00 am a call was received from the blood bank stating that Patient has positive Coombs test DAT (IgG4+)and the blood bank staff were unable to determine his blood type .IBP was 70/40 mmHg ,CVP 10 cmH2O.Controlled fluid resuscitation continued. MAP of 55–60 mmHg was targeted; The patient continued to be hypotensive Ionotropic support with dopamine and nordrenalin and vasopressin was added .There is no literature on the management of patient with undiagnosed coombs positve auto - immune hemolytic anaemia coming for an emergency blunt trauma surgery. A mesenteric tear with avulsed vessels Identified and ligated.The surgery lasted 150 minutes.4 L of crystalloids and 1 L of colloid were given.Postoperatively, the patient was mechanically ventilated. Post op hb level was 4 g%. The least incompatible RBC product was selected by the transfusion specialist and was transfused under iv steroid cover after invivo biological compatability test.in icu patient received 4 more units of blood and was extubated on the 3rd post op day and discharged on 10th post op day.
Conclusions: In incompatible cross match ,we should not avoid transfusion if it is urgently required:select least compatable RBC.In vivo compatibility test is safe, predictive, can be feasibly applied at the bedside and lifesaving for many patients
References:
1. The Least Incompatible Crossmatch Red Blood Cell Transfusion by Biological Compatibility Test.S Maral et al GLOBJ TRANSFUS MED 2019 0CT 4:154-7.

4322

A prospective cohort evaluation of effect of cardiac surgery on early cognition

Glumac S.[1], Kardum G.[2], Bulat C.[1], Fabris M.[1], Carev M.[1], Karanovic N.[1]
[1]University Hospital of Split - Split (Croatia),
[2]University of Split - Split (Croatia)

Background and Goal of Study: Postoperative cognitive decline (POCD) is a common postoperative complication, the most frequent following cardiac surgery.1 This study aimed to investigate: the incidence of POCD after cardiac surgery, the importance of selected POCD definition on POCD incidence, which cognitive domains are predominantly affected and the role of cardiopulmonary bypass (CPB) in POCD development.
Materials and Methods: This prospective cohort study enrolled 120 patients scheduled for elective cardiac surgery with or without CPB. A battery of 6 neuropsychological tests to assess various aspects of cognition was administered to patients 2 days before surgery and on the 6th postoperative day. POCD was defined as a decrease in performance of 1 SD or greater in postoperative z scores compared to preoperative z scores in 1 or more tests. To deeper understand the methodological impact of the applied definition on the POCD incidence, we performed 2 additional analyses using the strict POCD definition (i.e., as a decrease in performance of 1 SD or greater between 2 testing points in at least 2 and 3 tests, respectively).
Results and Discussion: On the 6th postoperative day, 66 of the 120 (55.0%) patients fulfilled the diagnostic criteria for POCD. After a strict POCD definition was applied, cognitive deterioration was present in 23 of the 120 (19.2%) patients and in 9 of the 120 (7.5%) patients. Twenty (37%) patients have not developed POCD while 36 (54.5%) patients have developed POCD when CPB was employed (P = 0.056). Like several other recent studies, we showed that the POCD incidence was significantly associated with selected POCD definition and that CPB usage did not increase the risk for POCD development.2
Conclusions: The POCD incidence was significantly related with applied POCD definition. The domains of global cognitive status, psychomotor speed, visual short-term and working memory were particularly impaired after cardiac surgery. There was no clear relationship between CPB usage and POCD occurrence.
References:
1. Greaves D, Psaltis PJ, Ross TJ, et al. Cognitive outcomes following coronary artery bypass grafting: A systematic review and meta-analysis of 91,829 patients. Int J Cardiol 2019; 289:43-49.
2. Glumac S, Kardum G, Karanovic N. Postoperative Cognitive Decline After Cardiac Surgery: A Narrative Review of Current Knowledge in 2019. Med Sci Monit 2019; 25:3262-3270.

4429

Cognitive decline on three months after noncardiac surgery evaluated using cognitive component of 12-items World Health Organization Disability Assessment Schedule 2.0.

Ida M.[1], Naito Y.[1], Inoue S.[1], Tanaka Y.[1], Kawaguchi M.[1]
[1]Nara Medical University - Kashihara (Japan)

Background and Goal of the Study: Several factors including older age, history of stroke and low educational level were reported as associated factors with postoperative cognitive decline. However, adjustable factors such as preoperative nutritional status on postoperative cognitive decline has been poorly documented. Therefore, in this study, we aimed to investigate the impact of preoperative nutritional status on postoperative cognitive decline after 3 months of noncardiac surgery.
Materials and Methods: Individuals aged ≥55 years who were scheduled to undergo surgery in our hospital between April 2016 and March 2018 were eligible for prospective observational study evaluating postoperative functional disability. Patients with diseases requiring psychiatric treatment and patients who were unable to complete the questionnaire without help were excluded. In this study, we focused on postoperative cognitive decline defined as a worsening score of cognitive components of 12-item WHODAS2.0 in the patients undergoing noncardiac surgery which was evaluated before surgery for baseline assessment and on 3 months after surgery. Patient's demographics including nutritional status, postoperative complications and reoperation were also evaluated. Preoperative nutritional status was assessed using the mini nutritional assessment-short form. Logistic regression analysis was applied to determine associated factors with postoperative cognitive decline.
Results and Discussion: Of 3070 patients registered in our original study, 2341 were included in the analysis, in which 633(27.0%) patients experienced postoperative cognitive decline after three months. The factors shown in Table 1 were independently associated with increased cognitive decline after 3 months, whereas use of preoperative statin was associated with decreased cognitive decline.
Conclusion: In our prospective cohort study, cognitive decline was observed in 27% of the patients on three months later after noncardiac surgery. Several factors associated with postoperative cognitive decline such as nutritional status and body mass index should be optimized preoperatively with the appropriate evaluation and intervention.

Table 1 Associated factors with cognitive decline on three months after noncardiac surgery.

	Odds Ratio	95% Confidential Interval	P value
Age	1.03	1.02-1.04	<0.001
Preoperative symptomatic stroke	1.4	1.02-1.92	0.038
Serum creatinine	1.15	1.04-1.28	0.006
Preoperative statin use	0.75	0.57-0.99	0.042
Body mass index > 30	1.84	1.16-2.93	0.009
Malnutrition	1.6	1.00-2.55	0.048
At risk of malnutrition	1.34	1.08-1.68	0.008
Malignancy	1.35	1.07-1.69	0.009
Reoperation	2.05	1.15-3.66	0.015

5104

PeriopeRativE ProgrAm foR Elderly (PREPARE), a multimodal prehabilitation program targeted at improving postoperative outcomes in frail elderly patients undergoing major abdominal surgery: A single tertiary centre experience

Tan J.[1], Lim W. Y.[1], Sim E.[1], Auyong A.[1], Gn Y. M.[1], Abdullah H.[1]
[1]Singapore General Hospital - Singapore (Singapore)

Background: Prehabilitation is a multimodal program encompassing preoperative physiotherapy (PT), nutritional intervention and psychosocial aid to increase functional reserves. The 'at risk' group includes the frail, elderly with multiple comorbidities undergoing major surgery. The goal of prehabilitation is to reduce postoperative complications, leading to shorter length of stay (LOS). The PeriopeRativE ProgrAm foR Elderly (PREPARE) program was initiated at Singapore General Hospital in January 2019.
Methods: Patients aged ≥65 and scheduled for elective major abdominal surgery were screened in the clinic. Frail patients (defined by Edmonton Frail Scale (EFS) scores ≥ 6) were recruited. Standardized medical optimization included anemia intervention, smoking cessation and titration of medication. In-house PT assessment and exercise sessions were formulated for patients. Nutritional intervention by dietitians was done for patients with Malnutrition Universal Screening Tool (MUST) score ≥ 2. A pre-post PREPARE implementation results for LOS is presented.
Results: Between January to June 2019, 142 of patients met the criteria for frailty. Of these, 35 had surgery planned for >2 weeks ahead and were recruited into PREPARE. 19 patients had EFS score 6-7 and 16 had EFS score of ≥8. Median age was 79 years. Prior to PREPARE, median LOS was 9 days for those with EFS score 6-7 and 11 days for those with EFS score ≥8. Post PREPARE, LOS was reduced to 5 days for patients with EFS 6-7 and 5 days for those with EFS ≥8 (Fig 1).
Discussion: As more elderly patients undergo elective surgery, a goal-oriented approach is essential. Pulmonary complications (PPC) remain the most serious adverse outcome after major abdominal surgery. Evidence suggests that in reducing PPC, PT is superior when taught in supervised sessions compared to providing information booklets. PREPARE reinforces a minimum of 2 one-hour sessions supervising inspiratory muscle training. Surgery creates an overall catabolic state and anabolic resistance is more prevalent in the elderly. The MUST score reliably predicts risk of malnutrition. PREPARE provides a tailored dietetics review for patients when surgery is planned >2 weeks ahead. The effects of nutrition and exercise-induced muscle synthesis are synergistic. PREPARE effectively combines both and targets 'at risk' population. Identifying eligible candidates earlier ahead of planned surgery will allow more patients to reap the benefits of PREPARE.

5617

Preoperative cognitive assessment in elderly: retrospective observational study

Quintao V.[1], Memoria C.[1], Tavares C.[1], Saba G.[1], Carmona M.[1], Anesthesia and Cognitive Function Study Group
[1]Hospital das Clinicas HCFMUSP, Faculdade de Medicina, Universidade de Sao Paulo - Sao Paulo (Brazil)

Background and goal of the study: Advanced age and impaired cognition are generally reported to be associated with postoperative cognitive complications. However, cognitive evaluation is not a standard routine part of the preoperative risk stratification of the surgical patient. The goal of this study is to present a descriptive analysis of surgical elderly patients of a tertiary medical center, including performance on cognitive screening tests.
Material and Methods: Surgical patients over 60 years are submitted to cognitive evaluation by the physician anesthesiologist in a preoperative assessment clinic. The initial screenings are the Clock Drawing Test and the 10-point Cognitive Screener (10-CS). If the patient had one or both screening impaired, Montreal Cognitive Assessment (MoCA) and the Geriatric Depression Scale (GDS-15) were applied.
Results and Discussion: Eighty-nine patients were included, being 56.2% male with a mean age of 71,5 years and mean schooling of 5.1 years. Fifty-six percent was classified as ASA 2 physical status with 90% reporting previous surgery. Urology and Ophthalmology were the surgical specialties more frequent. Twenty-four percent presented at least two comorbidities. High blood pressure, diabetes mellitus and chronic coronary artery disease were presented in 71%, 38%, and 30%, respectively. Sixty-eight percent reported a cognitive complaint. The MoCA test was performed in 75 patients and the mean score was 19.6. Using cutoffs according to schooling, this test was altered in 27 patients (36%). The MoCA test was independently influenced by schooling and age, and according to the Cramer V test, did not correlate with any comorbidity. The GDS-15 was applied to 75 patients, in which 33% had a score greater than 5, suggestive of depressive symptoms.
Conclusion: Cognitive screening protocols are feasible and provide information for perioperative care planning. On the other hand, such cognitive screening tests could be influenced by covariates. In this analysis, the MoCA was influenced by schooling and age, which could be a bias from the population of this preoperative assessment clinic. Besides, considering the low schooling of the Brazilian population, which contributes to cognitive decline, such preoperative cognitive assessment is very important.
Reference:
1. Sherman JB et al. A&A Practice 12 (2019).

5789

Postoperative delirium and postoperative complication spectrum, beyond anesthetic horizon: a machine learning approach

Stahlschmidt A.[1], João Marques A.[2], Leães Rodrigues A.[2], Kloeckner J.[2], Da Silva Rodrigues J.[2], Cadore Stefani L.[2]
[1]HCPA - Porto Alegre (Brazil), 2UFRGS - Porto Alegre (Brazil)

Background and Goal: Postoperative delirium (POD) is multifactorial and results from interactions between predisposing (vulnerabilities, complex comorbidities, neuroinflammation and cognitive status) and precipitating factors (hospitalization, anesthesia, surgical trauma and perioperative complications) that can accelerate or culminate with POD. The aim of this study was to identify the relationship between POD and postoperative complications in high-risk surgical patients (HRSP).
Materials and Methods: Cohort of 966 HRSP undergoing surgery at a Brazilian tertiary hospital between March 1th 2018 and July 1th 2019. Surgical risk was identified as probability of death > 5% by a the SAMPE Risk Model). Complications were measured by Postoperative Morbidity Survey scale. Traditional logistic regression (LR) model was done considering POD as main outcome and postoperative complications, as well as their number, as factors. Machine learning (ML) algorithms (developed from a training cohort and assessed on an independent validation cohort) were tested. Scatter plots were used to select variables and LR models, Support Vector Machine and RFC (Random Forest Classification) to identify their importance.. We compared models using the area under the curve (AUC), ie, the probability that a randomly selected patient with POD will have a higher risk score than a patient who did not. Traditional LR was analyzed with SAS Studio® and ML were conducted using Python®.
Results and Discussion: 966 HRSP (77% ASA III, 15% ASA IV and 2,5% ASA V); 51% urgent cases and 67% major surgeries. Incidence of POD was 8% and in-hospital death was 17%. Main variables associated with POD for the ML algorithm were number of complications (main feature), ventilatory support, hemodynamic instability, abdominal complications, reintervention, oliguria and infection. The LR model showed the best AUC 0.728, in contrast with the AUC of 0.54 in the RFC. In the traditional LR model, number of complications was analyzed with splines (absence of linearity) and was the only significative variable to predict POD. The odds-ratio for the presence of one complication was 5.16 (CI 3.68-7.24), for 2 complications 20.67 (CI 11.31- 37.78) with successive increase.
Conclusion: ML algorithms accurately identified patients at risk of POD based on the presence of postoperative complications. The number of complications, more than single site complications seems to be the most important factor for POD development

6013

Effects of fish oil on cognitive function after splenectomy in rats

Guo Y.[1], Cao Y.[1], Shang J.[1], Ping F.[1], Zhang J.[1], Li Y.[1]
[1]Shanghai Jiao Tong University Affiliated Sixth People's Hospital - Shanghai (China)

Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is a common complication after abdominal surgery. Several studies have reported that POCD is related to neuroinflammation induced by surgery. Fish oil (rich in a variety of ω-3 polyunsaturated fatty acids) can effectively inhibit the systematic inflammatory response. So we study the effects of fish oil on inflammation, immunity and cognitive behavior after splenectomy in rats.
Materials and Methods: 60 SD rats were randomly divided into control group (Group C, n=20), surgery group (Group S, n=20) and fish oil intervention group (Group F, n=20). Fish oil was injected intraperitoneally from 3 days before surgery to 7 days after surgery in Group F, and normal saline was injected simultaneously in Group S. Rats in Group S and Group F all received splenectomy under general anesthesia. Morris water maze behavioral tests were performed on the first, third, fifth and seventh day after surgery. The levels of IL-1b, IL-6, TNF-a, SOD and GSH-PX were detected.
Results and Discussion: Serum IL-1b, IL-6, and TNF-a concentrations in Group S and Group F were higher than those in Group C (P <0.01), while those inflammatory cytokines in Group F were significantly lower than those in Group S (P <0.01); serum SOD and GSH-PX levels in Group F were higher than those in Group S (P <0.01). The Morris water maze behavior performances of Group F were better than those in group S (P <0.05).
Conclusion: Fish oil can effectively improve postoperative inflammatory response, reduce the damage of antioxidant defense system, and improve postoperative cognitive function.

5833

Preoperative assessment of cognitive function: a pilot study

Fervienza A.[1], Gracia I.[1], García M.[1], Perdomo J.[1], Fábregas N.[1], Tena B.[1]
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background and Goal of Study: Postoperative neurocognitive disorders (pNCD) are considered a significant complication affecting up to 30% of people after surgery, being the preexistence of cognitive impairment one of the main risk factors associated. Assessment of cognitive function usually requires time consuming specialized tests that could be difficult to accomplish in the perioperative setting. The goal of the study was to evaluate the feasibility and results of a reduced self-administered test battery during the preoperative evaluation.
Materials and Methods: Three self-administered validated tests were provided to patients over 65 years of age, consecutively submitted to preanesthetic evaluation for urological surgery. They were asked to answer the tests by themselves after the medical visit. The tests were Cognitive Reserve Questionnaire (CRQ)1, Functional Activities Questionnaire (FAQ) of Pfeffer2 and Self Administered Gerocognitive Examination (SAGE)3. Time employed in tests accomplishment was registered. Results of the tests were recorded.
Results and Discussion: 31 out of 33 patients successfully answered the test. The mean time for tests completion was 31 minutes, and none of the patients needed more than one hour. Only 1 of the 31 patients (3.2%) showed an altered result in the evaluation of functional activities (FAQ test). According to the results obtained in the CRQ test, 7 out of 31 (22.6%) cases showed low cognitive reserve. Almost half of the patients (48.4%, 15 out of 31) obtained an abnormal result in the SAGE test and 9 out of 31 patients (29%) scored 14 points or below, suggesting that the real incidence of cognitive dysfunction in the elderly population could be underdiagnosed.
Conclusion: The incidence of preoperative cognitive impairment in the population over 65 years of age may be higher than expected. Since POCD is a non-negligible complication, especially in the elderly, the assessment of cognitive function prior

to surgery could improve the management of these patients. The use of self-administered and shortly completed validated test may enhance the adherence of patients for optimal evaluation.

References:
1. Nucci et al. Aging Clin Exp Res 2012; 24: 218.
2. Pfeffer RI et al. J Gerontology 1982; 37: 323-9.
3. Scharre DW et al. Alzheimer Dis Assoc Disord 2010; 24: 64-71.

6054

Preoperative anxiety in ambulatory surgery - a multicentric prospective observational study (preliminary results)

Monteiro C.[1], Mendes E.[2], Coelho M.[3], Bettencourt M.[3], Neves P.[4], Dahlem C.[5], Study Group: Baptista CR, Carrapatoso G, Martinho J, Neto L, Oliveira C, Saraiva L, Azevedo L, Granja C.
[1]Centro Hospitalar Universitário do Algarve - Faro (Portugal), [2]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal), [3]Centro Hospitalar do Baixo Vouga - Aveiro (Portugal), [4]Centro Hospitalar de Vila Nova de Gaia / Espinho - Vila Nova de Gaia (Portugal), [5]Centro Hospitalar Entre Douro e Vouga; Center for Health Technology and Services Research - CINTESIS - Santa Maria da Feira; Porto (Portugal)

Background and Goal of Study: In developed countries surgery is very common and most patients suffer from a variable degree of preoperative anxiety. Excessive anxiety is associated to increased postoperative complications, including pain. We aim: to evaluate the performance of the Surgical Fear Questionnaire (SFQ) and Anxiety Numeric Rating Scale (ANRS) as instruments for assessing preoperative anxiety in Portuguese patients; identify predictive factors for preoperative anxiety; evaluate how anxiety scores relate to postoperative outcomes.
Materials and Methods: Multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 3 Portuguese ambulatory units, from September 2018 to November 2019. Perioperative data included pain and anxiety ANRS (0-11) and SFQ (0-80). Postoperative outcomes were assessed through blind telephone interviews up to 3 months after surgery. Student's t-test and ANOVA were used to determine differences among groups; association between pain, patient satisfaction and anxiety scores were assessed using multiple regression techniques; alpha=0.05.
Results and Discussion: 237 men and 29 women were included, mean age 57,0 (12,9); 17% were smokers and 96% ASA< 3. Mean ANRS was 3,8 (2,5) and SFQ 21,7 (15,6), with a biggest contribution of short term items. 20% were considered to have high preoperative anxiety (scored higher than 1 standard deviation over the mean) in the ANRS and 15% in the SFQ. Women had consistently higher anxiety scores but only the SFQ showed statistically significant differences among genders (p=0,037). Age correlated with the total SFQ score (r=-2,13, p=0,001) but not to the ANRS. We found a significant correlation of ANRS with SFQ (r=0,548, p<0,001); education level (r=0,150, p=0,015) and age (r=-2,13, p=0,001) correlated to total SFQ score. Multivariate regression identified preoperative pain as risk factor for preoperative anxiety, using both total SQF (p=0,007) and NRS (p<0,001); analyzing the short term SFQ items, education level was also significant (p=0,043) and for the long term SFQ items the professional status (p=0,025). Preoperative anxiety was an independent risk factor for pain at 24h (p=0,010), 7 days (p=0,015) and 3 months.(p=0,043).
Conclusions: Female gender, younger age, preoperative pain, higher education level and active working status predicted higher preoperative anxiety, which is a strong predictor of postoperative pain.

5325

Measuring the futility: prospective observational study on unneeded tests requested for preoperative assessment at the Hospital Clínic of Barcelona

Forne D.[1], Gracia I.[1], Ubre M.[1], Risco R.[1], Basora M.[1], Martinez-Palli G.[1]
[1]Hospital Clinic of Barcelona - Barcelona (Spain)

Background and Goal of Study: Recent preoperative guidelines recommend the request of specific test guided by medical history and physical examination, avoiding systematic routine tests. Presumably, implementation of these guidelines depends largely on healthcare services organization. At our hospital, surgeons order preoperative tests before referring patient to the anaesthesiologist. These recommendations are in line with Right Care movement, which advocates to avoid overuse of healthcare resources. We have carried out a study to evaluate the level of adoption of these recommendations and to document the unneeded preoperative tests performed, as a previous step to modify our preoperative assessment strategy.
Materials and Methods: We conducted a prospective observational study at the Hospital Clínic of Barcelona, including all patients with appointed preanaesthesia visits (in-person/by phone) during a 30-day period. The staff anaesthesiologist in charge evaluated the suitability, according to recommendations, of the chest X-ray and electrocardiogram performed, and classified them into adequate or unneeded. Descriptive analysis of the collected data was performed.
Results and Discussion: Results are shown in the table:

	Unneeded chest X-ray	Unneeded EKG
OUTPATIENT SURGERY (n=294)	89 (30.3%)	115 (39.1%)
INPATIENT SURGERY (n=519)	91 (17.5%)	61 (11.8%)

Right Care movement promotes a clinical practice that takes into account patients' specific circumstances, values and perspectives. It must be based on the best and most updated scientific evidence, as well as cost-effectiveness studies. It works towards guaranteeing a healthcare model that minimizes excessive use of resources and its inherent iatrogenia. Patients' well-being is in the core of the clinical practice.Routine tests are time-consuming, for both patients and healthcare professionals. They have a high economic cost and make patients anxious about the results. They can even cause delays in surgery date due to the request for more tests.
Conclusions: A high rate of inappropriate tests for preoperative assessment has been documented. This study will help us to measure the impact of implementing a new preoperative strategy for individualized patient assessment, avoiding irrational use of healthcare resources, just as Right Care recommend.

4546

Perioperative levels of neurofilament light (NFL) in serum and its association with postoperative delirium (POD) after cardiac surgery

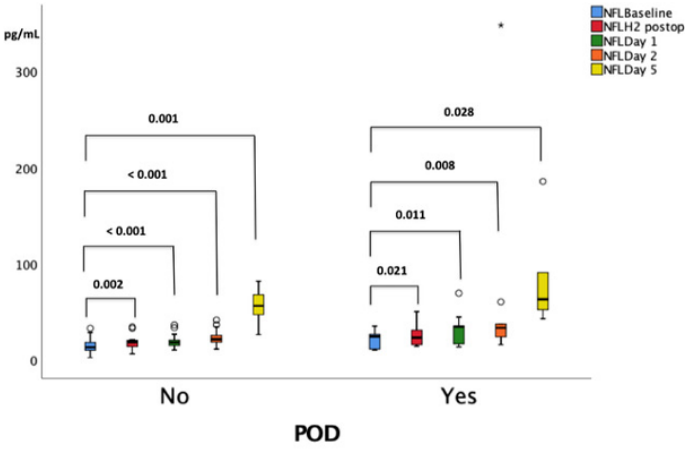
Khalifa C.[1], Lemaire G.[1], Watremez C.[1], Tircoveanu R.[1], Teunissen C.[2], Momeni M.[1]
[1]UCL - Cliniques Universitaires Saint-Luc - Brussels (Belgium), [2]VU University Medical Center - Amsterdam (Netherlands)

Background and Goal of Study: POD remains a major issue after cardiac interventions. Direct neuronal damage ensuing anaesthesia and surgery might play a key role in its pathophysiological mechanism. NFL is a sensitive biomarker of neuronal injury. Our aim is to evaluate whether higher perioperative NFL levels in serum are predictors of POD.
Materials and Methods: The study is a secondary analysis from an ongoing research project (NCT03706989). Blood samples were collected pre- and postoperatively (H2, D1, D2, D5) in 30 patients undergoing elective cardiac surgery with cardiopulmonary bypass. Quantitative determination of NFL in serum was performed using the Simoa technique, a single-molecule array method. POD was detected by CAM-ICU, CAM and a chart review until hospital discharge. Mann-Whitney U test was used to compare patients with or without POD. A Friedman's ANOVA and Wilcoxon tests were used to compare NFL over time in each group.
Results and Discussion: NFL at baseline increased significantly with age (p=0,001). All 30 patients presented a significant increase in NFL levels up to D5 (Fig 1). Patients who experienced POD had higher levels of NFL at D1 and D2 (Table 1).
Conclusion: These preliminary results show that NFL could be a potential biomarker of POD in cardiac surgery. We will further investigate the value of baseline NFL as a predictive biomarker of POD.

Reference:
1. Evered L. JAMA Neurol 2018;75:542-547.

Results: Median (P25-P75).

	POD+ (N=9)	POD- (N=21)	p
Age, y	81 (65-82)	68 (48-74)	0,022
Euroscore II, %	3,7 (2,6-7,78)	1,88 (0,94-2,76)	0,019
NFL Baseline, pg/ml	24,1 (11-26,4)	12,8 (9,7-18)	0,098
NFL H2 postop	22,9 (15,7-30,8)	18,3 (13,6-20,3)	0,144
NFL Day1	34,6 (16,5-35,3)	18 (14,9-20,4)	0,035
NFL Day2	33,2 (23,8-37,1)	21,2 (18,2-25,3)	0,046
NFL Day5	62,9 (52-90,5)	55,9 (46,8-67,6)	0,322



4349

Anesthesiologist versus surgeons: who cares about futility?

Tesoro R.[1], Suppan M.[1], Dupuis A.[1], Escher Imhof M.[1], Haller G.[1]
[1]Hopitaux Universitaires de Genève - Geneva (Switzerland)

Background and Goal of Study: Surgical interventions considered as futile are not proposed to patients. Criteria regarding futility may vary among professionals and particularly between surgeons and anesthesiologists. If consensus is observed on patients with absolute contrandication to surgery, it is unclear wheter this is true for criteria such as patient's quality of life, external opinions and personal beliefs, and this particularly for patients with emergency hospital admissions. We explored differences on criteria used to define futility among anesthesiologists and surgeons involved in the treatment of emergency patients.
Materials and Methods: We performed a cross-sectional study in March 2019 on anesthesiologists and surgeons working in the emergency setting of Geneva University Hospitals. We used a web-based questionnaire exploring environmental, patient and personal-related factors leading to the decision of cancelling a surgical intervention for futility reason. We also assessed differences in the definition of futility provided. We used a clinical vignette of a 45 yr old trauma patient resuscitated after cardiac arrest as introduction. For descriptive statistics we used mean values with proportions. All answers were dichotomised and a chi-square test used to compare professionals. A p value<0.05 was considered significant.
Results and Discussion: 109 physicians (62 anesthesiologists and 47 surgeons), representing 42% of respondents, participated in the survey. We found no difference between the 2 groups regarding the decision to anesthetize and operate the patient. In contrast, we identified significant differences regarding the definition of futility and environmental factors. Anesthesiologists considered patients' previous quality of life as a significant component of the definition of futility (97% vs 83%, p=0.0134) and were more often feeling their decision was constrained by their hierarchy (63% vs 38%, p=0.0108) and the level of occupancy of operating room (47% vs 22%, p=0.0059). Surgeons considered that treatements with uncertain benefit (79% vs 60%, p=0.0349) and surgeries without guarantee of a good quality of life should not be considered as futile (60% vs 39%, p=0.0307).
Conclusions: Significant differences exist between anesthesiologists and surgeons in the perception of futility in the emergency setting. This suggests an increased likelihood of conflict between the 2 professions. Further work should confirm this at a larger scale.

4402

Use of palonosetron and fosaprepitant in the prophylaxis of postoperative nausea and vomiting in women undegoing laparoscopic cholecystectomy. A randomised double-blind study

Braga E.[1], Gomes Durão N. M.[2], Coelho Ramos L. V.[2], Catanho Da Silva M. B.[2], Verçosa N.[3], Lima Cavalcanti I.[4]
[1]Universidade Federal Fluminense - Niterói (Brazil),
[2]Hospital Federal de Bonsucesso - Rio de Janeiro (Brazil),
[3]Universidade Federal do Rio de Janeiro - Rio de Janeiro (Brazil),
[4]Universidade Federal Fluminense - Niterói (Brazil)

Background and Goal of Study: Postoperative nausea and vomiting (PONV) occur in 30–50% of patients undergoing general anesthesia and in 70–80% of high PONV risk patients. In this study, we investigated the efficacy of palonosetron, a selective, second generation 5-hydroxytryptamine type 3 (5-HT3) receptor antagonist, compared to fosaprepitant, a neurokinin-1 (NK1) receptor antagonist. The study hypothesis is that administration of a single dose of palonosetron 75 µg or a single dose of fosaprepitant 150 mg, immediately after induction of anaesthesia, has similar effectiveness in the prophylaxis of PONV in women undergoing laparoscopic cholecystectomies.
Materials and Methods: Seventy-four, non-smoker women, aged in 18-60 years, American Society of Anesthesiologists physical status (ASA) 1 to 2, were randomly allocated into two groups. The primary objective was to compare the number of patients who had vomiting in the first 48 postoperative hours. The antiemetic solutions were prepared in 250 ml (0.9% saline) by an anaesthetist not involved in the anaesthetic act and were administered intravenously (i.v.), after induction of anaesthesia, in a single dose: palonosetron 75 µg or fosaprepitant 150 mg. General anaesthesia was induced with propofol, fentanyl, lidocaine, clonidine and maintained with sevoflurane, remifentanil and rocuronium. The incidence of postoperative nausea and vomiting, number of complete responders and use of rescue antiemetic drug, were assessed at six time intervals (0–2, 2–6, 6–24, 24–48, 0-24 and 0–48 h). Nausea and vomiting frequency were expressed by Chi-square test.
Results and discussion: In palonosetron group, 13.5% of the patients experienced vomiting in the first 48 postoperative hours, compared with 16.2% in the fosaprepitant group, P=0.74. There were no differences in the total frequency náusea (51.4 vs 61.2%), P=0.34%, number of complete responders (48.6 vs 37.9%), P=0.34% and use of rescue medication (32.4 vs 35.1%), P=0.80. There were also no difference in the incidence of nausea and vomiting in the other periods evaluated.
Conclusion: Based on the results, the administration of a single dose of palonosetron after the induction of anaesthesia was as effective as the administration of single dose of fosaprepitant for the prophylaxis of PONV in women who underwent laparoscopic cholecystectomy.

4982

May PONV cause subcutaneous emphysema of neck and face after total thyroidectomy?

Naco M.[1], Llukacaj A.[1], Belba M.[1], Gani H.[1], Kodra N.[1], Shkembi P.[1]
[1]University hospital centre Mother Thereza - Tirana (Albania)

Background: As we know, PONV after thyroidectomy surgery is a common complication after general anesthesia (GA), rarely it can cause life threatening complications such as subcutaneous emphysema (SCE), especially after uneventful surgery and anesthesia. SCE occurs when airs gets into tissue under the skin. It is self-limited, but mediastinitis can occur with high mortality as 50%. We describe a case of SCE neck, face and upper thorax, which developed 36 hours after total thyroidectomy under GA, following forcefully vomiting and discussed about management, complications.
Case Report: We present our experience in management of a female patient 56 y.o, Apfel score IV (ondaset 8 mg), that performed total thiroidectomy without evident events in our clinic. The patient is discharged from hospital the next days. After 36h she is readmitted in ER with sign of SCE of neck and face, anxiety, cough. She refered an episode of strong emesis home. Emergency CT-scan with injection of contrast revealed a SCE of upper chest, neck and head, no changes in blood formula, normal biochemical test, indirect laryngoscopy normal result, flexible bronchoscopy in 1/3 of trachea mucosal damage(biopsy). The SCE resolved with antibiotic treatment, anticoagulants, corticosteroid, anti-H2-receptor, cough medicine,O2 therapy and drainage of thyroid space . The biopsies of thyroid nodes and trachea were normal. The patient was discharged home 18 days after, in stable condition .
Discussion: There are many differential diagnoses of SCE and it's a rare complication after thyroidectomy and maybe has serious consequences. It usually resolves by itself , but a closed observation and conservative treatment were

mandatory, to prevent or treat the possible serious consequences. In that case we discussed the etiology of SCE is from PONV, from the pressure of endotracheal tub cuff, maybe the movement of tracheal tube during surgery or from damage of trachea during total thyroidectomy?

References:

1. S Shanbagavalli and Santosh Kumar. A case of subcutaneous emphysema following post-operative vomiting. Indian J Anaesth. 2013 Mar-Apr; 57(2): 214–215. doi: 10.4103/0019-5049.111883.

2. Souche R1, Bouyabrine H, Navarro F. Subcutaneous emphysema of thorax, neck and face after elective left colectomy: A case report.Int J Surg Case Rep. 2013;4(5):489-92.

Learning points: The prophylactic antiemetic to patients at high risk for PONV is worth for 48h. We need to ensure the normal pressure of the tracheal tub cuff.

4884

A retrospective comparison of the prophylactic antiemetic efficacy of droperidol versus dexamethasone

Pantazopoulos C.[1], Danassi D.[1], Fotopoulou G.[1], Kalogiannis E.[1], Analyti A.[1], Lampadariou A.[1]

[1]Laiko General Hospital of Athens - Athens (Greece)

Background and Goal of Study: Postoperative nausea and vomiting (PONV) is one of the most frequent and annoying adverse effects of laparoscopic operations. Antiemetic prophylaxis is highly suggested (1). The goal of this retrospective study is to compare the prophylactic antiemetic effect of droperidol and dexamethasone in patients undergoing laparoscopic interventions.

Materials and Methods: The study included 111 patients, ASA physical status I and II, that had undergone laparoscopic cholecystectomy. All demographic data, anesthesia time and anesthetic drug dosage was similar. All patients received propofol for induction of anesthesia, desflurane for maintenance of anesthesia, fentanyl and morphine for pain and rocuronium as a neuromuscular blocking agent. Patients received either iv droperidol 1 mg (Group Dro, n= 53) or dexamethasone 8 mg (Group Dex, n=58). Nausea and vomiting were evaluated during the first 24h postoperatively. Data were analyzed by Fisher's exact test (significance level $p< 0.05$).

Results and Discussions: The incidence of PONV during the first 24 hours after surgery was 15% for Dro group and 12% for Dex group ($p=0.35$). Rescue antiemetic treatment during the study period was required in 9% of patients in Group Dro and 2% of patients in Group Dex ($p<0.05$). No side effects related to the use of droperidol and dexamethasone were found.

Conclusion: Droperidol and dexamethasone had similar effects on preventing the incidence of PONV. The need for rescue antiemetic treatment was significantly lower in dexamethasone group compared to droperidol group.

References:

1. An update on the management of postoperative nausea and vomiting. Cao X, White PF, Ma H. J Anesth. 2017 Aug;31(4):617-626.

4920

Postoperative nausea and vomiting in a tertiary center - are anaesthesiologists acting correctly? An audit

Vieira A.[1], Oliveira T.[2], Infante C.[1], Teixeira J.[1], Ramos S.[1], Costa G.[1]

[1]CHUC - Coimbra (Portugal), [2]Centro Hospitalar e Universitário de Coimbra (CHUC) - Coimbra (Portugal)

Background and Goal of Study: Postoperative nausea and vomiting (PONV) are reported as a frequent complication in patients undergoing general anaesthesia. Portuguese recommendations for the management of this condition are published,referingstrategies to identify PONV risk and prophylaxis.1,2.. It has been demonstrated that target administration of PONV prophylaxis to those with at increased risk of PONV reduces its incidence 3. Previous studies demonstrated the guidelines for PONV prophylaxis are implemented widely but their effectiveness may be limited by poor adhrence.2 The aim of this work is to verify the compliance of anaesthesiologists (ANE) in adopting the appropriate prophylatic strategy according to patient's PONV risk stratification.

Materials and Methods: Prospective audit, performed in 09/2019, in a inpatient surgery unit of a tertiary center. Paediatric patient were excluded. Validated risk factors (RF)according to the Apfel Score (female, non-smoking status, previous history of PONV and motion sickness, opioids in the perioperative period) were registered as well as intraoperative prophylaxis therapy administered.

Results and Discussion: We analyzed data related to 151 patients (P). Mean age was 61±17years old, with 52% male, from different surgical specialties: general surgery 42%, orthophedic surgery 16%, urology 18%, vascular surgery 8%, neurosurgery 8% and gynecology 8%.0-1 RFwas found in 22,5%, 2 RF in 35,8% and 3 RF in 41,7%. Prophylaxis was adequate in 56% of patient with 1RF, in 59% of patient with 2 RF and in 32% of patient with 3 RF. Overall, prophylaxis was adequate in 47% of the cases. 40% of the patient had more prophylaxis and 12% had less than the recommended. The results obtained demonstrate a low compliance rate by ANE in PONV prophylaxis taking into account the patient's risk. They also show that the ANE tend to over medicate the patients.

Conclusion: This audit demonstrated the need for a reflection in medical conduct in order to bring ANEaction closer to the recommendations and don't jeopardize the effectiveness of a clinical guideline.

4942

Late PONV prolongs hospital stay in enhanced recovery programs for colorectal surgery: A retrospective multicenter cohort study

Mc Loughlin S.[1], De Boer H. D.[2], Viola Malet M.[3], Zarate E.[4], Warberg E.[5], Enciso D.[6], ERAS LatAm Research and ERAS Centers of Excellence.

[1]Hospital Italiano de Buenos Aires - Buenos Aires (Argentina), [2]Martini General Hospital - Groningen (Netherlands), [3]Médica Uruguaya - Montevideo (Uruguay), [4]Clínica Reina Sofia - Bogotá (Colombia), [5]Østfold General Hospital - Sarpsborg (Norway), [6]Hospital Civil de Guadalajara - Guadalajara (Mexico)

Background and Goal of Study: Current Enhanced Recovery After Surgery (ERAS®) guidelines for colorectal surgery care strongly recommend the use of prophylactic antiemetic protocols during the day of surgery. However, PONV during the ensuing days have been scarcely studied and described as a mild complication without influence on clinical outcomes. In a recent single centre study, we reported that the incidence of PONV continues to increase after the first day and independently prolongs the length of hospital stay (LOS). We now examine in a larger and multicenter study the incidence of PONV after colorectal procedures during the first 3 days and their influence on LOS.

Materials and Methods: This observational retrospective cohort study was conducted in 7 hospitals of 6 countries. Data were collected in the ERAS Interactive Audit system. This database includes preoperative, intraoperative and postoperative data with a follow-up period of 30 days. The day of surgery was defined as day 0 and the following postoperative days were numbered consecutively. Postoperative ileus was defined as ≥ 2 episodes of vomiting occurred in the absence of bowel movement. Postoperative complications were stratified according to the Dindo-Clavien classification of complications; those graded ≥3b were considered serious complications.

Results and Discussion: A total of 2287 patients were studied. Compliance with the ERAS guideline antiemetic recommendation was 98%. PONV incidence increased during the first 3 days (16%, 19%, 21% for day 0, 1 and 2 respectively; $p=0.001$). Patients with PONV on day 2 presented a 3-nights prolonged LOS when compared to patients without this complication (7 vs 4 nights; $p<0.0001$). After excluding patients that later developed ileus or a serious complication, the group with PONV on day 2 presented a 1-night increase in the median LOS (5 vs 4 nights; $p<0.0001$). In a multivariate analysis adjusted by pre, intra and postoperative variables; the presence of PONV on day 2 increased on average 1-night the LOS (β 1.34; $p<0.0001$).

Conclusions: Although traditionally considered a complication with peak incidence in the first 24 hours, the frequency of PONV continues to increase during the first 3 days after a colorectal surgery. Late PONV on day 2 independently prolongs the LOS despite high compliance to current antiemetic care recommendations. These results highlight the need for the development of standardised recommendations to address late PONV.

5969

Is there a time frame for PONV; A retrospective study

Pantazopoulos C.[1], Danassi D.[1], Kalogiannis E.[1], Fotopoulou G.[1], Koziakas I.[1], Lampadariou A.[1]
[1]Laiko General Hospital of Athens - Athens (Greece)

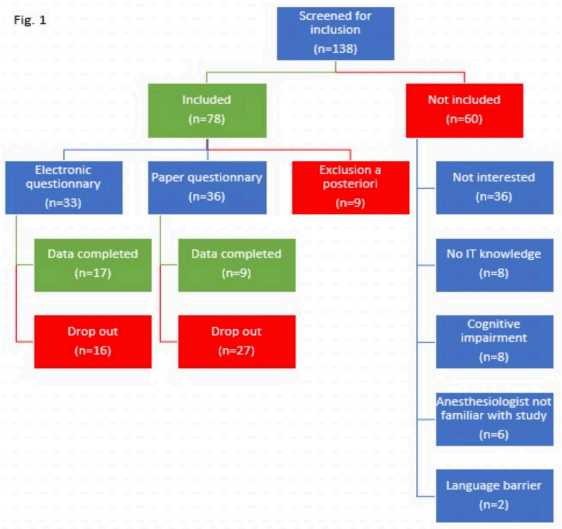
Background and Goal of Study: It is considered that PONV occurs mainly during the early postoperative period (1). The goal of this retrospective study was to determine the pattern of incidence of PONV.
Materials and Methods: We retrospectively examined the anaesthetic charts and the medical records of patients that had undergone elective surgeries that are considered as highly emetogenic, such as laparoscopic cholecystectomy, breast and ENT surgery, as well as gynecologic operations for a period of six months. All operations enrolled in the study were performed under general anaesthesia. All patients should have similar demographic data, antiemetic prophylaxis, anaesthetic drugs and drug dosage. 568 patients fitted the criteria. The incidence of PONV at 0-4, 4-8 and 8-12 hours postoperatively was noted.
Results and Discussion: 73 patients suffered PONV (12.8%). Only 11 patients (15%) had PONV 0-4h postoperatively. The peak of incidence was noticed during 4-8h postoperatively, when 45 patients (61.6%) suffered from PONV. From 8-12h postoperatively, 17 patients (23.3%) experienced PONV.
Conclusion: Patients develop PONV mainly in the late recovery period than in the early recovery period. Patients should be followed for at least 12h postoperatively for PONV. A second dose of antiemetics is suggested.
References:
1. Postoperative nausea and vomiting: physiopathology, risk factors, prophylaxis and treatment. Veiga-Gil L, Pueyo J, López-Olaondo L. Rev Esp Anestesiol Reanim. 2017 Apr;64(4):223-232.

5569

Patient reported outcome measures for anesthesia: are patients ready?

Sueys L.[1], Van Hoeylandt E.[1], Verougstraete M.[1], De Groof P.[1], Smolders J.[1], Swinnen W.[1]
[1]AZ Sint-Blasius - Dendermonde (Belgium)

Background and Goal of Study: To measure effects of patients (pts) centered care, pts reported outcome measures (PROMS) have been defined. Few PROMS for anesthesia have been defined or tested. The Quality of Recovery-15 score (QoR-15) could be suitable for PROMS for anesthesia, as it is a comprehensive and validated score, covering most postoperative issues about recovery after anesthesia. Primary goal: to determine the ideal moment of collecting QoR-15, hereby assessing QoR-15 at postop days +1, +4, +7, +14, +28. Secondary goal: reasons why pts are not included or why they drop out.
Materials and Methods: All pts scheduled for elective TKP and THP were screened during a pre-anesthesia assessment 1 month before surgery. Exclusion criteria: revision or urgent surgery. Reasons for non-inclusion were documented. 2 ways for reporting QoR-15 were offered: electronically or on paper. Interventions to minimize drop out: visit on postop day +1, contact per email or telephone when electronic reporting was absent, contact per email to return papers and when papers were not returned. The study has been approved by the Committee for Medical Ethics of az Sint-Blasius. Informed consent is registered. EU-GDPR requirements are met. Statistical tests: ChiSquare and Student t; $p<0.05$ is statistically significant.
Results and Discussion: In Fig.1 we present the results of the first 5 months of inclusion (May 24-Sep 25 2019). 56.5% of screened pts were included. 11.5% were excluded post hoc (revision surgery, surgery postponed, technical problems with electronic reporting). 42.3% chose electronic reporting, 46.2% on paper. Finally, only 33.3% of the included completed the questionnaire, statistically more in the electronic group (51.5% vs. 25%, $p<0.05$). Mean age did not differ between included and not included pts: 66±10y (p=1).
Conclusions: Pts do not seem to be very interested in PROMS for anesthesia. Despite interventions to minimize drop out after inclusion, drop out numbers were high, especially in the paper-reporting group. Electronic reporting seems to give better results. It remains unclear whether these PROMS are worth the effort in this population, anno 2019.



6184

The impact of midazolam on postoperative pain - a multicentric prospective observational study (preliminary results)

Monteiro C.[1], Coelho M.[2], Mendes E.[3], Martinho J.[3], Oliveira C.[4], Dahlem C.[5], Study Group: Baptista CR, Bettencourt M, Carrapatoso G, Neves P, Neto L, Saraiva L, Granja, C, Azevedo L.
[1]Centro Hospitalar Universitário do Algarve - Faro (Portugal), [2]Centro Hospitalar do Baixo Vouga - Aveiro (Portugal), [3]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal), [4]Centro Hospitalar de Vila Nova de Gaia / Espinho - Vila Nova de Gaia (Portugal), [5]Centro Hospitalar Entre Douro e Vouga - Santa Maria da Feira (Portugal)

Background and Goal of Study: Midazolam may affect postoperative pain, with animal studies suggesting systemic midazolam is hyperalgesic. In humans, scarce data show conflicting results. Anxiety contributes to pain and may be a confounder. We aim to clarify the relation between anxiety, midazolam and pain, and hypothesize that midazolam administered preoperatively might increase pain perception.
Materials and Methods: Multicentric prospective observational cohort study (clinicaltrials.gov NCT03499730). Inguinal hernia repair patients were recruited in 3 Portuguese ambulatory units, from September 2018 to November 2019. Perioperative data including pain and anxiety were collected. Postoperatively, pain was assessed through a blind telephone interview 24h, 7 days and 3 months after surgery. Association between pain, anxiety and midazolam were assessed, including subgroup analysis and multiple regression techniques; alpha=0.05.
Results and Discussion: 237 men and 29 women were included, mean age 57,0 (12,9); 17% were smokers and 96% ASA< 3. Patients administered midazolam (any dose) were less satisfied at 7 days (p=0,012) and 3 months (p<0,001) than patients not administered midazolam, however there was no direct impact of midazolam administration on postoperative pain. Multivariate regression identified risk factors for postoperative pain: lower age (p=0,012), preoperative pain (p=0,039), preoperative anxiety (p=0,010), non smoking (p=0,041) and female gender (p=0,008). Chronic benzodiazepine consumption (p=0,016), higher education level (p=0,025) and presence of preoperative pain (p=0,017) were associated to lower patient satisfaction. 24h-pain correlated to 7-day (p<0,001) and 3-month pain (p=0,005). The odds of referring moderate to severe postoperative pain (NRS >3) decreased with age - adjOR 0,963 (0,929-0,997) and increased with preoperative anxiety - adjOR 1,167 (1,034-1,318) - and pain adjOR 1,199 (1,049-1,370).
Conclusion: In open inguinal hernia repair, the administration of preoperative midazolam did not show any impact on postoperative pain. However, a randomized controlled trial would best answer this question, as anxiety is a clear risk factor for postoperative pain, being a confounder in this relation.

5978

Effect of anesthesia technique by anesthesiologist on intra-operative and post-operative morphine equivalent daily dose (MEDD) and highest post-anesthesia care unit (PACU) pain score in open gynecologic surgery in an Enhanced Recovery after Surgery (ERAS) pathway

Lasala J.[1], Mena G.[2], Pitcher B.[2], Brown J.[2], Meyer L.[2], Ramirez P.[2], ERAS GYN ONCOLOGY Group - University of Texas MD Anderson Cancer Center
[1]University Of Texas MD Anderson Cancer Center - Houston (United States), [2]University of Texas MD Anderson Cancer Center - Houston (United States)

Background and Goal of Study: To examine the effect of anesthesia technique by anesthesiologist in an ERAS pathway on intra and post-operative morphine equivalent daily dose (MEDD) and PACU pain score. Inhalational, total intravenous anesthesia (TIVA); and combined technique of inhalational and intravenous anesthesia were analyzed. Anesthesiologists were divided into groups, group 1 included anesthesiologists adhering to ERAS goals for our pathway and group 2 anesthesiologists who did not adhere to pathway. The hypothesis was that anesthesiologists adhering to ERAS pathway goals would have lower MEDD and PACU pain scores.
Materials and Methods: Patients undergoing open gynecologic surgery under an ERAS program from November 3, 2014 through December 31, 2018 were included. Patients were categorized into three groups: 1) Inhalational 2) TIVA and 3) combined inhalational and TIVA. Cases were eliminated if the anesthesiologist performed < 1% of total cases. Anesthesiologists were grouped according to the number of inhalational cases:< 35% inhalational=group 1, all others in group 2 (316 cases among group 1, 349 cases among group 2).Less than <35% inhalational cases assured us of a core group of anesthesiologist providing pathway management. Descriptive statistics were used to summarize the demographic and clinical characteristics of patients overall and by anesthesia technique (inhalational, intravenous, and combined). MEDD was recorded as the total dose received intra-operative and post-operative including doses received through post-operative day 3.Separate Kruskal-Wallis tests were used to compare intraoperative and post-operative MEDD among the anesthesia provider groups.All statistical analyses were performed using SAS 9.4 for Windows.
Results and Discussion: There were 665 patients included in analysis. Patients who underwent anesthesia from group 1 received significantly less intra-operative MEDD [mean (standard deviation)]: [47.2(22.4)] versus group 2 [62.4(45.7)], p<0.001.Patients who underwent anesthesia from group 1 had lower highest pain in PACU [mean (standard deviation)]: 4.4(3.0) versus group 2 5.1(3.0), p<0.003. There were no differences between the groups in respect to post-operative MEDD, surgical time, or length of stay.
Conclusion: Anesthesiologists have an impact on patient outcomes on an ERAS pathway by decreasing intra-operative MEDD and reducing highest pain scores in PACU by adhering to ERAS pathway principles of multimodal analgesia.

4932

A systematic review of published qualitative research pertaining to the field of perioperative anaesthesia

Gisselbaek M.[1], Hudelson P.[1], Savoldelli G. L.[1]
[1]University Hospitals of Geneva - Geneva (Switzerland)

Background and Goal of Study: Qualitative research (QR) draws on a wide range of data collection, analysis methods and theoretical frameworks to explore people's beliefs, behaviors, perspectives and experiences [1]. QR contributes to evidence-based healthcare through hypothesis generation, development and validation of research instruments, intervention development and evaluation. While QR has contributed to many areas of healthcare, it appears to be underused in the field of anaesthesia. The purpose of our review is to describe the current state of QR in anaesthesia, identify topics, and highlight current limitations.
Materials and Methods: We conducted a systematic mapping review of published QR studies pertaining to the field of perioperative anaesthesiology. We selected articles published between 2000 and June 2018 from 3 databases: CINHAL (241), Pubmed (520), Embase (1370). A total of 107 articles were included. Data were extracted and coded into predefined categories.
Results and Discussion: We observed a 6-fold increase in the number of QR publications between 2000 and 2018, reflecting a growing interest in QR in anaesthesia. Top publishing countries are both Scandinavian (mainly Danish and Swedish) and anglophone (UK, USA, CA, AUS). Publications are balanced between medical (42%) and nursing (38%) journals. The latter publish more studies on patients' experiences and opinions than medical journals. Research teams are both interprofessional (69%) and uniprofessional(27%) and include anaesthesiologist specialists in 79% of the cases. In 55% of publications in medical journals, at least one author is a scientist outside of the classical healthcare professions. We found that methodologies were misused or misunderstood by some authors. Details regarding methodologies and author's reflections on their own cultural backgrounds, beliefs and bias were frequently missing.
Conclusion: It is encouraging to see that journals are increasingly publishing anaesthesia related QR. However, reports need better descriptions of methodologies and transparency. We advocate for a better understanding of QR theoretical concepts, involvement of QR scientists, and improved quality and exhaustivity of reporting.
Reference:
1. Denzin, N.K., & Lincoln, Y. S., Handbook of qualitative research., ed. C. Thousand Oaks, Inc. 1994, US: Sage Publications.

4639

Can routine perioperative haemodynamic parameters predict postoperative morbidity after major surgery?

Buggy E.[1], Bonnet J. F.[2], Cusack B.[2], Sherwin A.[2], Wall T.[2], Buggy D.[2]
[1]UCD - Dublin (Ireland), [2]Mater Hospital - Dublin (Ireland)

Background and Goal of Study: Postoperative morbidity occurs in 10-15% of patients undergoing major, non-cardiac surgery. Predicting which patients are at higher risk of morbidity may help to optimize perioperative prevention. Preoperative haemodynamic parameters, Systolic Arterial Pressure (SAP)<100mmHg, Pulse Pressure(PP)>62 mmHg or <53 mmHg, and Heart Rate (HR)>87min-1are all associated with increased postoperative morbidity. We evaluated the correlation between these and other routine haemodynamic parameters, measured intraoperatively during anaesthesia, with postoperative morbidity. Postoperative morbidity was , measured by using the Comprehensive Complication Index(CCI) and length of stay (LOS). Additionally we also correlated CCI with the cardiac risk biomarker, preoperative NT-ProBNP.
Materials and Methods: This is a retrospective analysis of patients in MET-REPAIR, a pan-European observational study correlating self-reported physical activity with postoperative morbidity. Patients' electronic anaesthetic records (EARs), including perioperative haemodynamic data, was correlated with 30-day postoperative morbidity, CCI and LOS parameters. Statistical analysis to assess for correlation was by Kendall's Correlation Coefficient for tied ranks (Tau-B) or Spearman's Correlation Coefficient. Blood for NTproBNP measurement was collected <31 days before surgery.
Results and Discussion: Data from n=50 patients was analysed. The intraoperative duration of PP>62 mmHg was associated with a patient's postoperative LOS(tau=0.317, p=0.007). When stratified according to age>70 years, the duration of MAP<75 mmHg was associated with a higher CCI(tau=0.57, p=0.001) and prolonged LOS(tau=0.39, p=0.02). When stratified according to ASA>3, the duration of SAP<100 and PP>62 were also associated with an increased CCI and LOS. There was no correlation between preoperative NTproBNP and either CCI or LOS.
Conclusion: In older patients the duration of intraoperative pulse pressure (PP)>62 mmHg and mean arterial pressure (MAP)<75 mmHg, as well as SAP<100 mmHg in ASA>3 patients, are associated with increased postoperative CCI and LOS. These findings warrant confirmation in larger databases and evaluation of whether real-time intraoperative intervention could reduce postoperative morbidity.

5078

MINS for prediction of cardiac and non-cardiac complications after non-cardiac surgery

Bubb C.[1], Schaller S.[2], Fuest K.[1], Ulm B.[1], Blobner M.[1], Jungwirth B.[1]
[1]Klinikum rechts der Isar der TUM - Munich (Germany), [2]Charite Berlin - Campus Mitte - Berlin (Germany)

Background and Goal of Study: Myocardial injury after non-cardiac surgery (MINS) is defined by a postoperative elevation of high sensitive Troponin T (hsTnT) and is associated with cardiovascular events and mortality (1). The aim of this study was to investigate whether different definitions of MINS can predict cardiac as well as non-cardiac complications after elective non-cardiac surgery.
Materials and Methods: HsTnT was determined preoperatively and at the postoperative anaesthesia care unit (PACU) in 1011 high risk patients undergoing surgery at the TU Munich. High risk is defined by ASA ≥3 and/or an elective high-risk surgery. Two MINS definitions were analysed for prediction of postoperative complications: the postoperative definition of MINS ignores the preoperative

baseline while the perioperative does not. Both are defined by postoperative hsTnT ≥65ng/l or values between 20–65ng/l with a additional consecutive increase by at least 5ng/l. In addition, the perioperative definition requires a postoperative increase of at least 30%, when the baseline hsTnT >20ng/l. Primary Endpoint is the incidence of moderate to severe complications until hospital discharge defined by a Clavien Dindo Score (CDC) ≥ 3 in the nine domains of the Postoperative Morbidity Survey (2,3). The incidences are compared using Chi2 tests. The positive predictive values are compared with McNemar.

Results and Discussion: The postoperative mortality was 2.4%. During the PACU time, 12.9% of patients developed MINS when using the perioperative definition and 17,2% with the postoperative definition. The incidences of complications are displayed in the table. Both MINS definitions can predict postoperative complications. The perioperative definition shows a better positive predictive value for cardiac and non-cardiac complications (p <0.001).

	Definition	no MINS	MINS	p
at least one complication (CD ≥ 3)	perioperative	289/857 (33.7%)	83/127 (65.4%)	<0.001
	postoperative	273/826 (33.1%)	110/171 (64.3%)	<0.001
At least cardiac complication (CD ≥ 3)	perioperative	63/857 (7.4%)	58/127 (45.7%)	<0.001
	postoperative	61/826 (7.4%)	65/171 (38.0%)	<0.001
at least one complication (CD ≥ 3) without cardiac	perioperative	226/857 (26.4%)	25/127 (19.7%)	0.107
	postoperative	212/826 (25.7%)	45/171 (26.3%)	0.860

Conclusion: Our study supports the need for hsTnT determination at the PACU in order to predict postoperative complications in high risk patients. While preoperative hsTnT does not improve overall risk prediction, it may help to better discriminate between cardiac and non-cardiac complications.

Reference:

1. Devereaux PJ, et.al. JAMA. 2017;317(16).
2. Clavien PA, et al. Annals of surgery. 2009;250(2).
3. Grocott MPW, et al. 2007;60(9).

5053

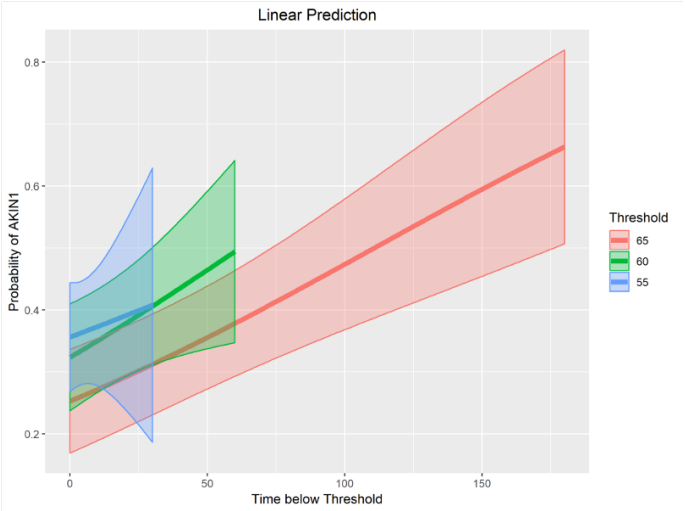
Duration and Timing of Intraoperative Hypotension and its Impact on Early Postoperative Acute Kidney Injury in Cystectomy Patients – A Retrospective Cohort Analysis

Löffel L. M.[1], Bachmann K.[1], Furrer M. A.[2], Wuethrich P. Y.[1]
[1]*Inselspital, University Hospital Bern - Bern (Switzerland),*
[2]*Departments of Surgery and Urology, The University of Melbourne, Royal Melbourne Hospital - Parkville (Australia)*

Background and Goal of Study: Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. Mean arterial blood pressures (MAP) below thresholds of 65 mmHg have been progressively associated with acute kidney injury (AKI) in a non-urological population. The aim of this study was to confirm these findings in a homogenous population undergoing major urological surgery.

Materials and Methods: In this retrospective observational single tertiary high caseload centre cohort series we analysed intraoperative data of 416 patients undergoing open radical cystectomy with urinary diversion between 2013 and 2019 and their correlation to postoperative AKI judged according to the Acute Kidney Injury Network criteria. We assessed the risk for postoperative AKI for different hypotension thresholds in form of time below a fixed threshold. Patients were divided into groups falling below MAP < 65 mmHg, MAP < 60 mmHg and MAP < 55 mmHg. The probability of developing postoperative AKI using all risk variables as well as the hypotension threshold variables (minutes under a certain threshold) was calculated using regression method.

Results and Discussion: Postoperative AKI was diagnosed in 128/416 patients (30.8%). Multiple regression analysis show that for every minute below a threshold of 65mmHg (OR 1.010 [1.005 – 1.015], p < 0.001) and 60mmHg (OR 1.012 [1.001 – 1.023], p = 0.02) the risk of developing AKI increases by 1.0% or 1.2%, respectively. On average, 26.5% (MAP < 65 mmHg), 50.0 % (MAP < 60 mmHg) and 76.5 % (MAP < 55 mmHg) of minutes below a certain threshold occurred between induction of anaesthesia and start of surgery and are thus fully attributable to anaesthesiological management.



Conclusion: With increasing time below hypotension thresholds of MAP <65mmHg and <60mmHg the risk for developing postoperative AKI escalates. Special attention has to be paid to the time between induction of anaesthesia and surgical incision as many episodes of hypotension occur in this period.

4761

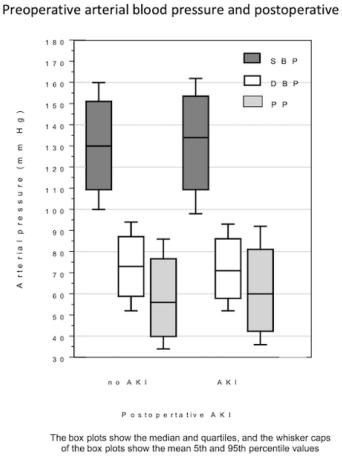
Elevated preoperative Pulse Pressure is not associated with postoperative acute kidney injury in patients undergoing colo-rectal surgery

Abad Motos A.[1], Fernández Dorado F.[1], Rubio Aguilera A. I.[1], Criado Camargo A.[1], Chico García M.[1], Ripollés-Melchor J.[1]
[1]*Hospital Universitario Infanta Leonor - Madrid (Spain)*

Background and Goal of Study: High preoperative pulse pressure (PP) has been identified as a predictor of postoperative acute kidney injury (AKI) in cardiac and non-cardiac surgery. The present study was aimed at determining whether baseline PP is associated with increased postoperative AKI in patients undergoing elective or emergency colorectal surgery.

Materials and Methods: Retrospective chart review of all patients submitted for colorectal surgery at our institution during a 6-year period. Baseline PP and other relevant preoperative and intraoperative data were investigated as predictors of AKI, cardiovascular complications, and mortality. Associations were analysed by the chi-square and Mann-Whitney U tests, and adjusted by multivariate logistic regression.

Results and Discussion: 798 patients were included. The baseline PP was <40 mm Hg in 105 (13.1%), 40-80 mm Hg in 622 (77.9%), and >80 mm Hg in 71 (8.9%). The incidence of postoperative AKI was 11.4%. There was a trend for a higher preoperative PP in patients with postoperative AKI (p=0.077). In the risk-adjusted model, age >70 years, emergency surgery, ASA >2, and preoperative creatinine >1 g/dl were associated with higher odds for postoperative AKI, while PP was not associated with postoperative AKI, cardiovascular complications or mortality.



Conclusions: Elevated baseline PP was not associated with postoperative AKI in patients undergoing colorectal surgery.

Acknowledgements: Arturo Pereira, Senior hematologist from Hospital Clinic Barcelona, for his advice and for performing the statystical analysis.

4731

Peroperative Fluid Management, Vasopressor Use and transfusion rate in Breast Reconstructive Deep Inferior Epigastric Perforator (DIEP) artery Flap Surgery: a retrospective study

Tejedor Navarro A.[1], Deiros C.[1], Carmona A.[1], Bassas E.[1], Espejo S.[1], Masdeu J.[1], Anaesthesiology Department
[1]*Consorci Sanitari Integral - Sant Joan Despi, Barcelona (Spain)*

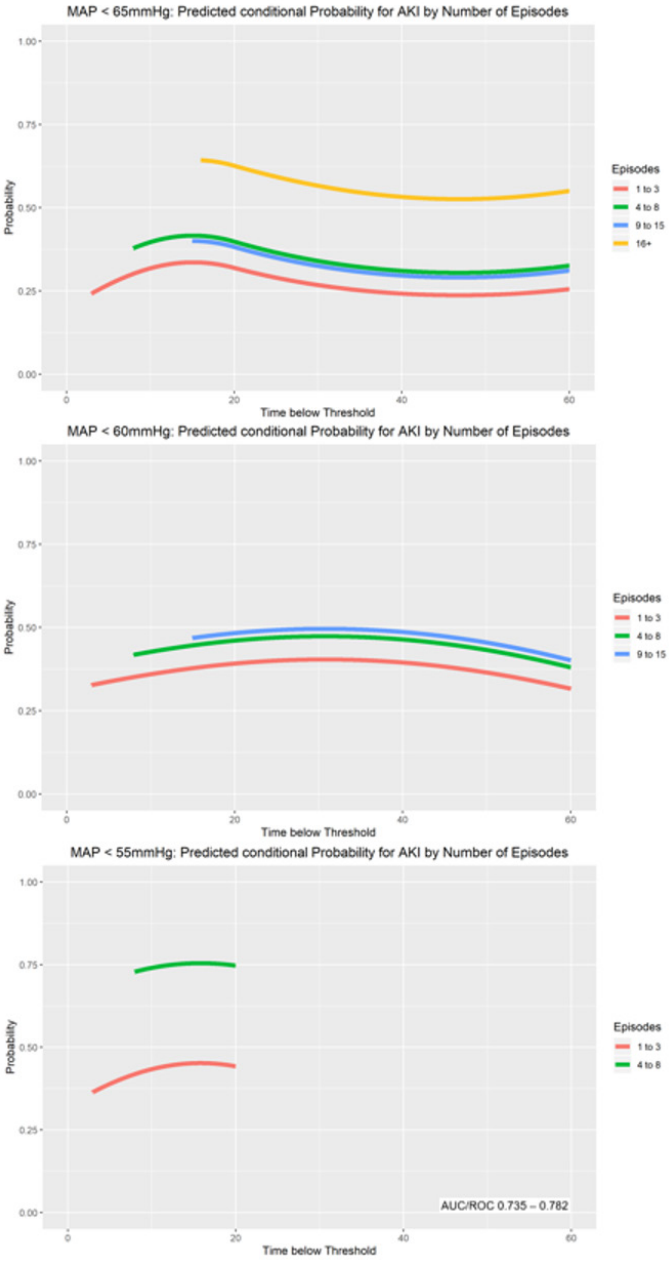
Background and Goal of Study: Anaesthetic management in reconstructive breast surgery with Deep Inferior Epigastric Perforator (DIEP) artery flap may influence on success rate of this surgery. Fluid therapy, vasopressor administration and blood management are controversial. The aim of our study was to audit hemodynamic management and to assess its impact on peroperative outcomes in our patients.
Materials and Methods: We gathered data from medical records of patients who underwent DIEP flap surgery in our centre between 2014 and 2019. Data collected: anthropometric data, ASA, comorbidities; anesthetic technique, length of surgery, peroperative complications, peroperative fluid therapy, vasopressors administered, transfusion rate, reintervention requirements and hospital stay. Results were reported as mean (SD) in quantitative data and percentage in qualitative data. Student's t-test was used to test differences between continuous data and $\chi 2$ test to assess relationship between categorical data. If not applicable, we run a Mann–Whitney U or a Fisher's Exact Test respectively. P values <0.05 were considered statistically significant. Analyses were carried out using SPSS v 22.0.
Results and Discussion: Sixty-seven patients were included. Preoperative hemoglobin (Hb) was 12.61(1.47) g/L and postoperative Hb 10.36(1.53) g/L. Intraoperative fluid therapy was 6.54(2.85) ml/Kg/hand in the peroperative period, 3.17(0.69) ml/Kg/h. Colloids were administered in 44.8% patients and 20.4% needed ephedrine, 5.25(10.81) mg to optimize hemodynamics. Blood transfusion was required in 26.9% patients. Thirty patients had postsurgical complications and 25.8% of them needed reintervention. Postsurgical complications were higher if colloids were administered (p=0.006). Red Blood Cell (RBC) transfusion was higher in patients who had postsurgical complications (p=0.034) and this therapy was also related to an increase in postsurgical complications (p=0.028). Neither peroperative fluid therapy, nor vasopressor use nor transfusion therapy were related to a longer hospital stay.
Conclusion: Intraoperative colloids administration and peroperative RBC transfusion may worsen outcomes in DIEP flap surgery. RBC transfusion has been related to a potential increase in flap thrombotic events and infectious complications. PBM programs may optimize peroperative outcomes and reduce postsurgical complications due to RBC transfusion.

5086

Increasing Number of Episodes of Intraoperative Hypotension is associated with Early Postoperative Acute Kidney Injury in Cystectomy Patients – Results from a Retrospective Cohort Analysis

Bachmann K.[1], Löffel L. M.[1], Engel D.[1], Furrer M. A.[2], Wuethrich P. Y.[1]
[1]*Inselspital, University Hospital Bern - Bern (Switzerland),*
[2]*Departments of Surgery and Urology, The University of Melbourne, Royal Melbourne Hospital - Parkville (Australia)*

Background and Goal of Study: Intraoperative hypotension is frequent during major non-cardiac surgery and a common side effect of anaesthesia. It has been progressively associated with acute kidney injury (AKI). In a sub study of major urological procedures, we hypothesized that the number of episodes of falling below a certain hypotension threshold intraoperatively is a risk factor for postoperative AKI.
Materials and Methods: We analysed data of 416 patients undergoing open radical cystectomy with urinary diversion at our high caseload centre between 2013 and 2019. We performed a probability prediction to analyse the risk of AKI depending on minutes below a certain hypotension threshold. We focused on subgroups of patients that recorded events below a given threshold and assessed the number of episodes as a grouped variable (1 to 3, 4 to 8, 9 to 15, > 15 episodes) in order to improve comparability. This led to conditional probabilities with 1 to 3 episodes as the reference group. We predicted the conditional probabilities for AKI with the help of quadratic splines with knots at 20, 60 and 120 minutes.
Results and Discussion: Figure 1 illustrates predicted probabilities for postoperative AKI using an average of our patient population. For a MAP below 65 mmHg, the probabilities for AKI increased with increasing number of episodes (1 - 3 episodes: 23.7%, 4 - 8 episodes: 27.3%, 9 - 15 episodes: 37.0%, > 15 episodes: 69.2%). This leads to an OR of 5.671 compared to baseline (95% CI 1.444 - 25.498, P=0.016). A similar trend was seen for a MAP below 60 mmHg (1 - 3 episodes: 26.0%, 4 - 8 episodes: 37.0%, 9 - 15 episodes: 47.1%) and 55 mmHg (1 - 3 episodes: 26.9%,4 - 8 episodes 61.5%), but no significance could be shown, mainly due to lack of statistical power.



Conclusion: Our results suggest that avoiding repeated episodes of intraoperative hypotension will protect postoperative renal function in cystectomy patients.

4705

Perioperative AKI and mortality in elective major non-cardiac surgery at Queen Elizabeth Hospital, Birmingham (QEHB)

Mughal S.[1], Bangash M.[1], Mcnulty D.[1]
[1]*Queen Elizabeth Hospital Birmingham - Birmingham (United Kingdom)*

Background: Perioperative acute kidney injury (AKI) is associated with an increased morbidity, mortality, length of stay (LOS) and costs.Most large studies have not investigated this in purely elective major surgical cohorts.
Aims: To determine the incidence of post-operative AKI in elective major surgery patients for 2015-2017 at QEHB. Secondary objectives: - Ascertain mortality rate associated with post-op AKI; - Identify risk factors for post-op AKI: surgical specialty, age, gender and ethnicity; - Compare LoS in patients with post-op AKI vs no post-op AKI.
Methods: Retrospective analysis of patients having elective major non-cardiac surgery for 2015-2017. Surgery was deemed major if it fulfilled the definition in

Lee's Revised Cardiac Index, or if it was listed as major under BUPA categorisation. Data was retrieved from two patient electronic record systems: Patient Administrative System, and Prescribing Information and Communications System. Suitable inclusion and exclusion criteria were applied to the data sets. AKI was defined according to KDIGO criteria. Differences between groups was compared using the Chi Squared and Student's t-test.
Results and Discussion: A total of 48,246 episodes were screened. 33,976 episodes were excluded leaving a cohort of 14,270 patients. Of these, 6598 patients had suitable data for analysis. A summary of the significant findings is as below.

	No AKI n=3240	AKI n=510
Mean age (years)	53.8	60.9
Male %	56.6	58.5
LoS > 8 days %	22.3	35.6
Median LoS (days)	4	6
Chinese ethnicity %	10.7	19.3
Mortality %	0.4	2.0
Needing RRT n (% of group)	10 (0.3%)	26 (5.1%)

Conclusion: In our large QEHB data set, AKI occurred in a high proportion of patients and was clearly associated with a longer length of stay and a several-fold increased risk of mortality. Risk factors associated with AKI occurrence included older age and Chinese ethnicity. Male sex was not a risk factor, which conflicts with published data. More research is required to understand how AKI can be prevented.

4339

Contribution of the novel pulse oximeter–based index in determining the amount of postoperative supplemental oxygen needed

Kumagai M.[1], Koishi W.[1], Kurihara H.[2], Eizuka A.[1], Suzuki K.[1]
[1]Iwate Medical University Hospital - Yahaba-cho (Japan), [2]Center for junior residents, School of Medicine, Iwate Medical University - Yahaba-cho (Japan)

Background and Goal of Study: Postoperative supplemental oxygen to prevent hypoxia can cause hyperoxia in some patients, which is reported to be associated with adverse effects, such as acute lung injury, increased hospital mortality, and worse outcomes in patients with ischemic stroke. Although blood gas analysis (BGA) is necessary to detect hyperoxia, it is invasive and intermittent. Oxygen reserve index (ORi™; Masimo Corp., Irvine, CA, USA) is a novel pulse oximeter–based index used to measure the oxygenation reserve status from 1 (much reserve) to 0 (no reserve). This study aimed to investigate whether the extent of postoperative hyperoxia can be limited by the use of ORi to determine the amount of supplemental oxygen needed and to evaluate the frequency of hypoxia.
Materials and Methods: We enrolled 50 patients with American Society of Anesthesiologists physical status class 1 or 2 scheduled for breast surgery. The patients were randomly assigned to one of the two groups: one received ORi-based oxygen treatment (group O) and the other received conventional postoperative oxygen treatment (group C). In group O, oxygen was administered at 4 L/min in the operation room after extubation. If ORi > 0.00, oxygen was decreased by 0.5 L/min until ORi was 0.00 for 30 min continuously in the post anesthesia care unit (PACU) and wards. In group C, oxygen was administered at a fixed amount (4 L/min) throughout the research period. Oxygen was administered via the nasal canula until the morning after surgery in both groups. BGA was performed 1 h after anesthesia induction (T0), after extubation (T1), before exit from PACU (T2), and on the morning after surgery in the wards (T3). Peripheral capillary oxygen saturation (SpO2) was measured every 2 s from 9 PM to 6 AM of the operation day. A two-way repeated-measures analysis of variance with post-hoc unpaired t-test was used to compare the partial pressure of arterial oxygen (PaO2) between the groups. Hyperoxia was defined as PaO2 >120 mm Hg, whereas hypoxia was defined as continuous SpO2 value ≤ 94% for more than 1 min.
Results and Discussion: PaO2 was significantly lower in group O than in group C at T2 [117.3 (26.8) vs. 170.0 (42.8) mmHg] and T3 [107.5 (16.5) vs. 157.1 (28.4) mmHg; mean (1SD); p < 0.01]. There were no patients with hypoxia.
Conclusion: Determining postoperative supplemental oxygen amount using ORi can noninvasively suppress hyperoxia, preventing hypoxia.

4405

Perioperative factors associated with postoperative morbidity after emergency laparotomy: A retrospective analysis in a university teaching hospital

Ahmed M.[1], M. Ahmed*,E. Garry*, A. Monyihan*, # W. Rehman, J. Griffin, DJ. Buggy; Department of Anaesthesiology and Perioperative Medicine and Clinical Surgery Mater Misericordiae University Hospital, Dublin Ireland
[1]Mater Misericordiae University Hospital - Dublin (Ireland)

Background and Goal of Study: Emergency laparotomy(EL) is a complex surgical procedure associated with increased morbidity and mortality. The UK National Emergency Laparotomy Audit (NELA) has identified variation in practice and patient outcomes, with 30-day mortality ranging between 7-15%. NELA and other observasional studies show correlation between preoperative haemodynamic parameters(e.g. mean arterial blood pressure <80mmhg for >10 minutes) and increased postoperative mortality. The association between intraoperative haemodynamic parameters and overall postoperative morbidity has not been evaluated in EL patients. Our objective in this analysis is to investigate the association between preoperative, intraoperative haemodynamic and other parameters and the post-operative morbidity.
Materials and Methods: The Comperhensive Complication Indix(CCI) is a scale where higher scores indicate higher morbidity impact. In this retrospective clinical analysis, we correlated a range of perioooperative parameters with CCI, among the patient who underwent EL during 2018.
Results and Discussion: Digital and paper records of all n=96 patients who had EL were evaluated. Mean+SD age was 64+16 yr, 44% being surgical category 1 Emergency. Median (25-75%) CCI was 27[9-45], and 30 day-mortality was 11.7%. While a number of intraoperative parameters correlated with CCI on univariate analysis, multivariable linear regression indicated only ASA status(P=0.005) and unplanned escalation to postoperative intensive care(P=0.03) were independently associated with CCI.
Conclusion: This retrospective analysis n=96 patients undergoing EL in a university teaching hospital has shown that ASA status and unplanned escalation to ITU, but not intraoperative haemodynamic parameters, were independently associated with increased postoperative morbidity. This warrants confirmation in a larger scale observational study.

5783

Does the use of continuous non-invasive blood pressure monitoring during non-cardiac surgery reduce amount of intraoperative hypotension?

Analitis A.[1], Kalogiannis E.[1], Mavrommatis E.[1], Stratigopoulou P.[2]
[1]Laiko General Hospital of Athens - Athens (Greece), [2]Laiko General Hospital of Athens, University of Athens, Greece - Athens (Greece)

Background and Goal of Study: Intraoperative hypotension is strongly associated with postoperative mortality.1 Even short periods of mean arterial pressure lower than 65mmHg are associated with worse outcomes such as myocardial injury and acute kidney injury.2 Continuous non-invasive monitoring may prevent long periods of hypotension but the extent of this reduction is unclear. The aim of this study is to investigate if continuous blood pressure monitoring with a non-invasive cuff in patients undergoing noncardiac surgery reduces the amount of hypotension when compared to standard intermittent oscillometric blood pressure monitoring.
Materials and Methods: We retrospectively reviewed medical records of forty eight 48 patients, 45 years and above, who underwent major, noncardiac abdominal surgery, lasting more than two hours. Twenty four patients were monitored intraoperatively with continuous hemodynamic monitoring with Clearsight (Edwards) (Gropu A), whereas the control group (24 patients) was monitored with the standard intermittent oscillometric blood pressure measurement. Gender, ASA physical status, comorbidities, blood loss, transfusion rates were also recorded. Episodes of mean arterail pressure (MAP) below threshold of 65mmHg was compared between two groups using Wilcoxon rank sum test and Hodges Lehmann estimation of location shift with corresponding asymptotic 95% confidence interval.
Results and Discussion: There were no demographic differences between the two groups. Among 24 patients in each group, patients with continuous blood pressure monitoring had significantly lower total amount of MAP under 65 mmHg 0.05 [0.00, 0.22] mmHg vs. intermittent blood pressure monitoring 0.11 [0.00, 0.54] mmHg (P=0.039, significance criteria P<0.048).
Conclusion: Continuous blood pressure monitoring during major non-cardiac surgery significantly reduced the magnitude of hypotension below threshold of MAP 65mmHg.
References:

1. Group PS, et al,Effects of extended-release metoprolol succinate in patients undergoing non-cardiac surgery (POISE trial): a randomised controlled trial. Lancet 2008; 371: 1839-47.
2. Salmasi V, et al, Relationship between intraoperative hypotension, defined by either reduction from baseline or absolute thresholds, and acute kidney and myocardial injury after noncardiac surgery: A retrospective cohort analysis. Anesthesiology 2017; 126: 47-65.

5009

When you can't explain perioperative hypoxemia: think platypnea-orthodeoxia syndrome, a challenging diagnosis

Vaz Gomes M.[1], Mendes E.[1], Carreira C.[1], Gonçalves N.[1], Ribeiro A. F.[1]
[1]Centro Hospitalar e Universitário de Coimbra - Coimbra (Portugal)

Background: Platypnea-orthodeoxia syndrome (POS) is a rare condition of positional dyspnea and hypoxemia1. The aim of this paper is to describe a case of hypoxemia with no obvious reason in the perioperative scenario.
Case Report: A 75-year-old man was submitted, under general anesthesia, to a radical prostatectomy. His background included arterial hypertension, isquemic stroke and HIV infection. For several occasions after anesthetic induction, peripheral oxygen saturation (SpO2) decreased from 100% to 86-90% without any feasible cause apart from arterial hypotension, recovering right after phenylephrine administration. In the post-anesthesia care unit (PACU), severe hypoxemia (paO2 41 mmHg, SpO2 77%) occurred and computed tomographic pulmonary angiography showed peripheral subsegmental pulmonary embolism that couldn't explain the clinical status. Due to the maintenance of severe hypoxemia without dyspnea, a right-to-left shunt was thought. Oddly, we've noticed hypoxemia correction with recumbency and aggravation with lifting the headboard and sitting position. A transesophageal echocardiography showed a right-to-left intracardiac shunt through a patent foramen ovale (PFO) with no pulmonary hypertension, establishing POS
Discussion: This patient had no anesthetic background nor past desaturation events, so intraoperative hypoxemia with arterial hypotension was first related to peripheral hypoperfusion. Instead, it was due to a drop in systemic vascular resistance that raised intracardiac shunt fraction. Orthostatism leads to atrial distortion, promoting deoxygenated blood flow through a PFO leading to hypoxemia exacerbation with upright position as seen in the PACU. Achieving diagnosis of POS requires a broad workup and a high degree of suspicion2 but missing it can translate into higher morbidity3.
References:
1. "Platypnea-Orthodeoxia Syndrome: A Case of Chronic Paroxysmal Hypoxemia". 2017. Rudy, C Craig et al.
2. "Shunt direita-esquerda através de forame oval patente sem hipertensão pulmonar." 2007. Lisboa, Thiago & Costa et al.
3. "Platypnea-Orthodeoxia Syndrome: Diagnostic Challenge and the Importance of Heightened Clinical Suspicion". 2015. Henkin, S et al.
Learning points: This case shows that although rare and often unrecognized, POS is an important consideration in the differential diagnosis of hypoxemia with no clear or more obvious explanation. Prompt recognition is key.

6372

Comparison between the EXCARE Model, the SORT model and the ASA-PS scale in the prediction of in-hospital postoperative mortality within 30 days

Stahlschmidt A.[1], Cavalcante Passos S.[1], Gutierrez C.[1], Seiki Mestre Okabayahi L.[1], Roloff Cardoso G.[2], Cadore Stefani L.[3]
[1]HCPA - Porto Alegre (Brazil), [2]UFCSPA - Porto Alegre (Brazil), [3]UFRGS - Porto Alegre (Brazil)

Background: Identifying the high-risk surgical patient in the preoperative period could improve care and enhance safety. In this context, we developed a preoperative risk stratification model: SAMPE Model. It is a statistical model that estimates the probability of 30-days in-hospital death, by the analysis of four variables: age, ASA-PS, nature of surgery (elective vs emergency) and surgical severity (minor, intermediate or major). Recently, we have updated SAMPE model and created a new one: the EXCARE model. The minor and intermediate surgical procedures were grouped, because there was no significant difference in the probability of death between the two types of surgery. We also observed that the increase in the probability of death in relation to age was not linear, and used splines technique to adjust this variable. The aim of this study is to compare the accuracy of this new model – the EXCARE model - with the SORT model and the ASA-PS scale, in the prediction of postoperative in-hospital death within 30 days.
Methods: We analyzed a cohort of 1.173 patients submitted to non-cardiac surgery between January 2016 and August 2018. Patients under 16 years, neurosurgery, outpatient surgery, obstetric procedures, diagnostic procedures and procedures under local anesthesia were excluded. The variables of the SORT model and the ExCare model were collected by the analysis of electronic medical records by a trained research staff. The final outcome was postoperative in-hospital death within 30 days. Statistical analysis was performed by SAS version 9.4. To compare the accuracy ExCare model, ASA-PS and SORT model for prediction of 30-days in-hospital mortality we used C-statistic. To evaluate the overall performance we calculate the Brier score. The DeLong's test was used to compare the three AUROC.
Results and Discussion: Mortality in the sample was 3.49% (n = 41). The ExCare model presented a good predictive capacity (AUC 0.89), superior to ASA-PS (AUROC 0.85). The SORT model presented a excellent accuracy (AUROC 0.92) in this cohort. There is a significant difference between AUROC ExCare and AUROC ASA-PS ($p < 0.05$) and there is no difference between AUROC ExCare and AUROC SORT ($p = 0.25$). The Brier score calculate to EXCARE, SORT and ASA-PS was, respectively: 0.026, 0.030 and 0.028.
Conclusion: The EXCARE model showed good accuracy, with advantage of using few variables that can be easily collected in the preoperative period.

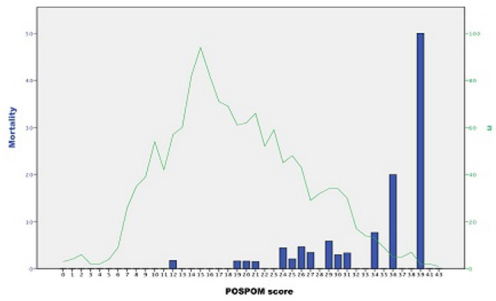
4861

POSPOM (Preoperative Score to Predict Postoperative Mortality): useful tool for postoperative risk stratification? Application of the score at two centers in Brazil

Freitas L. S.[1], Jeha C.[1], Benette G.[1], Pereira R. I.[1], Cardoso A.[1]
[1]Unicamp - Campinas (Brazil)

Background and Goal of Study: Due to the importance to accurately predict the in-hospital mortality, Le Manach et al. created the POSPOM score. Although it has a wide range of comorbidities, some known mortality risk variables are not addressed, like anemia and smoking. The goal of our study was to apply the score at Clinics Hospital (HC) and Center for Integral Attention to Women (CAISM) and analyze anemia and smoking load (SL) as possible predictors of mortality.
Materials and Methods: Retrospective data analysis identified patients older than 18 years who underwent elective surgeries for 4 months in HC and CAISM. For each one we recorded: gender, age, primary diagnosis, surgery, comorbidities, preoperative hemoglobin plasma levels (HB) and SL. We calculated the POSPOM score and related it to mortality.
Results and Discussion: Data were collected from a total of 1,411 patients. The mortality rate of the two hospitals was 1.20% (95% CI). Our study showed a positive relationship between the POSPOM score, HB and SL with mortality (Table 1). Some preoperative scores such as ASA, POSSUM, EuSOS, showed to have limitations, like data collected at hospital discharge, avoided in the POSPOM. Patients with a higher score have a higher chance of postoperative mortality (Figure 1). Anemia is very prevalent worldwide and we found an inversely proportional relationship between HB and mortality, with similar and high odds ratio in previous studies. Few studies have considered smoking as an independent variable. We verified a positive correlation for the presence of smoking, with a proportional relationship of SL.

Variable	N	P-value	Odds ratio	CI95%
HB	1379	<.0001	0.625	0.509; 0.769
SL	1225	0.0099	1.022	1.005; 1.039
POSPOM	1411	<.0001	1.140	1.071; 1.213



Conclusion: POSPOM showed a positive relationship and statistical significance with mortality in our cohort, as well as low HB and high SL have shown to be independent risk factors for mortality.
References:
1. https://doi.org/10.1097/ALN.0000000000000972.

6028

Preoperative prediction of postoperative mortality using machine learning

Graessner M.[1], Blobner M.[1], Ulm B.[1], Kargerbauer S.[1], Jungwith B.[1]
[1]Technical University Munich, Klinikum rechts der Isar - Munich (Germany)

Background and Goal of Study: Preoperative prediction of postoperative mortality, which is the third leading cause of death [1], is essential for preoperative optimization and personalized perioperative care. However, the currently recommended scores ignore plenty of preoperative available data leading to an imprecise risk prediction. Machine learning (ML) may be suitable to organize and analyse these data in relation to postoperative mortality, and therefore, may offer better prediction of individual risk.
Materials and Methods: After ethical approval, all patients undergoing non-cardiac surgery at the university hospital of the Technical University of Munich between January 2014 and August 2019 were included. Data for training and testing the ML-algorithm were obtained from the electronic medical records. Features included in the model are procedural data (n=28), surgical codes (n=267), laboratory variables (n=988), data from preoperative assessment (n=181), and current medication (n=201) of 122,056 surgical procedures. The model to predict postoperative mortality was created by Extreme Gradient Boosting and the area under receiver operating curves (AUROC) was calculated. Importance of variables was displayed by information gain.
Results and Discussion: The perioperative mortality following any non-cardiac surgical procedure was 2.5%. The model predicts death based on 733 of 1665 factors with an AUROC of 96.3 (95.7-96.9). The most important five factors for mortality prediction are given in the table. In contrast to other ML based models with lower AUROC [2], we included procedural data as well as the planned surgery. Four of the top five factors with the highest information gain are such procedural features.

Features	Actual mortality (n;%)	Predicted mortality (95% CI)	Information gain
Patient from ICU	1124 (31.9%)	7.3% [0.2;98.3]	7.3
Time of surgery			3.2
during core time	1964 (1.7%)	0% [0;6.5]	
during late shift	580 (5.6%)	0.2% [0;87.6]	
during night shift	672 (8.1%)	0.5% [0;92.0]	
ASA ≥ 3	692 (3.3%)	0.1% [0;78.6]	2.9
Preoperative ICU stay (duration)			2.7
0	1959 (1.7%)	0% [0;7.1]	
< 0.5 days	51 (7.7%)	0.8% [0;91.0]	
0.5 - 5 days	319 (17.9%)	2.1% [0.1;96.8]	
≥5 days	759 (28.8%)	4.8% [0.1;98.2]	
Type of hospital admission			2.5
childbirth related	0 (0%)	0% [0;0.4]	
for scheduled surgery	1105 (1.3%)	0% [0;2.9]	
by emergency services	1983 (6.2%)	0.3% [0;88.9]	

Conclusion: ML-based models for risk prediction of postoperative mortality need to include features without direct relation to the patients´ medical history and conditions.
References:
1. Nepogodiev, D., et al., Global burden of postoperative death. Lancet, 2019. 393(10170): p. 401.
2. Fritz, B.A., et al., Deep-learning model for predicting 30-day postoperative mortality. Br J Anaesth, 2019. 123(5): p. 688-695.

6249

Improving high-risk surgical patients outcomes: implementation of a bundle of extended care during 48 hours in the postoperative period (the EXCARE Pathway): preliminary results

Stahlschmidt A.[1], Cavalcante Passos S.[1], Schuh G.[2], Trost D.[3], Zerbetto Sbrissa G.[3], Cadore Stefani L.[2]
[1]HCPA - Porto Alegre (Brazil), [2]UFRGS - Porto Alegre (Brazil), [3]UFCSPA - Porto Alegre (Brazil)

Background and Goal of Study: While postoperative recovery is uncomplicated in the majority of cases, a proportion of high-risk surgical patients (HRSP) are prone to complications that have negative impact on rehabilitation, require disproportional amount of resources and are responsible for higher perioperative mortality rates. We aim to compare outcomes in HRSP population submitted to bundle of sustainable postoperative extended-care (EXCARE) to usual care. Our hypothesis is that EXCARE can increase the HRSP awareness and therefore reduce failure to rescue and postoperative morbimortality.
Methods: EXCARE bundle, implemented in a Brazilian tertiary hospital, comprises identification of the HRSP by the SAMPE Model, adoption of a HRSP handover, intensification of physician assistance on the ward (anesthetist, surgeons and clinical staff), more frequent checking of the vital signs and high-sensitivity cardiac troponin (TnT-hs), measure for 48 hours. EXCARE clinical pathway will be analyzed using before-and-after comparison (historical controls). Primary outcome is composed of 30-day mortality and pulmonary, infectious, renal, gastrointestinal, cardiovascular, neurological, hematological complications within 7 days. Secondary outcomes include hospital length of stay, number of Rapid Response Team (RRT) calls, unplanned postoperative ICU admission, surgical reintervention, elevation in TnT-hs and failure to rescue. A logistic regression model with individual propensity score will be calculated based on covariates that may influence the outcomes (significance level for all analysis of 5%).
Results: A prospective cohort of 361 patients was compared to a retrospective cohort of 963, both being HRSP was recruited so far. Preliminary results showed no change in most of postoperative clinical complications, except for higher transfusion rates (18 vs 12%, p<0.05), higher number of RRT calls (21% vs 11%, p<0.05), and higher number of surgical reinterventions (19% vs 8%, p<0.05) in the intervention group. There was significant decrease in postoperative death (9.1% vs 14.6%, p<0.05).
Conclusion: EXCARE bundle, using an objective risk communication tool and intensification of postoperative care based on processes changes in a sustainable proposal, decreased 30-day postoperative mortality. We believe that the extended care after surgery could speed-up recovery, reduce complications and provide instruments for better allocation of resources in health system

5831

Evaluation of high surgical risk patients in general surgical population through a modified risk score

Marquez Simoes C.[1], Cavalcante T.[2], Ottoboni A.[2], Pinn F.[2], Tonelotto B.[2], Silva E.[2], Serviços Médicos de Anestesia Ltda - Hospital Sirio Libanês
[1]São Paulo University - Sao Paulo (Brazil),
[2]Sirio Libanes Hospital - Sao Paulo (Brazil)

Background: Surgeons, anesthesiologists, intensivists and health institutions aim to admit in ICU the surgical patients who will benefit most from this high level of postoperative care. The present study aims to analyse the most important factors in the preoperative risk score for complications.
Materials and Methods: A retrospective cohort of 216 patients was performed through the analysis of medical records of patients undergoing non-ambulatory surgery during May 2017. Descriptive analysis and Logistic Regression were performed, considering $\alpha \leq 0.05$ The software SPSS 19.0 IBM was used for analysis.
Results and Discussion: 51.9% of the patients were male. We identified a prevalence of young adults aged 30-60 years (50.9%), followed by patients over 60 (41.3 %). 30.1% of the surgical procedures were major. According to the American Society of Anesthesiology (ASA) physical status classification, 27.8% patients were classified as ASA 1 58.3%, as ASA 2 and 13.9% as ASA 3. According to the risk classification, 56 patients presented criteria to be classified as high surgical risk, 29 as intermediate and 131 as low. Of the 216 patients evaluated, 36 (16.7%) required intensive postoperative care, of which 25 remained for more than 3 days and 4 required new intensive care unit admission, 02 (0.9%) required postoperative mechanical ventilation, 05 (2.3%) patients underwent new surgical intervention and 03 (1.4%) patients died after surgical procedure. The independent risk factors associated with postoperative complications were age over 70 years (OR 43.5; IC95% 4.6-415.5; p<0.001), preoperative vascular or neurologic disease (OR 20; IC95% 1.8-221.3; p=0,015) and high risk for perioperative blood loss (OR 28.6; IC95% 2.9-280.8; p=0.004).
Conclusion: The present study provides detailed information on the profile of surgical patients, use of intensive care resources, and outcome of patients until hospital discharge. It also exposes the importance of stratifying risk and supporting surgical team decisions. It also had the primary function of identifying the main risk factors for postoperative complications in our institution in the risk score adapted to the hospital patient profile and already in use since April 2017.
References:
1.Pearse RM, Holt PJ, Grocott MP. Managing perioperative risk in patients undergoing elective non-cardiac surgery. BMJ 2011; 343: d5759.
Acknowledgements: Sirio Libanês Hospital and Serviços Médicos de Anestesia Ltda.

5298

Pre and Post-Implementation Results of Enhanced Recovery After Surgery (ERAS) For Liver Surgery in an Asian Tertiary Institution

Au Yong P. S. A.[1], Liew G. H. C.[1], Thin T. N.[1], Abdullah H. R.[1], Sim E. Y.[1]
[1]*Singapore General Hospital - Singapore (Singapore)*

Background and Goal of Study: ERAS was conceptualized in mid-90s for colorectal patients and has since been replicated in other surgical specialties. ERAS allows faster recovery, reduction of complication rates and hospital length of stay, without an increase in readmission rate1. Liver resection poses unique challenges such as pre-existing liver disease or malignancy, postop coagulopathy, fluid management, biliary leak and postop organ failure2. Our study aims to demonstrate results of ERAS in liver surgery at our institution, Singapore General Hospital, which is the largest tertiary hospital in Singapore.
Materials and Methods: Consent was obtained from Singhealth Centralised Institutional Review Board. We used surgical outcome data for open and laparoscopic liver surgeries. The outcome data from January - September 2017 was used as the baseline for pre-ERAS implementation and data from October 2017 - July 2019 was used for comparison post-implementation. ERAS programme was a multidisciplinary effort implemented from October 2017, which included preoperative education, intraoperative protocols for anaesthesia, postoperative care and post-discharge followup(figure 1).
Results and Discussion: Pre-implementation of ERAS, there was significant variation in median length of stay (LOS) (3 – 18 days) among individual surgeons as compared to the hospital median for both laparoscopic and open surgeries (figure 2). Following ERAS implementation, there was decreased median LOS from 6 to 3 days and decreased inter-surgeon variation in LOS (figure 3). The mean Post Operative Morbidity Survey (POMS) score at postoperative days (POD) 3, 5 and 7 was decreased for ERAS vs non-ERAS patients.
Conclusion: The ERAS programme reduced both the median and variation of LOS, as well as the POMS score at POD 3, 5 and 7 days. A standardized protocol with good compliance by surgeons, anaesthetists and nurses can improve surgical outcomes in patients coming for elective liver surgery.
References:
1. Greco et al World Journal of Surgery 2014, 38:1531-1541.
2. V Agarwal, JV Divatia. Enhanced recovery after surgery in liver resection: current concepts and controversies. Korean Journal of Anesthesiology. 2019 Apr; 72(2): 119-129.

5336

Preoperative malnutrition in the elderly – Who is at risk and its association with more severe postoperative complications and prolonged hospital length of stay

Gn Y. M.[1], Loke W.[1], Au Yong P. S. A.[1], Thin T. N.[1], Abdullah H. R.[1], Sim Y. E.[1]
[1]*Singapore General Hospital - Singapore (Singapore)*

Background and Goal of Study: Malnourished elderly patients have longer hospital stays and more morbidities than those with normal nutritional state. Fortunately, malnutrition (MN) is potentially modifiable. To date, the prevalence of MN in the preoperative surgical population in Singapore is unknown. MN risk can be rapidly screened using the Malnutrition Universal Screening Tool (MUST). This study aims to assess the prevalence of MN risk in the preoperative elderly surgical population. We also examined factors associated with MN, and the association between MN risk and post-operative complications.
Materials and Methods: This is an audit of 1,033 elderly patients aged 65 years and older undergoing elective surgery at the Singapore General Hospital (SGH), a tertiary hospital, between January and March 2019. Patients were screened preoperatively for MN risk with MUST. Demographic data, comorbidities, operation details, postoperative complications and hospital length of stay (LOS) were recorded. Frailty was scored using the Edmonton Frail Scale; 30-day postoperative complications were scored using the Clavien-Dindo (CD) classification. Crosstabulation and multivariate logistic regression were done to determine the relationship between high MN risk (MUST≥2) and high CD grade complications (CD grade ≥2) or infective complications. Multivariate ANOVA was performed to determine relationship between high MN risk and hospital LOS.
Results and Discussion: 11.9% of the patients were at risk of MN (MUST ≥1). Of this, 4.6% were at high risk (MUST ≥2). General surgery and gynaecological surgery had the highest prevalence of MN risk. (16.8% and 22.3% vs 11.9%, p = 0.001). Higher ASA score, frailty (EFS ≥6), polypharmacy, and poor premorbid effort tolerance were associated with MN risk. Patients with high MN risk had higher odds of high CD grade complications compared to those with no risk (aOR 2.2, p=0.04) and longer hospital LOS (B=1.2, p=0.04) after multivariate adjustment for type and severity of surgery, presence of malignancy, presence of moderate to severe anaemia, CCI, EFS and ASA score. High MN risk was not associated with increased odds of infective complications.
Conclusion: MUST is validated for preoperative screening of MN. Patients with high MN risk have a higher risk of severe post-operative complications and longer hospital LOS. Patients with high comorbidity burden and frailty should be screened for MN so that nutritional optimisation can be sought.

5452

Risk in surgery: an analysis of several morbidity and mortality risk scores in a Portuguese Universitary Hospital

Seixas F.[1], Gonçalves V.[1], Cavaleiro C.[1], Nunes C.[1], Machado H.[1]
[1]*CHUP - Centro Hospitalar Universitario do Porto - Porto (Portugal)*

Background: There's conflicting literature regarding our perception of the perioperative risk. If clinicians tend to overestimate the benefit of certain treatment, we also may overestimate risk in complex surgical patients. Some international guidelines include risk stratification as part of preoperative assessment. Our goal was to understand which risk scores were best related to the complications for which they were created, in our population.
Methods: We analyse the comorbidities of the various systems. We calculated the risk scores Revised Cardiac Risk Index, Gupta Perioperative Cardiac Risk, Multifactorial risk index for predicting postoperative respiratory failure (Arozullah), ARISCAT Score for Postoperative Pulmonary Complications, P-POSSUM and POSPOM. The outcomes analysed were in-hospital mortality; at 30 days: myocardial infarction (MI) or sudden cardiac arrest (SCA), pneumonia, pulmonary complications, morbidity and mortality; 6 month mortality.
Results and discussion: We collected data from 431 patients submitted to general surgery from March to May 2017. RCRI showed good discrimination in 30-day MI and SCA (AUC: 0.889; p-value: 0.007; CI: 0.742 - 1.000); GUPTA did not discriminate MI or SCA (curve crosses 0.5 and estimates may be biased); ARISCAT did not discriminate for pulmonary complications at 30 days (AUC: 0.646; p-value: 0.073); Arozullah showed reasonable discrimination for predicting postoperative respiratory complications (AUC: 0.704; p-value: 0.013; CI: 0.531 - 0.877); P-POSSUM showed good discrimination in in-hospital (AUC: 0.939; p-value: 0.009; CI: 0.880 - 0.998) and 30-day mortality (AUC: 0.902; p-value: 0.006; CI: 0.822 - 0.9), and reasonable discrimination for 30-day morbidity (AUC: 0.776; p-value: <0.001; CI: 0.680 - 0.872) and 6-month mortality (AUC: 0.730; p-value: 0.027; CI: 0.545 - 0.914) ; POSPOM showed good discrimination for in-hospital (AUC: 0,862; P-value: 0,031; CI: 0,747 – 0,977) and 30-day mortality (AUC: 0,873; p-value: 0,010; CI: 0,784 – 0,961), and did not discriminate at 6-month mortality (AUC: 0,653; p-value: 0,117).
Conclusion: P-POSSUM and POSPOM discriminated for the outcomes for which they were built, and they are an easy and fast tool to apply in risk assessment. RCRI showed good discrimination and is a simple and highly reproducible risk score. In the respiratory complications we had the most conflicting data: neither of the two scores showed good discrimination of postop pulmonary complications.

5584

Does the patient have normal nutritive score prior to digestive surgery anesthesia?

Markovska-Ristovski Z.[1], Jandreska J.[1], Kolevska S.[1], Adjami B.[1], Trajkova R.[1]
[1]*GOB 8-mi Septemvri, Skopje - Skopje (Republic of North Macedonia)*

Background and Goal of Study: Nutritive status assessment is one of the most important factors for post-operative recovery. On the other hand, the physiological stress of operation increases the risk of poor nutritional status which is related to poorer outcomes. The aim of this study is to estimate nutritional condition in pre-operative period and its relationship with other pre-operative factors like gender, BMI, ASA and Glasgow index in patient who undergoes gastrointestinal surgery.
Materials and Methods: Pre-operatively we collected general data of 75 patients who underwent gastrointestinal surgery like gender, ASA status, body weight, body height. The nutrition assessment was investigated with two nutritional screening tools: - Royal Marsden nutrition screening; - Mini nutrition assessment short form (MNA-SF). In each patient we calculated Glasgow index which is ratio between CRP and Albumin value.
Results and Discussion: Out of 75 patients in total according to MNA-SF: - 21 (28 %) were detected with malnutrition; - 22 (29.3 %) patients were at risk of malnutrition;

- 32 (42.66 %) patients had normal nutritional status. Most of the malnourished patients had RMMS ≥ 2 and significantly higher Glasgow score compared to patients with normal status and risk of malnutrition. According to BMI in malnourished patients' group most of the patients were underweight which was 15 (71.43 %), but there were even two patients (9.52 %) who were overweight. Most of the patients or 17 (53.125 %) in total from the group of normal status patients according to MNA-SF and 14 (63.63 %) patients in the group of patients with risk of malnutrition had normal BMI. Gender wise most of the patients in all three categories according to MNA-SF were males: - males (13+16+14) = 43 (57.3 %); - females (8+8+16) = 32 (42.6 %). According to ASA: Malnourished patients had higher ASA score compared with patients with normal status and the ones with risk of malnutrition.
Conclusion: Nutrition status determined with MNA-SF is strongly associated with BMI, Gender, ASA, RMNS score and Glasgow score, and could aid in pre-operative assessment of nutritive status. Future action is needed to optimize usage of MNA-SF and RMNS tool.

5745

A novel infection marker in perioperative medicine - Intensive Care Infection Score

Hrazdilova O.[1], Wagner R.[1], Pavlík P.[1], Spáčilová H.[1],
[1]Centre for cardiac surgery and transplantation - Brno (Czech Republic)

Background and Goal of Study: The prediction of infection remains difficult and long-lasting (microbial cultures) in perioperative and intensive medicine. Intensive care infection score (ICIS), derived from five blood-count parameters, characterize the immune response in routine blood samples. In diagnostics of infection we routinely use evaluation of clinical status of the patient, biomarkers of infection like white blood cell count (WBC), C-reactive protein (CRP), procalcitonin (PCT), ICIS levels and microbial cultures.
Materials and Methods: The goal was to verify, that ICIS as a biomarker differentiates infection from systemic inflammatory response syndrome (SIRS). We have enrolled 50 cardiac surgery patients in this prospective study. The cohort was divided into infected and non-infected patient groups for evaluation.
Results and Discussion: Elevated level of ICIS had been proved in patients with positive microbial cultures in contrast to patients with postoperative SIRS (elevated CRP and negative microbial screening). Before surgery CRP and ICIS values are in correlation (p=0,019). We confirmed the cut – off ICIS level 5. CRP is not predictive for infection after surgery.
Conclusions: ICIS help us differentiate between infection and SIRS in critically ill patients. In contrast to CRP and PCT, the ICIS score can be obtained routinely without extra blood sampling and with lower costs, yielding results very fast (within 15 minutes).
References:
1. Weimann K, Zimmermann M, Spies CD, et al. Intensive Care Infection Score - A new approach to distinguish between infectious and noninfectious processes in intensive care and medicosurgical patients. Journal of International Med Research 2015, Vol43(3) 435-451.
2. Van der Geest PJ, Mohseni M, Linssen J,et al. The intensive care infection score -a marker for the prediction of infection and its severity. Critical Care 2016, 20:180.

5364

Prevalence and risk factors for moderate-to-severe thirst in the post-anesthesia care unit: development of an optimized management protocol from a quality improvement program

Lee C. W.[1], Fu C. H.[1], Liu S. T.[2], Chao A.[1]
[1]National Taiwan University Hospital - Taipei city (Taiwan),
[2]National Taiwan University Cancer Center - Taipei city (Taiwan)

Background and Goal of Study: Post-operative thirst is common and may cause intense patient discomfort. Unfortunately, its clinical relevance is frequently downplayed, generally considered less distressing than other post-operative symptoms. Among various pathogenetic factors, preoperative fasting and fluid loss may lead to hyperosmolarity and hypovolemia. Moreover, certain drugs utilized in anesthetic practice may promote a thirst sensation, which can be further intensified by prolonged surgical and intubation times. We designed the current study with the following aims: (1) to examine the prevalence of moderate-to-severe post-operative thirst, (2) to identify the main risk factors for moderate-to-severe post-operative thirst, and (3) to develop an optimized protocol to maximize the efficacy and safety of thirst management.
Materials and Methods: This is a retrospective analysis of data collected over a quality improvement program implemented during August 2018. The study was conducted in the National Taiwan University. Patients aged at least 20 years were included and classified according to surgery type. We excluded subjects who were unable to communicate or understand instructions clearly and those whose oral intake required strict restriction during the early post-surgical phase.
Results and Discussion: Moderate-to-severe thirst during the first PACU assessment was present in 675 (55.8%) patients. The use of glycopyrrolate during anesthesia was significantly more frequent in patients who experienced moderate-to-severe thirst. Notably, this variable was the only independent predictor of moderate-to-severe thirst identified (adjusted OR:1.46, p=0.013). A total of 900 patients entered into the thirst management optimization program. All of three management approaches (i.e., ice cubes, room temperature water, oral moisturizer) significantly decreased NRS scores over subsequent assessments conducted in the PACU (p<0.001). Adverse events occurred rarely and did not require specific interventions.
Conclusion: Moderate-to-severe post-operative thirst is commonly observed in the PACU and the use of glycopyrrolate is the main independent risk factor. Ice cubes or room temperature water are superior to an oral moisturizer for the management of post-operative thirst. From a practical standpoint, the supply of room temperature water every 15 min is a simple and safe strategy that may easily implemented in the early post-operative period in a high-volume PACU.

5837

Serum ketones as a diagnostic tool in the detection of patients' weight loss in the preoperative period. A pilot study

Borys M.[1], Piwowarczyk P.[1], Kutnik P.[1], Tekely E.[1], Rypulak E.[1], Czuczwar M.[1]
[1]Medical University of Lublin - Lublin (Poland)

Background and Goal of Study: Evidence suggests that increased serum ketones are associated with the presence of patients' cachexia. This problem can be especially important among patients with cancer in perioperative period due to the loss of their weight caused by neoplastic process. Although most patients are fed with high protein diet before scheduled surgeries, still serum ketones bodies might be elevated. The main aim of this study was to assess if serum ketones elevations can be a diagnostic tool to reveal oncological patients in comparison to other surgical ones.
Materials and Methods: This was a prospective, observational study performed in the university hospital. The study was approved by the institutional review board [KE-0254/350/2018]. Each patient signed the consent before their inclusion in the trial. The patient previous medical history, type of surgery, loss of weight during the previous months, and intensity of preoperative nutrition was obtained. In the operating theater, two mL of patient blood was collected for ketones detection. Moreover, arterial blood gas analysis was performed. Blood for ketones detection was collected in heparinized sample tubes. After 10 minutes of centrifugation (3000×g) plasma was collected from each sample tube and was frozen in 81 degrees Celsius. Ketone bodies detection was performed with mass spectrometry technique.
Results and Discussion: Twenty patients after different types of surgical procedures were recruited to the study. Of 21 patients, 10 were scheduled for surgery due to oncological problem. No difference was between oncological (88.4 [55.85-153] mcg/mL) and non-oncological patients (40.43 [22.19-73.85]mcg/mL) regarding serum ketones elevation. However, the percent of body loss before the surgery and perioperative glucose level was correlated with serum ketones. The area under the ROC curve was 0.785 obtained after computation with the logistic regression model including these two parameters. The odds ratio for glucose was 0.978 (0.961-0.996), p=0.019 and for the percent of body weight loss was 1.22 (1.0-1.49), p=0.05.
Conclusion: Preoperative serum ketones might help to discriminate patients with severe weight loss, but not oncological patients from non-oncological individuals.
References:
1. Shukla SK, et al. Metabolic reprogramming induced by ketone bodies diminishes pancreatic cancer cachexia [published correction appears in Cancer Metab. 2014;2:22]. Cancer Metab. 2014;2:18.

5489

The role of Dexmedetomidine and Hyperbaric oxygen therapy in Ludwig's angina- a case report

Frias P.[1], Oliveira I.[2], Resendes H.[2], Silva R.[2], Cabral T.[2], Andrade M.[2]
[1]Hospital Divino Espirito Santo Ponta Delgada - Ponta Delgada (Portugal), [2]Hospital do Divino Espirito Santo - Ponta Delgada (Portugal)

Background: Ludwig's Angina is a rare, but potentially life-threatening, diffuse cellulitis of the neck and floor of the mouth, usually secondary to odontogenic infection. We report a case of a patient with Ludwig's Angina, along with a review on the potential benefits of dexmedetomidine and hyperbaric oxygen therapy (HBO) in the post-operative approach of these patients.
Case Report: A 36-years-old male, ASA II, diagnosed with Ludwig's Angina underwent uneventful surgical drainage under general anesthesia with standard ASA, BIS and TOF monitoring. Successful awake fibreoptic intubation with a nasotracheal tube (NTT) was performed as a method of induction due to trismus. After appropriate neuromuscular block (NMB) reversal, the patient remained sedated (propofol and fentanyl), keeping the NTT in situ due to periglotic edema. In the Postanesthesia Care Unit (PACU), both propofol and fentanyl infusion-doses were progressively reduced, and a dexmedetomidine loading 0,4 mcg/kg (30mcg) followed by maintenance 0.7 mcg/kg/h was infused. After 2 hours, the patient recovered spontaneous ventilation and a T-piece with oxygen was attached to the NTT. At time of discharge to Intermediate Care Unit (IMCU), he was hemodynamically stable, vigilant and collaborative. On day 1, HBO (anaerobic protocol) was initiated- 105' (60' at 2,8 ATA + 30' at 2,4 ATA) in two sessions and 90' at 2,4 ATA in the following sessions.
Discussion: He did 6 uneventful sessions of HBO with the NTT in situ. On day 4 he was extubated. On day 7 he was discharged from the hospital without any signs or symptoms of respiratory disease, completing a total of 14 HBO sessions in ambulatory regimen. Dexmedetomidine induces a unique sedative response, which shows an easy transition from sleep to wakefulness, thus allowing this patient to be cooperative and communicative when stimulated.1 HBO, as an adjuvant to surgery and directed antibiotic therapy, allowed a better and faster recovery.2
References:
1. Seongheon Lee, M.D, Ph.D, Dexmedetomidine: present and future directions, review article, Korean Journal of Anesthesiology (2019).
2. Mark W. Jones, MD, Hyperbaric Therapy For Wound Healing, StatPearls (2019).
Learning points: This case demonstrates a successful example of articulation between different specialties, where dexmedetomidine and the hyperbaric chamber played a relevant role in the patient recovery.

6141

Prehabilitation and Multimodal analgesia to reduce postoperative ileus

Romero I.[1], Sadurní M.[1], Adalid I.[1], Román L.[1], Rodríguez C.[1], Corcoy M.[1]
[1]Department of Anaesthesia and Intensive Care Medicine, Hospital del Mar - Barcelona (Spain)

Background and Goal of Study: Rectal cancer surgery is associated with the development of postoperative ileus, among other complications. The implementation of preoperative prehabilitation and perioperative multimodal analgesia might decrease the incidence of ileus. The goal of the study is to confirm if the incidence and characteristics of postoperative ileus has improved in patients scheduled for rectum surgery after a prehabilitation-multimodal analgesia program.
Materials and Methods: Cohort study with 2 groups of patients scheduled for elective rectal cancer surgery after neoadjuvant therapy within an Enhanced Recovery After Surgery environment. Management of both groups was similar excepting: - Prehabilitation and Multimodal Analgesia group (2017-2019): Preoperative prehabilitation program (4 weeks) before surgery and perioperative multimodal analgesia (intraoperative analgesia with ketamine + lidocaine infusion); - Historical group (2014-2016): Patients without prehabilitation period nor intraoperative lidocaine infusion. Principal variable: incidence of postoperative ileus. Secondary variables: Length of ileus, need of total parenteral nutrition and hospital stay; demographic (age, sex, ASA) and intraoperative characteristics (duration, laparoscopy approach and fentanyl needed). Database included data from electronic medical records. Statistical analysis included Student's t test or Chi-square to compare both groups.
Results and Discussion: A total of 96 patients were included (37 patients Historical Group and 59 Prehabilitation-Multimodal Analgesia Group). There were no statistically significant differences between both groups regarding demographic or intraoperative characteristics. We found a decrease of postoperative ileus (65% of Historical Group vs 29% Prehabilitation-Multimodal Group), p<0.05. However, there were no statistically significant differences between Prehabilitation and Multimodal Analgesia group and Historical group regarding the duration of ileus (9,3±5,6 vs 9,5±4 days) and need of total parenteral nutrition (54% vs 42%). Length of hospital stay was shorter in Prehabilitation and Multimodal Analgesia group (11,9±8 days) than in the Historical group (16,7±9 days).
Conclusion: It is possible to decrease the incidence of postoperative ileus and length of hospital stay by implementing a prehabilitation program and the use of perioperative multimodal analgesia for rectal cancer surgery.

6308

Effect of analgesia nociception monitoring during general anesthesia with three different analgesia monitoring devices and clinical signs on remifentanil consumption and serum cortisol levels

Nitzschke R.[1], Pinnschmidt H. O.[1], Brinkmann C.[1], Wesseler S.[1], Funcke S.[1]
[1]University Medical Center Hamburg-Eppendorf - Hamburg (Germany)

Background and Goal of Study: In recent years, analgesia monitoring devices estimating the effect of analgesia during general anaesthesia from different physiological variables have become available. The present study determined the effect of remifentanil titration by 3 different analgesia monitoring devices or clinical signs on remifentanil consumption and serum level of the stress hormone cortisol.
Materials and Methods: After obtaining ethics review board approval and informed consent, 96 patients undergoing radical retropubic prostatectomy with propofol/remifentanil anaesthesia were randomized into 4 groups to receive remifentanil either guided by 1 of 3 analgesia monitoring devices (Surgical Pleth Index [SPI], Pupillary Pain Index [PPI], Nociception Level [NOL]) or by clinical judgment (Control). The primary end point was intraoperative remifentanil consumption. Stress hormones were measured at 4 time points during the day of surgery. Data were analyzed by ANOVA with adjustment for inhomogeneous group variances with Bonferroni-adjustment for six primary group comparisons, mixed model and area under the curve (AUC) analyses for group comparisons of stress hormones.
Results and Discussion: The total amount of remifentanil administration (µg/kg/minute) differed between the groups: Control = 0.34 [0.32-0.37], SPI = 0.46 [0.38-0.55], PPI = 0.07 [0.06-0.08], NOL = 0.16 [0.12-0.21] (mean [95%CI]). All pairwise group comparisons P < 0.001, except Control vs. SPI P = 0.048. The AUC analysis indicated differences among groups in cumulative cortisol levels (µg/liter·minute): Control = 37846 [33263- 43067], SPI = 38576 [33712- 44142], PPI = 72030 [63068-82265], NOL = 54336 [47515-62136] (mean [95%CI]). Pairwise group comparisons Control vs. SPI P = 0.840, Control vs. PPI P < 0.001, Control vs. NOL P < 0.001, SPI vs. PPI P < 0.001, SPI vs. NOL P = 0.001 and PPI vs. NOL P = 0.005.
Conclusion: The analgesia–nociception balance was differently reflected by the analgesia monitoring devices and led to different amounts of intraoperative remifentanil consumption. Groups with lower levels of opioids administered were associated with higher serum cortisol levels.

6346

The necessity of postoperative phospates monitoring in patient treated with i.v. iron preoperatively

Jumić A.[1], Lalić L.[1], Tripković M.[1], Divjak L. P.[1], Karmelic D.[1], Tomić Mahečić T.[1]
[1]University Hospital Centre Zagreb - Zagreb (Croatia)

Background and Goal of Study: Hypophosphatemia is defined as serum phosphate level below reference range of 0,79-1,42 mmol/L, but, in clinical practice, phospates are supplemented at levels below 0,65 mmol/L. In literature,hypophosphatemia occurs in about 25% (10-80%) of patients admitted to intensive care unit (ICU). Even moderate hypophosphatemia may impair diaphragmatic contractility, reduce left ventricular stroke work and can lead to insulin resistance. High dosage intravascular iron therapy can potentially cause hypophosphatemia. In our prehabilitation program for surgical patients in an anaemia clinic, patients receive intravenous iron therapy, and those who are at a high nutritional risk (nonvolatile weight loss more than 10% during last 6 months, BMI less than 18.5kg/m2, NRS 2002 score more than 5 and albumin levels less than 30 g/l) are instructed to take nutritional supplements for at least 2 weeks preoperatively.
Materials and Methods: We analysed retrospective data of heterogeneous cohort of consecutive critically ill adult patient in 2 weeks in ICU in UHC Zagreb and compared them to data of patients who were treated by intravenous iron before the surgery through our anaemia clinic.
Results and Discussion: Compared to consecutive ICU patients, where 13 %

patients had hypophosphatemia on their 0. postoperative day (but only 3,3% below 0,65 mmol/L), patients from prehabilitation program treated with iron supplementation had greater degree of hypophospatemia (44,4%, and 33% needed phospates supplementation), regardless of the i.v. formula of high dosage iron.
Conclusions: Phospate levels should be checked and corrected perioperatively in all patients receiving i.v. iron supplementation before the operation since they demonstrate hypophospatemia significantly more often then is baseline for the same population, despie nutritional supplementation.

6302

Complementing beta-blocker titration in the operating room - is it possible?

Capeto P.[1], Oliveira S.[2], Leal F.[2]
[1]Hospital Central Da Aeronáutica - Rio De Janeiro (Brazil),
[2]Hospital Central Da Aeronautica - Rio De Janeiro (Brazil)

Background: Cardiovascular complications (CC) are an important cause of morbidity and mortality after non-cardiac surgery. The use of peri-operative beta-blockers (BB) for cardiac protection is controversial1. The ESA guideline recommends considering pre-operative BB use in patients with ischemic heart disease, starting more than 1 day before surgery2. This report intends to present anaesthetic management with supplemental dose of BB in the operating room (OR) for a patient with previous use of BB but with heart rate (HR) above target.
Case report: SCBS, female, 83 y.o., 1.50 m, 80 kg, with hypertension, diabetes mellitus, dyslipidemia, coronary artery disease and dilated cardiomyopathy, was hospitalized for a parotidectomy due to a malignant tumor. She reported use of metformin, losartan, trimetazidine, isosorbide, bisoprolol, ASA, atorvastatin and cilostazol. Dyspnea and angina were present on small exertion. Cardiac catheterization showed a patent stent, 70% obstruction in anterior descending artery and total occlusion of the right coronary artery. Cardiology, Anaesthesiology and Surgical teams decided to perform the procedure in a class IV cardiac risk patient considering the underlying disease. In the OR, with an initial HR of 83 bpm and blood pressure (BP) at 140/90 mmHg, esmolol was started with 50 mcg.kg-1. min-1 for 15 min before anaesthetic induction (aiming a HR around 60 bpm), and raised until 100 mcg.kg-1.min-1 in some moments. Surgery and anaesthesia were uneventful. She was discharged one week after surgery.
Discussion: BB treatment should be adjusted before surgery to achieve a resting heart rate of 60-70 bpm with systolic BP above 100 mm Hg. In this case, despite previous use of BB, the optimization of HR was not achieved and the main goal of the anaesthesia team was to avoid tachycardia or hypotension. Starting BB during surgery is not supported by ESA guideline, but using intravenous (IV) complementation during surgery to tailor plasmatic concentration in a patient which previous BB use was not titrated may be of value.
References:
1. Wong SSC et al. Cardioprotection for non-cardiac surgery. Anaesthesia. 2016, 71 (Suppl. 1), 29-39.
2. Kristensen S et al. 2014 ESC/ESA Guidelines on non-cardiac surgery: cardiovascular assessment and management. Eur J Anaesthesiol. 2014;31(10):517-73.
Learning points: HR control with BB is essential to prevent CC; Use of IV BB as complementation during surgery may be a strategy to adjust previous treatment.

6162

Implication of residual neuromuscular blockade on the quality of recovery after anaesthesia and surgery

Fernandes A. L.[1], Lopes M.[1], Mendonça M.[1], Costa D.[1], Zenha S.[1], Freitas S.[1]
[1]Hospital Central do Funchal - Funchal (Portugal)

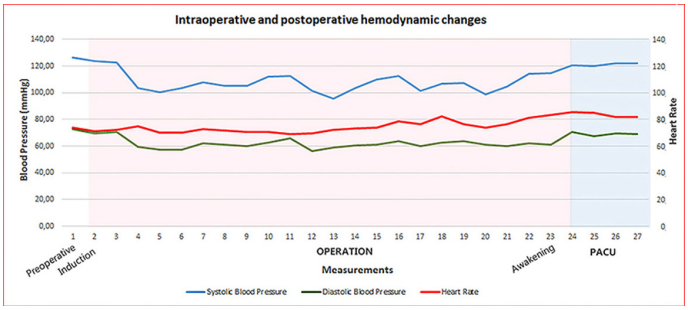
Background and Goal of Study: Residual neuromuscular blockade (RNMB) is a well-known postoperative complication associated with the use of neuromuscular blocking agents, and causative of potential life-threatening events1. The Quality of Recovery 15 (QoR-15) questionnaire is a validated, patient-reported form of evaluating the quality of recovery in patients who underwent anaesthesia and surgery2. QoR-15 evaluates 5 dimensions of health: patient psychological support, physical comfort, emotional state, physical independence and pain2. The aim of this study was to assess the incidence of postoperative RNMB and its association with poorer quality of recovery.
Materials and Methods: After approval of the ethics committee, a prospective study was undertaken in 52 consenting adult patients who underwent scheduled surgery. The occurrence of RNMB was defined as an average train-of-four ratio (aTOFr)<0.9 after three measurements in the post-anaesthetic care unit (PACU), and quality of recovery was assessed using the QoR-15, recorded 24h after surgery. After dividing the population into two groups according to the aTOFr and RNMB diagnostic, differences in the quality of recovery were assessed.
Results and Discussion: The overall incidence of postoperative RNMB was 16.3%. The median QoR-15 score recorded was 125,5. There were no significant differences recorded in the QoR-15 scores between the two subgroups (aTOFr ≥ 0.9; aTOFr < 0.9; p=0.859). Regarding the different dimensions evaluated by the QoR-15 questionnaire, the medians recorded between the aTOFr≥0.9 and the aTOFr<0.9, respectively, were as follows: psychological support 8.5 vs. 10, physical comfort 9 vs. 8, emotional state 8.5 vs. 10, physical independence 7 vs. 7 and pain 8.5 vs. 9. No statistically significant differences were recorded within the dimensions.
Conclusion: RNMB occurred in 16.3% of the patients studied. Even though literature shows a greater incidence of complications in this population1 and an inferior quality of recovery, we could not demonstrate such an association, as evaluated by the QoR-15 questionnaire, in the studied population.
References:
1. Hunter JM. Reversal of residual neuromuscular block: complications associated with perioperative management of muscle relaxation. BJ Anaesth 2017. 119. I53-62.
2. Stark PA et al. Development and psychometric evaluation of a postoperative quality of recovery score – The QoR-15. Anesthesiol 2013. 118. 1332-40.

5207

Efficacy and safety of Opioid Free Anaesthesia in total laryngectomy: a case series

Gravia E.[1], Andreeva A.[2], Makrypodi M.[2], Devadze G.[2], Vavoura A.[2], Dimakopoulou A.[2]
[1]General Hospital of Athens "G. Gennimatas" Greece - Athens (Greece),
[2]General Hospital of Athens "G. Gennimatas" - Athens (Greece)

Background and Goal of Study: Opioids have played a crucial role in the evolution of anaesthesia. However, questions have been raised concerning their use, especially in high risk patients. To this context, we evaluated the efficacy of Opioid Free Anaesthesia (OFA) in a case series of total laryngectomy patients and its effect on hemodynamics and postoperative recovery.
Materials and Methods: 7 patients undergoing total laryngectomy from July till November 2019 were enrolled. After an initial bolus dose of dexmedetomidine 0.4μg/kg, induction of anesthesia was performed with Mullimix solution (50μg dexmedetomidine, 500mg lidocaine and 50mg ketamine in 100ml N/S 0.9%) at a loading dose of 0.2ml/kg, propofol 2mg/kg and rocuronium 0.9mg/kg. Maintenance was achieved with mixture of desflurane/O2/air and continuous infusion Mullimix at 0.2ml/kg/h. Ondansetron 4mg, dexamethasone 8mg, droperidol 0.625mg, paracetamol 1g, parecoxib 40mg and MgSO4 40mg/kg were given. At the end, the incision was infiltrated with 20ml ropivacaine 0.375%, Mullimix rate was reduced at half and the infusion continued in PACU for 30min. Postoperatively, patients received ondansetron 8mg/24h, parecoxib 80mg/24h and paracetamol 3g/24h. Tramadol or morphine were administrated if VAS score>4 and metoclopramide in case of vomiting. Intraoperative hemodynamics and SpO2 and postoperative VAS score, patient's satisfaction score and extra medication demand were recorded.
Results and Discussion: 7 ASA II-III patients were studied (mean age 63.67±9.30 years, all male). Mean operative and Mullimix infusion time were 9.04±1.22 and 10.08±1.20 hours, respectively. Intraoperative hemodynamics remained stable (Fig 1) and SpO2 in normal levels. Mean VAS and satisfaction scores varied between 3.33 and 8.33 at awakening and 1.33 and 10 at 48h. Tramadol was given in 2 patients in PACU for VAS scores of 5. No nausea, vomiting or disturbing dreams were recorded. Mild oliguria was noted in all patients.
Conclusion: OFA provided a high level of perioperative analgesia in total laryngectomy, without totally excluding the need for opioids. Randomized trials are needed to further evaluate our findings.



4929

An investigation of the associations between epidural fentanyl consumption and oncologic outcomes of lung cancer after surgical resection

Chiou C. S.[1], Wu H. L.[2], Tai Y. H.[3], Chang K. Y.[2]
[1]*China Medical University Hospital - Taichung (Taiwan),*
[2]*Taipei Veterans General Hospital - Taipei (Taiwan),*
[3]*Shuang Ho Hospital - Taipei (Taiwan)*

Background and Goal of Study: The effect of epidural anesthesia and analgesia (EA) on recurrence of miscellaneous cancers after surgical resection remains controversial and the combination of epidural local anesthetics and opioids may offset the potential benefits of EA to outcomes after cancer surgery. This study aimed to investigate whether the amount of fentanyl used for EA was associated with recurrence and overall survival after surgery for non-small cell lung cancer (NSCLC) and explore influential factors of EA consumption.
Materials and Methods: We conducted this retrospective study to collect patients with stage I-III NSCLC undergoing primary tumor resection and postoperative patient-controlled EA in a tertiary medical center in Taiwan between 2011 and 2015. All patients received a solution of 0.1% bupivacaine with 1 ug/ml fentanyl for EA and the total amounts of EA consumption and epidural fentanyl dose were retrieved from the electronic medical recording system. Patient characteristics, surgical features and pathological findings were collected as well. Cox regression analysis was performed to evaluate the effect of epidural fentanyl dose on recurrence-free and overall survival. Restricted cubic spline functions were also applied to examine potentially non-linear effect. Linear regression analysis with a stepwise model selection strategy was employed to identify influential factors of the amount of EA consumption.
Results and Discussion: A total of 860 patients were included in the analysis and the mean epidural fentanyl consumption during the three-day course was 426.7 ug. No significant association was demonstrated between epidural fentanyl consumption and disease-free ($p = 0.58$) or overall survival ($p = 0.32$). Restricted cubic spline analysis did not find and non-linear dose-response effect either. Six independent factors were identify to affec EA consumption, including body weight ($p < 0.0001$), age ($p = 0.001$), anesthesia time ($p = 0.007$), history of stroke ($p = 0.01$), postoperative chemotherapy ($p = 0.015$), and sex ($p = 0.018$).
Conclusion: In the context of patient-controlled EA, epidural fentanyl consumption was not related to cancer recurrence or overall survival in patients receiving surgery for NSCLC. Judicious use of epidural fentanyl to improve analgesic quality could still be considered in these patients.

4700

Effect of intraoperative magnesium on postoperative RASS score after endovascular repair of aortic aneurysm: a preliminary randomized controlled trial

Joko R.[1], Fujita Y.[2], Kanamori H.[2], Hashimoto A.[2], Sato Y.[2], Fujiwara Y.[2]
[1]*Aichi Medical University Hospital - Nagakute, Aichi (Japan),*
[2]*Aichimedicaluniversity - Nagakute (Japan)*

Background and Goal of Study: Intraoperative magnesium has the effect of reducing postoperative opiate requirement1 and pain2, and recently was also reported to decrease postoperative agitation3. Given that its effect on postoperative sedation and delirium is unclear, we investigated its effect on the postoperative Richmond Agitation-Sedation Scale(RASS) score and delirium.
Materials and Methods: The study was approved by the Institutional Review Board and registered at the Japan Registry of Clinical Trials(JRCTs041190013). Written informed consent was obtained from all patients. Forty-five consecutive patients diagnosed with abdominal(33) and thoracic(12) aortic aneurysm who underwent endovascular repair of aortic aneurysm under general anesthesia were eligible. Patients were allocated randomly to the magnesium group (magnesium infusion of 30mgkg-1 in the first hour followed by 10mgkg-1h-1 until the end of surgical procedure) or the control group(0.9% saline at the same volume and rate). Primary outcome was difference in postoperative RASS score between the two groups. Secondary outcomes were incidence of delirium(Confusion Assessment Methods for the Intensive Care Unit: CAM-ICU), analgesia score (numerical rating scale; NRS), use of analgesic drugs, and ICU stay.
Results and Discussion: At ICU admission, magnesium had not significantly reduced the RASS score (0[0, 0]vs0[0, 0];P=0.136), but the NRS score was statistically different, 0[0, 3] vs 3[0.5, 6.5](P=0.048). However, other data (RASS score, NRS score, CAM-ICU at 0, 1, 6, 12, and 24h and length of ICU stay) did not show a significant difference. Measured ionized magnesium was significantly different (0.68±0.08 vs 0.53±0.156 mmol/L, P=0.0001). During the observational period, no adverse events caused by magnesium infusion were recorded.
Conclusion: In this preliminary study, we could not show that magnesium reduces postoperative RASS score and delirium. We suspect one of the reasons to be the rare incidence of RASS score >0.
References:
1. Steinlechner B, et al. Br J Anesth 2006; 96:444-9.
2. Shin HJ et al. Br J Anesth 2016; 117: 497-503.
3. Hazem EE, et al. Eur J Anesth 2017;34:658-64.

4441

New insights for screening of etomidate analogues in the human H295R cell model

Deng C.[1], Gong D.[1], Yang J.[1], Ke B.[1], Liu J.[1], Zhang W.[1]
[1]*West China Hospital, Sichuan University - Chengdu (China)*

Background and Goal of Study: Etomidate is a sedative hypnotic with excellent pharmacological effect, like rapid onset and hemodynamic stability. However, it has adrenocortical toxicity for binding to 11β-hydroxylase. Therefore, it is urgent to develop an approach for screening new etomidate analogues without endocrine disrupting. Here, the objective of this study was to better define the relationship between etomidate analogues and its adrenocortical inhibitory potency in vitro.
Materials and Methods: In our study, the adrenocortical tumor cell line NCI-H295R was used as an in vitro system for etomidate analogues screening and the values of hormone in cells was detected by a HPLC-MS/MS-based method.
Results and Discussion: The H295R cell line, as a screening tool can be used to analyze the adrenocortical toxicity of etomidate analogue. Then dose-response curves of hormone release and the concentration of the individual compounds were obtained. Besides “Adrenocortical Inhibitory index” was used for the evaluation of the adrenocortical inhibitory potency of each test drug, which may be used as a preliminary evaluation criteria for adrenocortical suppression. As we all know, etomidate bind with high affinity to 11β-hydroxylase, inhibiting the synthesis of adrenocortical steroids, which may considered as “off-target” affinities. Such incidents keep cropping up in both pre-clinical trials and clinical performance during drug development. To address the problems, there gradually rises a consensus that combining in vitro pharmacological profiling with traditional safety pharmacology, can make a positive influence on the success rates of first-in-human studies.
Conclusion: It would be beneficial to use the developed methods to screening etomidate analogues without suppressing adrenocortical function, especially when we combine in vitro system with in vivo animal tests.

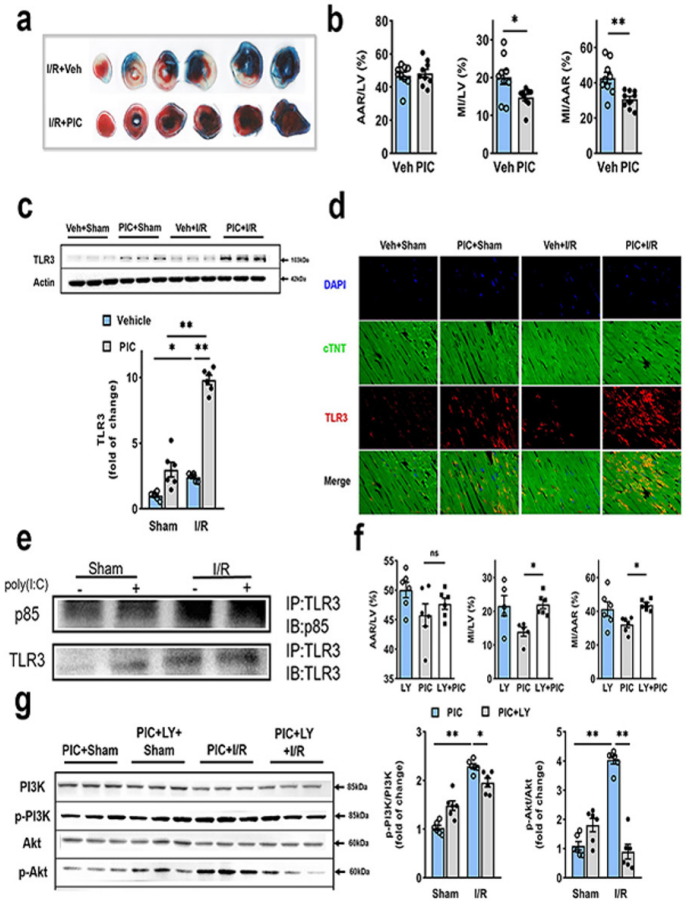
5333

Poly(I:C) preconditioning redirects TLR3 via PI3K/Akt in mediating tolerance to myocardial ischemia/reperfusion injury

Chen E.[1], Gao R.[1], Gan L.[1], Liu J.[1], Zhu T.[1], Chen C.[1]
[1]*West China Hospital, Sichuan University - Chengdu (China)*

Background and Goal of Study: Small doses of Toll-like receptors (TLRs) ligands preconditioning have been implicated in inducing significant cardioprotection against ischemia/reperfusion (I/R) injury. The TLR4 and TLR2 ligand preconditioning are associated with the activation of PI3K/Akt signaling pathway. The crosstalk between PI3K/Akt and TLR signaling pathway is considered to be a modulation target that could confer cardioprotection from I/R injury. The objective of this study was to establish whether prophylactic lacpharmalogical activation of TLR3 would render the heart resistant to I/R injury and thus limit myocardial infarct size.
Materials and Methods: Models of myocardial I/R injury: C57BL/6 mice were subjected to a temporary ligation of left anterior descending coronary artery for 45 minutes, followed by 24 hours reperfusion. Detection of TLR3 expression and translocation: Western blotting and were used to detect expression of TLR3, along with immunofluorescence staining. Connection between TLR3 and PI3K/Akt proteins: The expression of phosphrylation of PI3K and Akt was deteced with Western blotting. The immunoprecipitation of TLR3 and p85 PI3K in vivo and in vitro were tested, and the inhibitor of PI3K, LY294002, were administered together with poly(I:C) before the myocardial I/R insult. Statistical analysis: Group mean values (two groups) comparison were carried out by two-unpaired Student’s t-test. Multiple groups were compared using one-way ANOVA with Bonferroni post hoc analysis. *P <0.05; **P <0.01.
Results and Discussion: Poly(I:C) pre-treated mice significantly reduced infarct size (Fig.1a, b). Moreover, administration of poly(I:C) was associated with increased expression of TLR3 in vivo and in vitro (Fig.1c, d). Further, the association of TLR3 with the p85 subunit of PI3K were increased (Fig.1e). When the PI3K inhibitor, LY294002, was administered 15 min before myocardial I/R, the protective effect

induced by poly(I:C) was abolished (Fig.1f, g).
Conclusion: These results demonstrate that the poly(I:C) preconditioning yeild a significant infarct-sparing effect, which is mediated through the TLR3/PI3K/Akt-depedent signaling pathway.



5052

Health-related quality of life (HRQoL) questionnaire implementation in enhanced recovery after elective laparoscopic colorectal surgery (ERAS) protocol. Interim results comparing two different types of anesthesia

Kontrimaviciute E.[1], Jankuviene A.[1], Kolevinskaite S.[1], Baltruskeviciute L.[2], Bubulis D.[2], Poskus T.[1]
[1]Institute of Clinical Medicine, Faculty of Medicine, Vilnius University - Vilnius (Lithuania), [2]Vilnius University, Faculty of Medicine - Vilnius (Lithuania)

Background and Goal of Study: ERAS protocols were designed to reduce perioperative stress and accelerate postoperative recovery and HRQoL. The most widely used preference-based EQ-5D-5L questionnaire (EQ-5D-5L-Q) is used to assess patients' post-operative wellbeing, ability to perform routine activities and mobilization. The main aim of this study is to evaluate and compare satisfaction and HRQoL for consecutive patients undergoing laparoscopic colorectal surgery with two different types of anesthesia using a standardized EQ-5D-5L-Q.
Materials and Methods: After approval of the Medical Ethical Committee the prospective randomized study during January-October of 2019 period was performed. The study was registered in ClinicalTrials.gov (NCT04091815).Patients were divided into two groups according to anesthesia types – general anesthesia (group 1,N19) and combined (spinal with intrathecal morphine 0,1mg and general) anesthesia (group 2,N17). Multimodal analgesia protocol was applied using NSAIDS (Paracetamol and Diclofenac) for 2 days. Standardized EQ-5D-5L-Q (5 questions,1-5 points' value each), wellbeing (0-100%) assessment was performed:1 day before surgery,1 week,1 month after surgery. All variable data were analyzed using SPSS version 23.0. Student t and Mann-Whitney U tests were used.
Results and Discussion: 36 patients were included in the final analysis (19 women;17 men). The mean age was 64.61±3.90 years. The two groups were homogeneous. Patients' wellbeing 1 day before surgery was significantly better in group 2 (80.00% vs 90.00%, p0.035).Duration of surgery (2.54h vs 2.99h, p0.50), anesthesia (3.30h vs 3.86h,p 0.50) and length of hospital stay (LOS) (9 vs 8 days,p 0.31) did not differ between groups. There was no difference in pain intensity between both groups in the early postoperative period (p>0.05). No difference concerning patients' wellbeing 1 week (80.00% vs 70.00%, p0.72),1 month (78.94%±9.94 vs 73.23%±14.88,p 0.14) after surgery were registered between groups). HRQoL evaluation using EQ-5D-5L-Q 1 week after and 1 month after revealed no difference between two groups (p>0,05).
Conclusions: There is no significant difference in short-term results (1 week,1 month after surgery) using ERAS in colorectal surgery of HRQoL evaluated with EQ-5D-5L-Q between two different types of anesthesia. The study is in process and further data analysis and inclusion of a larger patient group are needed to confirm findings and to reduce the chances of discovery failure.

5111

Asymptomatic hyperCKaemia? Preanaesthetic finding of uncertain susceptibility to Malignant Hyperthermia (MH)

Vilchez Monge A. L.[1], Tijero Paramo M. T.[1], De Vicente Martin M.[1], Arteche Lopez A.[2], Silva Villar L.[1], De La Quintana Jimenez B.[1]
[1]Hospital Universitario Santa Cristina - Madrid (Spain), [2]Hospital Universitario Doce de Octubre - Madrid (Spain)

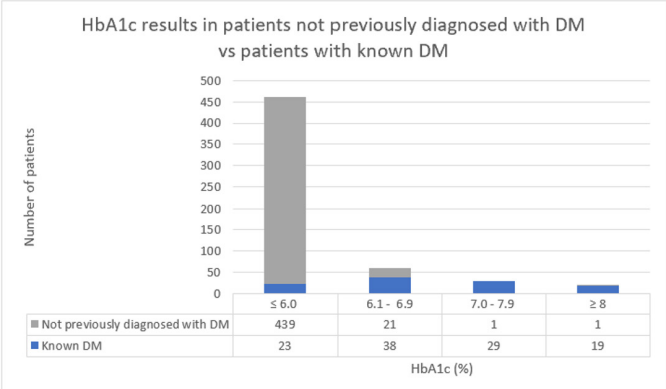
Background: MH-related morbimortality is preventable and elevated CK may be the only alarm sign in susceptible patients. However, importance of preanaesthetic assessment and complementary tests in ASA I patients for elective ambulatory surgery is underestimated.
Case Report: A 20-y.o. patient undergoing preanaesthetic assessment for elective circumcision refers a history of elevated CK since the age of 2, and recurrent syncope thoroughly studied during infancy and adolescence (normal EEG, EMG, cerebral MRI, ECG Holter, echocardiogram and ECG). Discharged after a single normal CK result at 18 years of age diagnosed with recurrent vasovagal syncope and unexplained hyperCKaemia. No family history regarding general anaesthesia. A new preanaesthetic test shows elevated CK value of 518 U/L [reference interval 30-200 U/L] so the patient is referred for a genetic study of RYR1 gene revealing heterozygous c.7025A>G (p.N2342S), a genetic variant of uncertain clinical significance.
Discussion: RYR1 mutations are associated with MH in up to 86% of cases. Mutations reflect structural or functional alterations of the ryanodine receptor but do not provide information on their clinical effect. Uncertainty regarding these genetic variations requires further investigation. This mutation has only been reported in a few cases, some associated with MH, not allowing to exclude or confirm pathogenicity. Since association with recurrent syncope in our patient cannot be excluded, further evidence is needed. We report this case to highlight the importance of preanaesthetic assessment considering many medical specialists are often unaware of potentially life-threatening anaesthetic complications. Investigation of MH susceptibility is required in idiopathic hyperCKaemia where other causes have been excluded. However, a degree of clinical suspicion is needed to look for this phenomenon. Following existing guidelines might have resulted in earlier identification of potential MH susceptibility (1). Communicating genetic findings and sentinel cases is needed to generate data enabling future classification of mutations as pathogenic (2).
References:
1. European MH Group Guidelines. BJA 2015 115(4):531-9.
2. www.EMHG.org.
Learning points: Thorough preanaesthetic assessment including childhood past medical history is of key importance in all patients. Improved awareness regarding anaesthetic-related events among other medical specialists could allow earlier identification of MH susceptibility.

5080

Prevalence of undiagnosed and poorly controlled diabetes mellitus among elective non-cardiac surgical patients

Sia I.[1], Gui C. H.[1], Chong B.[1], Ke Y.[2], Lim W. Y.[2], Abdullah H. R.[2]
[1]Yong Loo Lin School of Medicine, National University of Singapore - Singapore (Singapore), [2]Department of Anaesthesiology and Perioperative Medicine, Singapore General Hospital - Singapore (Singapore)

Background: Type 2 Diabetes Mellitus (DM) is a major comorbidity affecting more than 11% of the Singapore population and is expected to increase in the next decade. Recently, local clinical practice guidelines approved the use of HbA1c as an alternative screening test for DM. HbA1c ≥7.0% is used to diagnose DM directly, while HbA1c 6.1-6.9% required further tests with FPG or OGTT where DM can be diagnosed if either FPG ≥7.0 mmol/L or OGTT ≥11.1 mmol/L or pre-diabetes if FPG 6.1-6.9 mmol/L or OGTT 7.8-11.0 mmol/L. HbA1c also offers a more convenient and acceptable form of DM screening. Currently, the epidemiology of DM among surgical patients in Singapore is unknown. DM increases the risk of microvascular and macrovascular complications which impact surgical outcomes. Furthermore, the perioperative period is an effective "teachable moment" for the control of chronic diseases. We aim to determine the prevalence of undiagnosed and poorly controlled DM among surgical patients to establish the utility of the Preoperative Assessment Centre (PAC) for DM screening and intervention.
Methods: We conducted a prospective observational study at the PAC in a Singapore tertiary hospital. Adult surgical patients (excluding cardiac surgery) scheduled for routine preoperative blood tests were recruited. We performed HbA1c screening to assess the prevalence of patients at risk of pre-diabetes (HbA1c ≥6.1%), diabetes mellitus (HbA1c ≥7.0%) and poorly controlled DM (HbA1c ≥8.0%).
Results: A total of 549 patients were recruited. The median age was 57 (IQR 42-67) and 49.6% were males. The overall prevalence of HbA1c ≥ 6.1% and ≥ 7.0% was 19.85% and 9.11% respectively. Out of 109 (19.85%) pre-existing DM patients, 19 (17.43%) had poorly controlled DM. Of those not diagnosed with DM, 21 (3.83%) had HbA1c ≥6.1% and 2 had newly diagnosed DM (HbA1c ≥7.0%).



Conclusion: There is a high prevalence of undiagnosed and poorly controlled DM among elective surgical patients. Cohort screening of DM may be appropriate for selected surgical patients during their visit to the PAC. Further studies are needed to determine if preoperative interventions are effective in improving glycaemic control.

5212

Improving the accurate use of the American Society of Anesthesiologists physical status classification system

Dias L.[1], Dykes N.[1]
[1]Royal Liverpool and Broadgreen University Hospitals NHS Trust - Liverpool (United Kingdom)

Background and Goal of Study: The American Society of Anesthesiologists physical status (ASA) classification system was updated in 2014 [1] with new examples included for the first time. Previous studies have questioned the inter-rater reliability of ASA grading and found it has moderate to poor inter-rater reliability, which has been attributed to the system's inherent subjectivity [2]. The inclusion of examples adds objectivity. A retrospective audit was conducted to assess compliance with the updated ASA classification system and then an action plan instituted to improve its accurate use.
Materials and Methods: A retrospective audit to assess compliance with the updated 2014 ASA classification system was conducted at the Royal Liverpool and Broadgreen University Hospitals NHS Trust in England. All operations involving general anaesthesia between 02/07/2018 and 08/07/2018 were included. The ASA grade allocated by the anaesthetist was reviewed against the objective criteria in the updated classification system.
Results and Discussion: A total of 264 cases were assessed. Out of these cases 88% (n=232) were compliant with the updated classification system. However, 12% (n=32) were not compliant. 10.5% (n=28) were assigned to an ASA grade 1 class different and 1.5% (n=4) to an ASA grade 2 classes different. An educational session was delivered where anaesthetists took a test before and after the session consisting of 10 hypothetical patients they were asked to grade. The teaching session improved the average score from 4 to 9 out to 10. A subsequent audit assessing the accuracy of 55 ASA grades given to patients undergoing general anaesthesia between 24/06/2019 and 25/06/2019 found 95% (n=52) of cases were compliant with only 5% (n=3) assigned to an ASA grade 1 class different.
Conclusion: Use of ASA is a standard component of anaesthetic assessment worldwide. It is used to guide preoperative investigations and importantly in risk scoring models allowing shared decision making [2]. Accurately grading patients is therefore important for the provision of quality care.
References:
1. American Society of Anesthesiologists physical status classification system. 2014. [online]. Available from: https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system.
2. Sankar A, Johnson SR, Beattie WS, et al. Reliability of the American Society of Anesthesiologists physical status scale in clinical practice. Br J Anaesth 2014; 113(3): 424–32.

6081

Anescardiocat as a predictor of Major Cardiac and Cerebrovascular Events in multilevel spinal surgery patients

Romero I.[1], Román L.[1], Vilà E.[1], Mases A.[1], Núñez M.[1], Rodríguez U.[1]
[1]Department of Anaesthesia and Intensive Care Medicine, Hospital del Mar - Barcelona (Spain)

Background: Multilevel spinal surgery is associated with important blood loss, potentially contributing to Major Adverse Cardiovascular and Cerebrovascular Events (MACCE). ANESCARDIOCAT score considers intraoperative transfusion and hypotension as independent risk factors for MACCE1.
Goal of the study: To evaluate ANESCARDIOCAT score as a predictor of MACCE in Major Spinal Surgery.
Materials and Methods: We retrospectively analysed data obtained from electronic medical records of patients that underwent scheduled multilevel spinal surgery (3 or more levels) in Parc de Salut Mar between Jun 2017 and Jun 2019. We collected demographic data, preoperative cardiovascular risk factors and data related to surgery. Dependent variables were the occurrence of any MACCE (myocardial infarction, myocardial injury, angina, stroke/TIA, cardiac arrest, acute heart failure and new onset arrhythmias) as well as global mortality until hospital discharge. We also analysed if perioperative transfusion was related to MACCE. A chi-squared test was used to determine the relationship between ANESCARDIOCAT score and MACCE.
Results and Discussion: A total of 91 patients were included, mean age 67.9 years. Prevalence of ANESCARDIOCAT risk factors: 3.3% cerebrovascular disease, 14% coronary artery disease, 18.5% abnormal ECG, 6.5% kidney disease, 24% intraoperative transfusion and 49% intraoperative hypotension. Anescardiocat score was 0 for 26 patients (28.3%), 1 for 28 patients (28.3%), 2 for 24 patients (26.1%) and 3 for 15 patients (16.3%). Intraoperative mean blood loss was 868 mL and 28 patients (30,4%) received postoperative blood transfusion. MACCE incidence was 16% (15 patients). Most frequent MACCE were non-fatal cardiac arrest (9.9%) and myocardial injury (MINS) (9.9%). MACCEs were more prevalent in patients requiring transfusion (p=0.02) and with higher ANESCARDIOCAT score (p=0.0004).
Conclusion: According to our results, multilevel spinal surgery is associated with a high prevalence of perioperative cardiovascular events. Higher Anescardiocat score and perioperative transfusion could help to identify patients at risk of MACCE.
References:
1. Sabaté S et al. Incidence and predictors of major perioperative adverse cardiac and cerebrovascular events in non-cardiac surgery. BJA 2011;107(6):879-890. doi: https://doi.org/10.1093/bja/aer268.

5178

Use of myocardial perfusion imaging in bariatric surgery patients

Gillott H.[1], Panteliou E.[2], Thorat P.[3], Schwiebert C.[3], Davies C.[1], Coppack S.[2]
[1]Barts Health NHS Trust - London (United Kingdom), [2]Barts and The London School of Medicine - London (United Kingdom), [3]Homerton University Hospital NHS Foundation Trust - London (United Kingdom)

Background: Bariatric surgery is the most effective treatment for morbid obesity, with increasing numbers reported as the burden of obesity increases. A significant proportion of this population have very poor exercise tolerance, making it difficult to evaluate their cardiovascular function with significant risk factors for cardiovascular disease being common. There are currently no guidelines or consensus for preoperative cardiovascular assessment and risk stratification beyond a 12-lead ECG.
Materials and Methods: We report our experience using myocardial perfusion imaging (MPI) to assess subclinical myocardial ischaemia in poorly mobile, high-risk patients. We identified a cohort of 100 patients who had a myocardial perfusion imaging for pre-operative evaluation during a 2 year period (Jun 2016 – Jun 2018). Patients had MPI if they were poorly mobile (<4 METS), had exertional dyspnoea, additional risk factors (e.g. diabetes, hypertension, smoking) and minor changes on resting ECG.
Results: 71 MPI scans were reassuring and 29 had inducible ischaemia. These 29 patients underwent further cardiac investigations i.e coronary angiogram or CT angiography. Significant stenoses were found in 11 patients and 3 had interventional revascularisation. Widespread atheromatous disease with no target lesions for revascularisation was the most common finding. Four patients were considered too high risk for surgery; the rest were optimised with medical therapy with subsequent uneventful surgery.
Discussion and Conclusion: Overall our cohort study suggests that previously unrecognised atherosclerosis of the coronary vasculature, of clinical relevance, is not uncommon in the high-risk bariatric patients, warranting either coronary revascularisation (~3%), cancelling of operations (~4%) or medical optimisation (~10%). MPI can be a useful, accessible, non-invasive and effective way of screening this population and can help to guide further management.

5252

Hand grip strength predicts postoperative day 1 mobility following Total Knee Arthroplasty

Sim Y. E.[1], Tan P. Y. B.[1], Chew E. S.[1], Pua Y. H.[1], Thin T. N.[1], Abdullah H. R.[1]
[1]Singapore General Hospital - Singapore (Singapore)

Background: Handgrip strength (HGS) is a simple, quick bedside assessment that correlates with a patient's physical fitness and frailty. HGS is an independent predictor of prolonged postoperative length of stay (LOS) in other surgeries, but its utility in total knee arthroplasty (TKA) has not been established. Early postoperative mobility is one of the key determinants for suitability for outpatient or short-stay TKA.
Questions/purposes: (1) What are the factors associated with a low HGS? (2) Is there an association between HGS and short-term outcomes such as mobilization on postoperative day 1 (POD1), hospital LOS and discharge destination?
Methods: This is a single-centre, prospective observational study. 385 patients undergoing elective total knee arthroplasty (TKA) were recruited. Preoperative HGS, demographic data, comorbidities, postoperative LOS, discharge destination and physiotherapy outcomes were recorded. Spearman correlation was performed to assess the correlation between HGS and demographic data. Mobility on POD1 was ranked in an ordinal likert scale from 1 to 10, with 1 being the best and 10 the worst, based on the gait aids and level of physiotherapist assistance required. HGS was categorized into gender-based quartiles. Multivariable logistic regression was performed to identify factors associated with better mobility (within the best mobility-rank quartile) on POD1, discharge to step-down facilities and hospital LOS ≤ 3 days (best quartile).
Results and Discussion: Majority of patients were discharged home (75.3%). Compared to patients in the lowest gender-based HGS quartile, patients in higher quartiles had higher odds of better mobility on POD1 (adjusted odds ratio (aOR) 2.4 - 3.5, P = 0.002 - 0.02). Patients with the best preoperative handgrip strength quartile had twice the odds (aOR 2.3, P = 0.01) of having a shorter hospital LOS (≤ 3 days), compared to patients in the lowest quartile. HGS was not independently associated with discharge to step down facilities. Taller, heavier, male patients were more likely to have higher HGS.
Conclusion: Preoperative HGS may be useful in predicting patients with better mobility on POD1 and shorter LOS after primary TKA.

5428

Systematic review of management and outcomes of perioperative myocardial ischaemia after non-cardiac surgery

Kong C. Y.[1], Kourounis G.[2], Glen P.[1]
[1]University Of Glasgow - Glasgow (United Kingdom), [2]University Of Edinburgh - Edinburgh (United Kingdom)

Background and Goal of Study: Perioperative myocardial ischaemia (PMI) remains an important determinant of morbidity and mortality after non-cardiac surgery. There exists data that PMI is distinct from non-surgical myocardial infarction (MI) in terms of clinical and pathophysiological characteristics. Current PMI management is extrapolated from the management of non-surgical MI despite these differences. There is a strong need to systematically appraise current available evidence for the outcomes of PMI.
Materials and Methods: A systematic review was performed and reported in accordance with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Briefly, Embase, Medline and Cochrane Library were systematically searched using a predefined search strategy including any English language studies reporting PMI management strategies and associated outcomes. A narrative review is reported themed around PMI management and its outcomes.
Results and Discussion: One randomised controlled trial, 19 observational studies and 39 case series/reports were included in this systematic review. These studies were generally had a high risk of bias. Multiple PMI management modalities were reported and/or compared. Nine studies reported comparative outcomes. Two studies reported comparative bleeding outcomes. Different single or combined management modalities were compared in these studies. The case series/reports highlight a wide variability in PMI diagnosis and management modalities.
Conclusion: There is a lack of evidence on PMI management and its associated outcomes. Where available, its interpretation is limited by bias. The high variability of its current management in real-world clinical practice reflects this. Further high-quality evidence is required to clarify this important and common clinical problem.

5349

Validation of current risk indexes for prediction of cardiac and cerebrovascular events (MACCE) and myocardial injury (MINS) in a risk population in non-cardiac surgery

Mases A.[1], Bosch L.[1], Gallart L.[1], Sabaté S.[2], Alonso E.[1], Beltrán De Heredia S.[1]
[1]Parc de Salut Mar - Barcelona (Spain), [2]Fundació Puigvert - Barcelona (Spain)

Background and Goal of Study: Myocardial injury in non-cardiac surgery (MINS) is a new entity with short and long term prognostic implications. Several risk prediction scores for perioperative cardiovascular events have been described, some of them before the era of new cardiac biomarkers. The aim of the study was to validate current risk indexes for prediction of MACCE and its efficacy for prediction of MINS in a high-risk population.
Materials and Methods: Prospective, single centre cohort study (MINSMAR study) recruiting patients from May 2017 to May 2019. Eligible subjects were patients 45 years or older undergoing non-cardiac surgery: 1) high cardiac risk surgical procedures or 2) intermediate cardiac risk procedures in patients with clinical risk factors. All surgeries were elective and under general and/or neuraxial anaesthesia. Patients had Troponin T (TnT) surveillance: baseline (after anaesthesia induction), and postoperatively at 3 hours, 1st, 2nd and 3rd day. Dependent variables were MINS and any MACCE until 30th postoperative day. MINS was defined as at least a TnT value ≥ 30ng/L with a rise and/or fall +/- 20% regarding the baseline. We validated the Revised Cardiac Risk Index (RCRI), National Surgical Quality Improvement Program for Myocardial Infarction and Cardiac Arrest Calculator (NSQIP-MICA), ANESCARDIOCAT score and the Surgical Apgar Score (SAS). C-statistic was calculated for each score.
Results and Discussion: We recruited 746 patients, aged 72 (IQR 64-78) years, being 67% male. Patient comorbidities were: coronary artery disease 25%, heart failure 11%, diabetes with treatment 38%, peripheral artery disease 37%, previous stroke/TIA 18%, chronic kidney disease 23%. MACCE occurred in 78 patients (10.6%) and all- cause mortality was 2.6%. MINS occurred in 154 patients (20.6%). Results are shown in table.

Discriminative performance for each score in relation to MACCE, MINS and MACCE plus MINS.

SCORE	MACCE		MINS		MACCE + MINS	
	c-statistic (95% CI)	P	c-statistic (95% CI)	P	c-statistic (95% CI)	P
RCRI	0.52 (0.45 - 0.59)	0.519	0.58 (0.52-0.63)	0.003	0.57 (0.52-0.62)	0.003
NSQIP-MICA	0.65 (0.59 - 0.71)	<0.001	0.68 (0.63-0.72)	<0.001	0.68 (0.63-0.72)	<0.001
SAS	0.55 (0.48 - 0.63)	0.100	0.55 (0.49–0.59)	0.127	0.54 (0.49-0.59)	0.091
ANESCARDIOCAT	0.56 (0.49 - 0.63)	0.066	0.63 (0.58-0.69)	<0.001	0.63 (0.58-0.67)	<0.001

Conclusion: Although NSQIP-MICA showed the best predictive performance in our at-risk population, c-statistics showed only moderate discriminative ability. A new risk index is needed to better stratify cardiac risk patients and those who need troponin surveillance.

5254

Preoperative transthoracic echocardiography predictive analytics using machine learning for postinduction hypotension prediction

Yoshimura M.[1], Morimoto Y.[1]
[1]Ube Industrial Central Hospital - Ube (Japan)

Background and Goal of Study: Hypotension is a risk factor for adverse perioperative outcomes. Machine-learning methods can process large amounts of data to develop robust predictive analytics. We hypothesized that machine-learning methods can help predict the risk of postinduction hypotension.
Materials and Methods: Data were extracted from the electronic health record of a single quaternary care center between April 2014 and September 2019 for patients aged >15 years who underwent general anesthesia, without catecholamine use cases and intubated cases. Multiple supervised machine-learning classification techniques were used, with postinduction hypotension (mean arterial pressure < 55 mmHg from intubation to the start of procedure) as the primary outcome and 95 transthoracic echocardiography measurements as factors influencing the primary outcome. We used 10-fold cross-validation with the training set (70%) to select the optimal hyperparameters and architecture based on the mean cross-validation performance. These optimal hyperparameters and architecture were assessed using a separate test set (30%).
Results and Discussion: Of 1958 patients, 640 (34%) had postinduction hypotension. Area under the receiver operating characteristic curve using deep neural network was 0.57 (95% CI 0.51–0.63), gradient boosting machine was 0.55 (95% CI 0.49–0.61), random forest was 0.54 (95% CI 0.47–0.60), naïve bayes was 0.55 (95% CI 0.49–0.61), support vector machine was 0.52 (95% CI 0.46–0.59), and logistic regression was 0.56 (95% CI 0.50–0.62). Important factors influencing hypotension were left ventricular diastolic diameter, end diastolic volume, atrial diameter, e' wave, s wave, and ascending aortic diameter.
Conclusion: This technique was successful in predicting postinduction hypotension, demonstrating the feasibility of using machine-learning models for predictive analytics in preoperative assessments, with performance dependent on model selection and appropriate tuning.

5487

New-onset atrial fibrillation in non-cardiac operations: prevalence, recurrent rate and long-term MACE (POAF-NCS Study)

Hakim R.[1], Koren O.[1], Rudin M.[1], Rozner E.[1], Turgeman Y.[1]
[1]Emek Medical Center - Afula (Israel)

Background and Goal of Study: Post-operative new-onset atrial fibrillation (POAF) is common after cardiothoracic surgery but not much has been studied about its occurrence after non cardiothoracic surgery. This study was conducted to examine the risk factors for the appearance of POAF, treatment strategy and onset of abnormal cardiovascular events (MACE) in the short and long term.
Materials and Methods: This is a retrospective cohort study that was conducted in Emek medical center, Afula, Israel. The study population consists of patients hospitalized in eight surgical wards from January 1, 2014 to the end of December 2018. Patients who met the inclusion criteria were divided based on the occurrence of POAF. Data was collected in accordance with International Diagnostic Code 10-ICD.
Results and Discussion: The mean age of the participants was 63.78 ± 11.50. The mean BMI of the participants was 28.89 ± 7.31. 67.1% of the participants were males. Smoking, CVA, diabetes, hypertension, hyperlipidemia, vascular dx, valvular dx, CHF and COPD were present in 23.1%, 20%, 69.2%, 36.9%, 55.4%, 30.8%, 20.0%, 7.7% and 9.2% of the patients. New onset of atrial fibrillation after non-cardiac surgery was significantly low compared to known cardiac related surgery (0.002 vs 0.287, p<0.001). From patients diagnosed with NOAF, prevalence was higher in general surgery ward (58.46%) and following laparotomy (36.92%). 60% of patients with NOAF were operated due to an acute situation. 29.23% of the patients were subjected to anticoagulant use. 60% of patients received rhythm control drug to control AF. Average length of hospitalization was 24 days. Rate of MACE at 1 year was 24.62 %. Death at the same hospital stay was seen at 20% of patients. There was no significant association between occurrence of MACE and treatment modalities like rate/rhythm control drug and anticoagulant use.
Conclusion: The incidence of new onset AF seems to be low following non cardiac surgery yet, pose a significant clinical and outcome implication. NOAF is associates with longer hospitalization length, multiple drug use and high rate of MACE.

4640

Anaesthesia and brugada syndrome, perioperative management protocol – case series

Silva M. J. S.[1], Dias S.[1], Serra S.[1]
[1]Portuguese Oncology Institute, IPO Porto - Porto (Portugal)

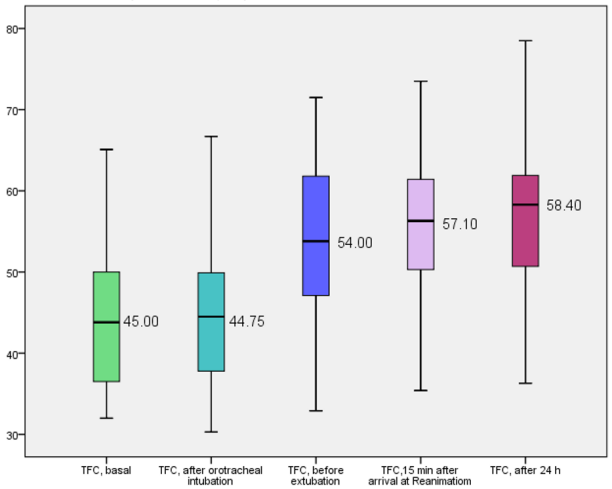
Introduction: Brugada syndrome (SB) is a rare abnormality of the cardiac ion channels, which is characterized by an electrocardiographic ST-segment elevation pattern in V1-V3 in a structurally normal heart. SB increases the risk of ventricular tachyarrhythmias, and it accounts for 40% of sudden death cases in structurally normal hearts. Due to SB low incidence what is currently known is derived from clinical experience. Thus, as there are no specific anesthetic guidelines, pharmacological options obeys to a knowledge of the triggering factors, physiological/metabolic control and specific pharmacological restrictions. The aim of this paper is to, through a series of cases, review the literature and present a clinical protocol for anesthetic management in SB patients.
Case series: Retrospective analysis of 5 patients with SB who were submitted to anaesthetia for 10 surgical procedures in our Institution between 2010 and 2019. Patient consent was obtained. 4 of the patients had type I SB and 1 type II SB. 4 of the patients were male and 1 female, aged 59 to 70 years. 2 patients were classified as ASA II and 3 as ASA III. 3 patients had an ICD. Regarding anaesthetia, despite different pharmacological combinations, general anesthesia was performed: inhalatory (1), intravenous (1) and balanced (8). In 4 surgeries was decided to monitor invasive blood pressures. 2 cases of sinus bradycardia were reported and promptly reversed with Atropine 0.5mg. No other complications were reported. Postoperative surveillance took place in a post-anesthetic care unit, and then in an intermediate care unit.
Discussion: A multidisciplinar approach is essential in preparation for surgery. During the perioperative period, awareness of which drugs can precipitate or worsening ST-segment elevation and arrhythmias, and knowledge of how to manage this situation is imperative. The implementation of a specific protocol in the institutions allows optimization of perioperative care in these patients.
Bibliography:
1. Dendramis G, et al. Am J Cardiol 2017;120:1031–1036.
Learning Points: If asymptomatic and clinically stable, these patients may undergo anesthetic/surgical procedures without further studies. Avoidance of proarrhythmogenic factors and knowledge of specific pharmacological options are essential. Postoperative should occur in differentiated care units with surveillance for 36h or up to 5 half-lives of the drugs used.

6094

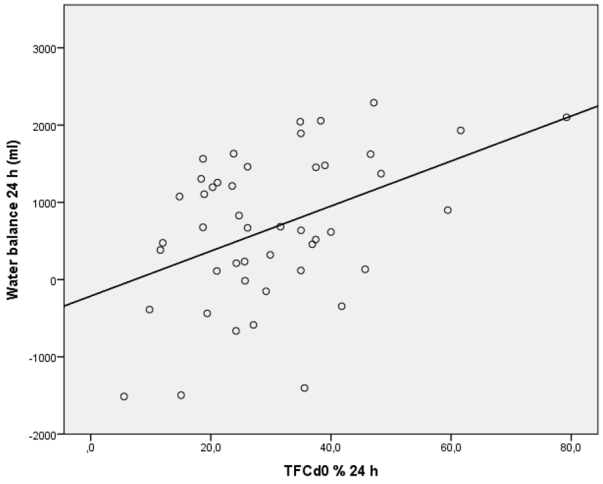
Bioreactance for fluid therapy guidance in the postoperative period of major abdominal surgery

Martín Serrano P.[1], Alday Muñoz E.[1], Planas Roca A.[1], Nieves Alonso J. M.[1], Martín Pérez M. E.[1]
[1]Hospital de la Princesa - Madrid (Spain)

Background and Goal of Study: TFC (Thoracic Fluid Content) is a variable that provides Cheetah bioredactance cardiac output monitor, whose value has been studied in patients undergoing hemodialysis, finding a good correlation between changes in TFC and the volume extracted to patients with chronic renal failure undergoing hemodialysis. Our objective was to demonstrate that the variation of TFC in the first 24 h correlated with the postoperative water balance, and could be useful to guide fluid therapy during the postoperative period.
Materials and Methods: A prospective observational study was conducted with 50 patients undergoing scheduled abdominal surgery with a minimum admission of 24 h in Resuscitation. Patients were monitored with Cheetah monitor from before anesthetic induction and for 24 h. The monitor data were collected at different stages of the perioperative period. Intra and postoperative information, such as water balance and complications, were collected. Data were analyzed using IBM SPSS Statistics program, applying Pearson and T-Student parametric tests.



Results and Discussion: Water balance in the first 24 h showed a correlation (r=0.437, p=0.002) with the variation in the value of TFC the morning after surgery, coinciding with our hypothesis that TFC increases as the balance becomes more positive. We observed a statistically significant difference (p=0.05) between the mean of the variations of TFC in the first 24 h after surgery and the presence of respiratory complications during admission, being 28.99% (SD:15.43) in those who did not present complications of this type and 40.98% (SD:13.77) in those who did.



Conclusion: TFC, measured non-invasively by bioreactance, is a tool that should be considered to monitor the water balance in the immediate postoperative period, avoiding excess fluids and respiratory complications associated with it.

5599

Prevalence of anaemia and iron deficiency in patients undergoing Radical Cystectomy and the role of intravenous iron therapy on postoperative haemoglobin levels within an enhanced recovery after surgery programme

Espinosa J.[1], Castellarnau S.[1], Sierra P.[1], Sabate S.[1], Hernando D.[1]
[1]Fundacion Puigvert - Barcelona (Spain)

Background and Goal of Study: Perioperative anaemia in relation to major surgery is associated with adverse clinical outcomes. Iron deficiency (ID) is the most common cause of anaemia worldwide and intravenous (IV) iron therapy is increasingly used to treat ID. The goal of this study was to determine the prevalence of anaemia in patients undergoing radical cystectomy (RC) within an ERAS protocol, evaluate the accurate management of iron deficiency and inquire into whether IV iron treatment initiated perioperatively improves haemoglobin levels (Hb).
Methods: This study included 147 consecutive patients enrolled in an ERAS protocol, each of whom underwent RC from December 2016 to November 2019. Anaemia was defined using the current World Health Organization criteria. We stratified non anaemic and anaemic patients into iron deficient and iron replete groups and if they were treated with IV iron. We study the changes in Hb levels immediately before surgery, minimal Hb during the postoperative period, at the time of hospital discharge and 30 days after hospital discharge. Mann-whitney U test and Fisher exact test were used to compare quantitative and qualitative viariables respectively.
Results: Thirty one percent of total patients had anaemia, of which 47.6% had iron deficiency and 29.6% had normal serum ferritin (p=0.035).

				Intravenus Iron	
				No	Yes
Haemoglobin g/l	> = 130	Serum Ferritin µgr/L	> = 100	94%	6%
			< 100	36.4%	63.6%
	< 130	Serum Ferritin µgr/L	> = 100	61.9%	38.1%
			< 100	6.7%	93.3%

Table 1. Relationship between Hb, serum ferritin and iron treatment (p < 0.001)

In patients with ID, the median Hb 30 days before surgery was 131 [109-146.5], immediately before surgery was 129 [116.7-129], minimal Hb during the postoperative period was 96 [86.2-106.7], at the time of hospital discharge was 96 [92.2-99.7] and 30 days after hospital discharge was 122 [110-132].
Conclusion: Our results show a low prevalence of anaemia in patients undergoing RC enrolled in an ERAS protocol, lower Hb level in iron deficiency patients and illustrate the therapeutic potential of IV iron supplementation in patients with iron deficiency. We recommend aggressive management of iron deficiency anaemia to improved haemoglobin level as a key component of prehabilitation prior to RC.

5749

The effect of perioperative fluid balance on 30-day morbidity in women undergoing major surgery for advanced ovarian cancer

Hasselgren E.[1], Camderman T.[2], Hertzberg D.[3], Salehi S.[3], Gupta A.[3]
[1]Karolinska University Hospital Solna - Stockholm (Sweden),
[2]Karolinska Intitutet - Stockholm (Sweden),
[3]Karolinska University Hospital - Stockholm (Sweden)

Background and Goal of Study: Women undergoing cytoreductive surgery (CRS) for advanced stage epithelial ovarian cancer are susceptible to major fluid shifts during surgery which may increase risk for perioperative complications and prolonged hospital stay (1). Our objective was to determine the association between perioperative fluid balance and postoperative morbidity assessed by Clavien-Dindo classification (CDC) within 30 days after CRS.
Materials and Methods: This was an observational study from prospectively collected data and included patients who underwent CRS 2014-2016 at Karolinska University Hospital, Sweden. Women subjected for epithelial cancer were identified in an institutional database, variables were extracted from the database and electronic medical records of patients. Linear regression with 95% confidence intervals was used to study the association between 0-48 h perioperative fluid balance and CDC grade. Postoperative complications within 30 days were recorded.
Results and Discussion: A total of 270 women were registered in the database and a total of 184 patients were finally analysed. There was no significant association

between 0-48h fluid balance and postoperative morbidity according to CDC in the crude analysis (p=0.34) or in the multivariable adjusted analysis (p=0.08). There was a significant association between fluid balance 24-48 h and postoperative morbidity according to CDC (p=0.0195) after multivariable adjustment). There were 135 patients (73.4%) with postoperative complications (CDC grade ≥ 1). Forty patients (21.7%) had postoperative complications classified as Grade ≥ 3. Excess fluid load was associated with longer hospital stay but it did not delay start of chemotherapy.
Conclusion: Although 0-48 h perioperative fluid balance was not associated with an increased 30-day postoperative morbidity, excessive fluids administered during 24-48 h postoperatively had a clear relationship with morbidity. Patients should be carefully monitored, and fluid overload avoided, specifically during 24-48 h.
References:
1. Desale et al. Perioperative fluid status and surgical outcomes in patients undergoing cytoreductive surgery for advanced epithelial ovarian cancer. Gynecol Oncol. 2016.

5924

Prophylactic penehyclidine inhalation reduces postoperative pulmonary complications in high-risk patients: A double-blind randomized controlled trial

Yan T.[1], Liang X. Q.[1], Wang G. J.[1], Li W. O.[1], Zhu S. N.[1], Wang D.[1]
[1]Peking University First Hospital - Beijing (China)

Background and Goal of Study: Postoperative pulmonary complications (PPCs) is common in high-risk patients and is associated with worse outcomes. Inhaled muscarinic antagonists are the first line treatment for chronic obstructive pulmonary disease and have been used to prevent PPCs in these patients. We investigated whether prophylactic penehyclidine inhalation, a long-acting selective M1- and M3-receptor antagonist, could safely decrease the incidence of PPCs in high-risk patients.
Materials and Methods: This randomized, double-blind, placebo-controlled trial was conducted in a tertiary hospital in Beijing, China. We enrolled patients aged 50 years or older who were scheduled to undergo major upper abdominal or noncardiac thoracic surgery (≥2 hours) and had an expected ARISCAT risk score ≥45. Patients were randomly assigned to receive prophylactic inhalation of either penehyclidine or placebo from the night before surgery until the second day after surgery, in an interval of every 12 hours. The primary outcome was the incidence of PPCs within 30 days. Analyses were done by intention-to-treat and safety populations.
Results: Between Sept 1, 2015 and Dec 10, 2018, 864 patients were recruited and randomly assigned to receive penehyclidine (n=432) or placebo (n=432). Of these, 826 completed the study and were included in the final analysis. The incidence of PPCs was significantly lower in the penehyclidine group (18.9% [79/417]) than in the placebo group (26.4% [108/409]; odds ratio[OR] 0.651, 95% CI 0.469-0.905, P=0.010). Among the secondary outcomes, the incidence of bronchospasm was also lower in the penehyclidine group than in the placebo group (1.4% [6/417] vs. 4.4% [18/409]; 0.317, 0.125-0.807, P=0.016). Regarding safety, the incidence of high airway pressure during anesthesia (peak airway pressure >40 cmH2O) was lower in the penehyclidine group than in the placebo group (1.9% [8/417] vs. 5.1% [21/409]; 0.361, 0.158-0,826, P=0.012). Occurrence of delirium did not differ between groups.
Conclusions: For high-risk patients undergoing major upper abdominal or noncardiac thoracic surgery, prophylactic penehyclidine inhalation significantly reduces the incidence of PPCs. The therapy is safe.
Trial Registration: Chinese Clinical Trial Registry (www.chictr.org.cn, ChiCTR-IPC-15006603); ClinicalTrials.gov (NCT02644876).

5765

Do blood lactate levels differ between cancer and non-cancer patients undergoing elective non-cardiac Surgery?

Kalogiannis E.[1], Analitis A.[1], Mavrommatis E.[1], Stratigopoulou P.[2]
[1]Department of Anesthesiology, Laiko General Hospital of Athens, - Athens (Greece), [2]Laiko General Hospital of Athens, University of Athens, Greece - Athens (Greece)

Background and Goal of Study: Tissue lactate levels tend to be elevated in cancer patients due to the Warburg effect.1 Moreover, increased lactate levels were shown to be associated with high morbidity and mortality in critically ill patients.2 Blood lactate levels have also been used to risk stratify patients in order to determine prognosis and administer appropriate treatment.3 However, there is currently little evidence regarding the association between cancer and blood lactate levels. The aim of this study was to investigate a possible relationship between cancer and intraoperative blood lactate levels, by comparing arterial blood lactate levels between cancer and non-cancer patients.
Materials and Methods: We retrospectively review medical records of 80 adult cancer (n=80) and non-cancer (n=90) patients who underwent elective non-cardiac major abdominal surgery at our institution between April 2018 and December 2018. Collected data included demographics, ASA PS classification, the type of procedure performed, and the value of arterial blood lactate levels. Multivariate logistic regression was performed to investigate a possible association between cancer and elevated blood lactate levels.
Results and Discussion: Both cancer and non-cancer patients were stratified to normal (≤1.6 mmol/L) and high (>1.6 mmol/L) lactate levels. Without adjustment for demographics, there was no statistically significant association between blood lactate levels and cancer status for either the normal or high lactate categories. The odds of having a higher lactate level for cancer patients was 0.995 (95% CI: 0.703-1.408) times that of non-cancer patients (p=0.977). After adjusting for patient sex, age, and ASA level, the adjusted odds of having a higher lactate level for cancer patients was 1.076 (95% CI: 0.754-1.534) times that of non-cancer patients (p=0.688).
Conclusion: Our data did not show statistically significant higher blood lactate levels in cancer patients. Limitations to our study included a limited sample size, and the absence of co-morbidity analysis.
References:
1. Goodwin ML, et al. Frontiers in Nutrition. 2014;1:27.
2. Ferreruela M, et al, Journal of Critical Care. 2017;42:200-205.
3. Bou Chebl R, et al. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine. 2017;25:69.

5719

Postoperative opioid consumption after radical retropubic prostatectomy comparing two different intraoperative analgesic treatment protocols

Funcke S.[1], Schick-Bengardt X.[1], Pinnschmidt H. O.[1], Nitzschke R.[1]
[1]University Medical Center Hamburg-Eppendorf - Hamburg (Germany)

Background and Goal of Study: For open radical retropubic prostatectomy (RRP) over many years spinal anaesthesia (SPA) was combined with general anaesthesia (GA) to decrease immediate postoperative pain compared to GA alone. Nevertheless, there is a lack of evidence for an optimal pain management protocol for RRP. We aimed to re-evaluate established treatment protocols for quality improvement and investigate influencing factors.
Materials and Methods: This study compared 318 consecutive patients in the SPA group (SPA with isobaric bupivacaine 0.5% preceding GA) with 318 patients in the GA only group regarding postoperative pain and opioid consumption in a single-centre retrospective chart review. The regional ethics committee of the Medical Council Hamburg, Hamburg, Germany waived the requirements for ethical approval on July 11th, 2017 because the study only involved a chart review and data collection included de-identified patient records (ERB reference number: WF-040/17)). The primary endpoint of the study was opioid (piritramide) consumption in the post-anaesthesia care unit (PACU). Differences between the groups were analysed by a two-sided t-test. The influence of the study group and possible confounders on postoperative piritramide consumption were evaluated with a general linear model.
Results and Discussion: The mean piritramide administration was 1.9 mg higher in the SPA group (95% CI: [0.8; 3.1], P= 0.001) than in the GA group. The general linear model revealed next to the study group only age as an influencing factor with a decreased opioid amount of 1.5 mg per 10-year increase in the patient's age (95% CI: -2.3 to -0.7], p<0.001). Post-operative pain levels did not differ significantly between the groups. Thus, the addition of spinal anaesthesia to general anaesthesia with a local anaesthetic but without intrathecal opioid administration

does not appear to be advantageous in RRP to decrease immediate post-operative pain.
Conclusion: Spinal anaesthesia in addition to general anaesthesia for RRP was associated with higher opioid consumption in the PACU compared to general anaesthesia alone to achieve a comparable postoperative pain level. Post-operative opioid consumption decreased with the patient's age.

5635

Forced warm air blanket attenuate redistribution hypothermia during induction of general anaesthesia

Hashimoto A.[1], Kaneko A.[1], Fujita Y.[1], Fujiwara Y.[1]
[1]Aichi Medical University - Nagakute (Japan)

Background and Goal of Study: Redistribution hypothermia is recently smaller than before, because some devices are used to warm patients during induction of general anaesthesia. However, there is no research investigating the impact of forced warm air blanket on developing redistribution hypothermia. Measurement of core temperature used to be difficult during induction, because thermal probe need to be placed in nose, rectum or bladder. New thermometer (3MTM SpotOnTM) placed on skin surface can measure core temperature. It is possible to start measuring core temperature before induction of general anaesthesia. The aim of our research is to measure magnitude of redistribution hypothermia during induction of general anaesthesia, while patients are warmed with forced air blanket.
Method: We conducted prospective observational study. We measured core temperature using thermometer placed on skin surface in patients undergoing general anesthesia. The thermometer was placed on patient's neck just after arriving at operation room. The room temperature was set at 26℃. Patients were warmed with 40℃ forced air blanket during the induction. The temperature was recorded on anesthesia record. We investigated the association between the magnitude of hypothermia and patients' characteristics using multivariate regression models.
Results: We obtained body temperature data from 19 patients. Three patients were excluded because baseline temperature was not recorded. The body temperature significantly decreased during induction of general anaesthesia (baseline: 36.47 ± 0.48℃, lowest: 36.18 ± 0.34℃, p=0.012). The lowest temperature was recorded at 39.1 ± 9.9 min after the induction. Mean magnitude of hypothermia was only 0.29 ± 0.40℃. The magnitude was not statistically related to patients' age, sex, body weight, or BMI.
Discussion: Patients' body temperature decreased during induction of general anaesthesia. However, the magnitude of hypothermia was not as large as reported decades ago, that was 1 to 2℃ (1).
Conclusion: Mean magnitude of redistribution hypothermia was only 0.29 ± 0.40℃. Forced warm air blanket can attenuate redistribution hypothermia during induction of general anaesthesia.
Reference:
1. Miller's anesthesia 8th edition. Elsevier; 2015, pp.1627.

4608

A cohort study into intravenous drug provocation tests in perioperative allergy

van Cuilenborg V.[1], Hermanides J.[1], Bos E.[1], Hollmann M.[1], Kooij F.[1], Terreehorst I.[1], Dutch Perioperative Allergy Center
[1]Amsterdam UMC, location AMC - Amsterdam (Netherlands)

Background and Goal of Study: Perioperative allergic reactions are rare, yet dangerous complications of anesthesia. Contemporary, skin testing (ST) is the most prevailing diagnostic in perioperative hypersensitivity reactions. However, STs are known to give false positive and false negative results. Therefore, intravenous (IV) drug provocation tests (DPTs) may deserve a more prominent place in perioperative allergy diagnostics. The goal of this study was to investigate the value of IV DPT testing in perioperative allergy diagnostics.
Materials and Methods: We conducted a cohort study of 27 patients, referred to our Dutch Perioperative Allergy Center (DPAC) for assessing the culprit of perioperative allergic reactions from 2016 to 2019. All patients were subjected to a full allergological investigation including STs (skin prick tests and intradermal testing) and DPTs. The primary outcome measures were the culprit agent and discrepancies between STs and DPTs.
Results and Discussion: With the aid of DPT, a culprit was identified in 12 cases (44%). In 11 cases (41%) no perioperative used agent could be determined as the culprit or an alternative perioperative diagnosis was deemed more likely, 4 patients (14%) retreated from the diagnostic process. Discrepancies between the outcomes of STs and DPTs are displayed in table 1. In 7/27 (26%) patients, negative STs were followed by a positive DPT, whereas in 4/27 (15%) positive STs were followed by negative DPTs. Hence, over 40% of our patients would have received a false diagnosis based on STs alone.

Table 1: Discrepancies between STs and DPTs

Patient	Per-operative reaction	Agent	SPT	IDT	Provocation
Negative skin test, positive/ambiguous provocation test					
Patient 4	Anaphylaxis	Metamizole	Negative	Negative	Positive
Patient 6	Generalized urticaria	Cefazolin	Negative	Negative	Positive
Patient 7	Anaphylaxis	Cefazolin	Negative	Negative	Positive
Patient 18	Dyspnea post-operative	Rocuronium	Negative	Negative	Ambiguous
Patient 22	Urticaria / angioedema	Morphine	Negative	Negative	Positive
Patient 25	Anaphylaxis	Metamizole	Negative	Negative	Positive
Patient 26	Anaphylaxis	Morphine	Negative	Negative	Positive
Patient 27	Non-generalized urticaria	Morphine	Negative	Negative	Positive
Positive/ambiguous skin-test, negative drug-provocation test:					
Patient 9	Anaphylaxis	Sufentanil	Negative	Positive	Negative
Patient 10	Rash / hypotension	Midazolam	Negative	Ambiguous	Negative
Patient 11	Non-generalized urticaria	Metamizole	Negative	Ambiguous	Negative
Patient 12	'Collapse during spinal anesthesia'	Midazolam	Negative	Positive	Negative

Conclusion: In our cohort, intravenous drug provocation tests proved to be of added value in perioperative drug allergy diagnostics. Solely performing skin tests for suspected perioperative allergy may lead to patients being re-exposed to the culprit drug or false allergy labels. Intravenous drug provocation tests for perioperative allergy are safe, provided that they are performed in a monitored setting with appropriate supervision from an anaesthesiologist.

4320

Incidence of suspected perioperative hypersensitivity reactions in an Egyptian population

Shoeib H.[1], Abdellatif M.[1], Ibrahim N.[1], H.Abdel-Wahab A.[1], Savic L.[2], Hopkins P.[2]
[1]Assiut University Hospitals - Assiut (Egypt),
[2]St James's University Hospital - Leeds (United Kingdom)

Background and Goal of Study: Epidemiological studies of perioperative hypersensitivity reactions have estimated the incidence to be between 1:353 and 1:13,000 with clear geographical variability1. Our aim was to estimate the incidence of suspected perioperative hypersensitivity reactions in an Egyptian population.
Materials and Methods: Our methodology followed that of a multicentre snapshot study in the UK2 although this is a single centre study. Data were collected through a questionnaire completed by the responsible anaesthetist after each elective list in Assiut University Hospital over a 12 week period. They were asked to document the number of patients who had received general anaesthesia on the list and the number of those patients who had developed any of the following signs: unexpected unexplained hypotension, unexpected unexplained bronchospasm, angioedema, urticaria, widespread erythema or cardiac arrest. They were also asked their opinion on any likely culprit agent.
Results and Discussion: Data were collected from 1,092 general anaesthetics involving 16 different subspecialties, with 34 cases meeting our inclusion criteria. Widespread erythema was the most common presentation (n=26, 76%) while there was one cardiac arrest. Unexpected unexplained hypotension or bronchospasm were reported in 3 (8.8%) and 2 (5.8%) cases respectively. Urticaria was noted in 9 cases while angioedema was reported in only 2 cases. The reactions were graded according to the Ring and Messmer scale3 (fig 1): 28 were Grade 1 (skin manifestations only) and many of these may represent non-allergic reactions (atracurium was the implicated culprit agent in 18 cases). There were 3 cases of Grade 3 (life-threatening hypotension and/or bronchospasm) or 4 (cardiac arrest) severity.
Conclusion: Even when excluding cases where erythema was the only feature there were 1:136 patients who met the inclusion criteria, which compares with 1:353 in the UK study with comparable criteria. The incidence of suspected anaphylaxis (Grade 3 or 4) was also high at 1:364 (95% CI 1:115 – 1:1,111). We emphasise that these cases do not have a confirmed diagnosis and further work is required.
References:
1. Mertes PM, Ebo DG, Garcez T, et al. Br J Anaesth 2019;123:e16-28.
2. Savic L, Kaura V, Yusaf M, et al. J Allergy Clin Immunol: In Practice 2015: 3; 454-5.e1; 3. Ring J, Messmer K. Lancet 1977; 1: 466-9.

5113

Non-intubated VATS under Thoracic Epidural Analgesia, Propofol, and Dexmedetomidine: an Opioid Sparing Anesthesia

Ke H. H.[1], Ting C. K.[1], Hsu P. K.[1], Tsao M. Y.[1]
[1]Taipei Veterans General Hospital - Taipei (Taiwan)

Background: The anesthesia of non-intubated video-assisted thoracic surgery (VATS) is composed of sedation and regional analgesia. Dexmedetomidine is an α2 agonist with effects of anti-anxiety, sedation, analgesia and lesser respiratory depression than Propofol. The application of Dexmedetomidine may reduce intra- and postoperative opioid consumption.
Materials and Methods: The data of this retrospective study was reviewed from patients treated with non-intubated VATS lung wedge resection with Propofol combined with opioid (Group A, n = 18) compared to Propofol combined with Dexmedetomidine (Group B, n = 12) between Jan. and Nov. 2019. Transnasal humidified rapid-insufflation ventilatory exchange was used in both groups to provide adequate oxygenation, prevent hypercapnia and acidosis which were usually occurred during non-intubated VATS. Thoracic epidural analgesia or paravertebral block was applied for intraoperative pain control. Alfentanil was administered through intravenous bolus to reduce respiratory rate and enhance sedation. Statistical analysis was performed using SPSS 17.0, Mann–Whitney U test and Pearson's chi-squared test.
Results and Discussion: There are no significantly difference between two groups in all patient characteristics. Group B had significantly lower intra- (22.1 mg ± 27.6 vs 122.1 mg ± 112.8, p < 0.05) and postoperative average opioid consumption (1.9 mg ± 2.6 vs 1.3 mg ± 2.1) than Group A. The average postoperative chest tube retention time was shorter in group B (0.8 days ± 1.5 vs 1.1 days ± 1 (Figure 1). In addition, intraoperative CO_2 retention status, surgical duration, the number of patients converting to thoracotomy, complications and perioperative mortality were similar in both groups.

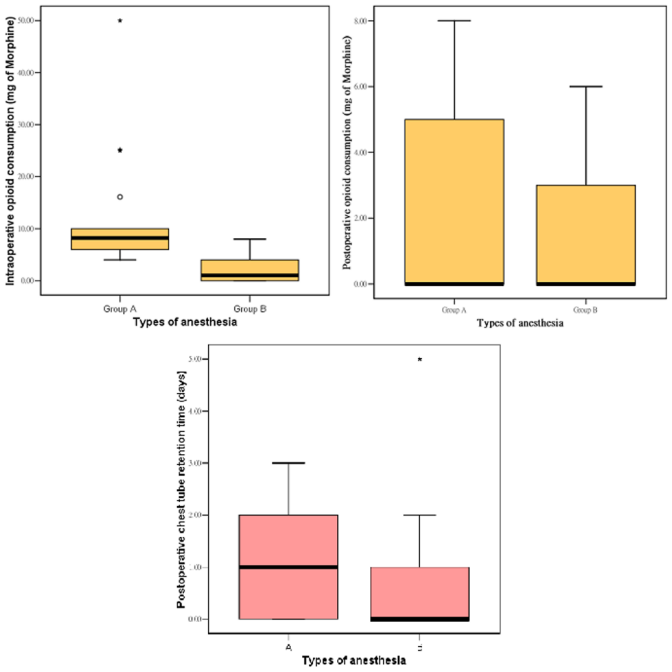


Figure 1

Statistical analysis showed Dexmedetomidine may be beneficial to opioid sparing for non-intubated VATS with TIVA, due to mechanism of α2 agonist related analgesia.
Conclusion: Opioid sparing and multimodal analgesia are essential components of ERAS protocols. Dexmedetomidine use in non-intubated VATS with TIVA is not only effective in achieving perioperative opioid-free analgesia, but also noninferior to Propofol in anesthesia quality.

5128

Adverse outcomes after cytoreductive surgery with hyperthermic intraperitoneal chemotherapy

Muiño Palomar V.[1], Delgado Alonso M. C.[2], Becerra Bolaños Á.[2], Santana Ortega L. M.[2], Hernanz Rodríguez G. M.[2], Rodríguez Pérez A.[3]
[1]Hospital Universitario de Gran Canaria Doctor Negrín - Las Palmas (Spain), [2]Hospital Universitario de Gran Canaria Doctor Negrín - Las Palmas (Spain), [3]Universidad de Las Palmas de Gran Canaria - Las Palmas (Spain)

Background and Goal of Study: Peritoneal carcinomatosis (PC) is the end-stage of tumor dissemination from gastrointestinal, gynecologic or peritoneal tumor. Cytoreductive surgery (CR) and hyperthermic intraperitoneal chemotherapy (HIPEC) has demonstrated to be able to increase survival, but is often associated to complications, such as anastomotic leaks, sepsis, pancreatitis, intestinal fistula, kidney injury or hematological toxicity. We aim to evaluate adverse outcomes and mortality after this procedure and to identify risk factors associated.
Materials and Methods: After the approval of the Ethics Committee, we carried out an observational study, including patients scheduled for CR and HIPEC from March 2016 to May 2019. Following data were recorded: age, weight, ASA physical status, intraoperative temperature, length of surgery, intraoperative fluid therapy, outcomes and mortality. Postoperative complications and mortality were analyzed regarding different perioperative data. Results were analyzed using SPSS 24.
Results and Discussion: Thirty-one patients were evaluated (46.7% ASA 3), with a mean age 59+7.8yo. 43.2% of patients suffered from postoperative complications: acute renal failure (31.3%), respiratory failure (25%), ileus (18.7%) and septic shock (18.7%). Overall mortality in study period was 22.58%. No statistical significant differences were found regarding postoperative complications and mortality and age, ASA, intraoperative temperature and hospital length of stay. Mortality rate was higher in patients who received less intraoperative fluid therapy (4644±2393 vs 1557±1816, p=0.003) and those with a lower preoperative hemoglobin (12.6±1.7 vs 10.5±1.9, p=0.01).
Conclusions: Acute renal failure and respiratory failure were the most frequently adverse outcomes in patients submitted to CR + HIPEC. We found a higher mortality rate compared to the literature, probably because these were the first cases of this type of surgery in our hospital. Optimization of preoperative hemoglobin parameters and intraoperative volume status could benefit patients outcome.
References:
1. Morano WF et al. Clinical studies in CRS and HIPEC: Trials, tribulations and future directions-A systematic review. J Surg Oncol. 2018; 117: 245-259.
2. Raspé C et al. Best practice for perioperative management of patients with cytoreductive surgery and HIPEC. Eur J Surg Oncol. 2017 Jun; 43 (6): 1013-1027.

5120

An observational study of perioperative anaesthetic considerations in cytoreductive surgery and hyperthermic intraperitoneal chemotherapy for peritoneal carcinomatosis

Solanki S. L.[1], Patel S.[1], Agawane N.[1], Desai P.[1]
[1]Tata Memorial Hospital, Mumbai - Mumbai (India)

Background and Goal of Study: Gatrointestional and gynaecological cancers with peritoneal carcinamatosis were thought to be a terminal disease in the past. Cytoreductive surgery (CRS) combined with hyperthermic intraperitoneal chemotherapy (HIPEC) has shown promising results. CRS is followed by HIPEC where chemotherapy agents are infused in the peritoneal cavity at 42°-43°C to kill the microscopic metastatic tissues. CRS with HIPEC is a long and complex procedure with significant blood and fluid loss, haemodynamic alterations, electrolyte imbalance, temperature extremes (hypothermia during CRS and extreme hyperthermia during HIPEC phase) and coagulation abnormalities. Aim of this observational study was to find out the perioperative haemodynamic, blood gas parameters, temperature variations and outcomes in ICU stay and readmissions in ICU, re-exploration rate, 30 and 90-day mortality.
Materials and Methods: We analysed prospectively collected data of 110 patients who underwent CRS-HIPEC at a tertiary care cancer institute from April 2016 to Sept 2019.
Results and Discussion: Haemodynamic parameters measured in an interval of 30 min during the CRS and 10 min during HIPEC phase. Friedman test was used to test the change in the different parameters with repeated measures. A significant difference (p< 0.001) in the median heart rate, mean arterial pressure (MAP), temperature, central venous pressure (CVP), pulse pressure variation (PPV), cardiac output (CO), cardiac index (CI), stroke volume (SV), stroke volume variation (SVV) and urine output observed form start of the surgery to 240 minutes of CRS and at during average 70 min of HIPEC phase. Mean temperature during HIPEC

phase in °C was 34.8±0,96, 36.33±0.93, 37.07±0.76 and 37.02±1.32 at 10 min, 30 min, 60 min and 90 min of HIPEC respectively. Mean lactate level during CRS phase and HIPEC phase are 2.65±1.74 mmol/L and 5.50±1.44 mmol/L respectively. In the post-operative period, 6.4%(7), 62.7%(69) and 18.2%(20), of patients were extubated in operating room, postoperative day (POD) 1, and POD 2 respectively. Median ICU stay was 3 days (range from 1 to 52 days). 25.5%(28) patients were readmitted in ICU. 3.6%(4) patients were re-explored within 30 days. 30 and 90-day mortality was 2.7% and 5.5% respectively.
Conclusion: CRS-HIPEC is complex procedure and require intensive monitoring in perioperative period and leads to higher morbidity and mortality in postoperative period.

5255

Value of HbA1C in predicting outcomes in cardiac surgery in Asian Population

Yek J.[1], Ke Y. H.[1], Sim E.[1], Rizal Bin Abdullah H.[1]
[1]Singapore General Hospital - Singapore (Singapore)

Background and Goal of Study: About 30% of patients undergoing cardiac surgery has diabetes mellitus(DM)[i], and glycated hemoglobin (HbA1C) is an indicator of glycemic control. It is well established poorly controlled diabetes is associated with worst outcomes in general surgical populations. The aim of our study is to look for the predictive value of pre-operative HbA1C for post operative complications undergoing elective cardiac surgery in Asian population.
Materials and Methods: A retrospective review of patients undergoing cardiac surgery in a tertiary hospital between 2016 and 2018 was done. Ethics approval was obtained from Institutional Review Board. Patients were included if they had their HbA1C taken within 1 month of surgery. Other peri-operative data and post operative complications were collected. Patients were divided into 3 groups for analysis, HbA1C<6.5%, HbA1C 6.5 - 8.0% and HbA1C>8.0%. Multivariate logistical regression models were used where appropriate for the statistical analysis.
Results and Discussion: A total of 1339 patients were included, 977 patients met the inclusion criteria. The overall prevalence of DM was 364/977(37.3%) with 24(2.5%) newly diagnosed DM(A1C>=6.5%). In total, 217/977(22.2%) had HbA1C 6.5-8.0% and 147/977(15.1%) HbA1C>8.0%. Table 1 shows the association between the groups and post operative complications. A preoperative HbA1C value of >8.0% is a positive predictor of renal complications (Adjusted HR(95% CI) 1.63(0.08-0.90), p=0.020), but a negative predictor of cardiac complications in univariate analysis(Unadjusted HR(95% CI) 0.56(-0.99- -0.17), p=0.006). Subgroup analysis showed that patients with lower HbA1C were more likely to have valvular surgeries(Chi Sqr p<0.001). In multivariable analysis corrected for type of surgery, HbA1c is not a significant predictor (Adjusted HR(95% CI) 0.70(-0.80- -0.09), p=0.114).
Conclusion: Higher preoperative HbA1C of >8.0% is predictive of post operative renal complications, but does not correlate well with other complications such as infections and re-operations. Further subgroup analysis with larger sample size may be useful to isolate specific group of patients that may benefit from postponing operation until better DM control is achieved.
References:
1. Flaherty JD, Davidson CJ. Diabetes and coronary revascularization. JAMA. 2005;293:1501–1508.

5931

ABO blood groups and Renal allograft survival

Boran E.[1], Boran M.[2], Boran M.[3]
[1]Duzce University, Faculty of Medicine, Departement of Anesthesiology and Reanimation - Duzce (Turkey), [2]Yozgat Bozok University, Faculty of Medicine, Departement of Internal Medicine, Division of Nephrology - Yozgat (Turkey), [3]Duzce University, Faculty of Medicine, Departement of Thorasic Surgery - Duzce (Turkey)

Background and Goal of Study: The effects of ABO blood groups on renal allograft survival (AS) are unclear. Allosensitized kidney transplant patients have a short AS. We evaluate the comparative allograft survival in different ABO blood groups kidney transplant recipients.
Materials and Methods: Of 239 renal transplant recipients who underwent transplantation in a single center, 84 (35.14%) patients were blood group O, 104 (43.51%) were blood group A. Because the blood group AB patients' number is low, the blood group B and AB patients were grouped at one group blood group B (51; 21.3%). The groups' variables were investigated and compared. Our retrospective study was approved by the institutional education planning board.
Results and Discussion: The AS of blood group O recipients was significantly longer than that of blood group B recipients (p=0.001). Correlation analyses revealed that recipient's age (p=0.002), donor's age (p=0.013), creatinine (p=0.022), glomerular filtration rate(e-GFR) (p=0.005), human leucocyte antigen(HLA) mismatches(p=0.001), blood group O (p<0.0001), blood group B(p<0.0001), Drug cyclosporine A(CyA) (p<0.0001) and Drug sirolimus(p=0.032) were predictors of AS. Multivariate regression analyses indicated that group B (β = -0.618, p < 0.0001) and CyA-based immunosuppression (β =-0.924, p < 0.0001) were significant strong negative predictors, of AS.
Conclusion: We revealed that e-GFR, recipient age, donor age, gender and the number of HLA mismatch, were correlated with long-term AS, in contrast shorter AS was related with blood group B and CyA treatment. Also, the AS of blood group O recipients was significantly longer than that of blood group B recipients.
References:
1. Joysey VC, at all. Differential kidney graft survival associated with interaction between recipient ABO group and pretransplant blood transfusion. Transplantation 1977; 24: 371–376.
2. Hassan A, at all. The influence of ABO blood groups on sensitization of potential kidney transplant recipients. African J Nephrol 2016; 2: 30–33.

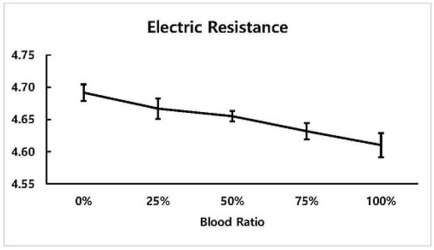
5296

Assessment of estimated blood loss during surgery

Huh H.[1], Seong H.[1], Yu J. H.[1], Park S. H.[1], Cho J. E.[1], Kim H. C.[1]
[1]Korea University Anam Hospital - Seoul (South Korea)

Background and Goal of Study: Estimating intraoperative blood loss is one of the major concerns of anesthesiologists and surgeons during surgery. This is because estimated blood loss (EBL) is arguably the most important factor when planning out fluid management for intraoperative hemodynamic stability. In addition, the decision to administer blood products is largely based on visual EBL and clinical signs. However, there is a lack of a standardized method to measure the amount of intraoperative blood loss. The purpose of this study is to find an accurate way of measuring the exact amount of blood loss during surgery.
Materials and Methods: This study was approved by the Institutional Animal Care & Use Committee (IACUC) of Korea University College of Medicine (KOREA-2019-0045). Three YLD crossbred pigs weighing 30-40kg were used in this study. Two sets of experiments were conducted on 500ml of blood taken from the pigs. A total volume of 50ml was used in the experiment through mixing the blood sample with normal saline and diluting the blood concentration to 0%, 25%, 50%, 75%, and 100%. Each blood concentration groups were then measured in terms of weight, optical density, and electrical resistance.
Results and Discussion: There were no significant differences in weight among the groups according to blood concentration. The optical density was significantly higher in blood concentration 25% than 0% (Fig.1). Electrical resistance was respectively 4.69±0.03, 4.67±0.04, 4.66±0.02, 4.63±0.03, and 4.61±0.05 at blood concentrations 0%, 25%, 50%, 75%, and 100%. There is a statistically significant difference (P = 0.004). We found an inversely proportional relationship between blood concentration and electrical density.

Figure 1. Electrical resistance according to blood concentrations 0%, 25%, 50%, 75%, and 100%.



Conclusion: With the results of our findings, EBL may be more accurately estimated by measuring the total weight and electrical density of the intraoperative blood accumulated in the suction containers.

5469

Neutrophil-lymphocyte ratio as predictor for the outcome of postoperative cognitive function in patients undergoing elective non-cardiac surgery

Ntalouka M.[1], Tzimas P.[2], Stertsou E.[1], Variadis D.[1], Chalkias A.[1], Arnaoutoglou E.[1]
[1]University of Thessaly, Faculty of Medicine, Univeristy Hospital of Larissa - Larissa (Greece), [2]Faculty of Medicine, School of Health Sciences, University of Ioannina - Ioannina (Greece)

Background and Goal of Study: Perioperative inflammatory response seems to play a major role in the pathogenesis of postoperative cognitive dysfunction (POCD). This study investigated the association of neutrophil to lymphocyte ratio (NLR) with the incidence of POCD in patients undergoing elective non-cardiac surgery.
Materials and Methods: The study included 162 consecutive patients undergoing elective non-cardiac surgery, under general anaesthesia with inhaled anaesthetic. NLR was measured pre- and postoperatively at 24 and 96 hours and the cognitive function was assessed preoperatively and at 10 days, 3, 6 and 9 months postoperatively. Statistical analysis of the acquired data was performed with Stata 14.1 software (StataCorp, College Station, TX).
Results and Discussion: At 10 days 22.2% of the patients were diagnosed with moderate POCD and 37.6% with severe POCD respectively. At 3 months 20.3%, at 6 months 11.7% and at 9 months only 3.7% of the patients were diagnosed with severe POCD. Patients with POCD had statistically significant higher mean values of NLR at 24 and 96 hours after surgery (t test, Mann Whitney U test). At 24 hours mean values of NLR were 2.52±0.63 at patients with moderate POCD at 10 days and 3.23 ±0.21 at patients with severe POCD at 10 days. Moreover, mean values of NLR at 24 hours were 3.2 ±0.23, 3.24 ±0.26 and 3.34±0.11 at patients with higher rates of severe POCD at 3, 6 and 9 months respectively. Additionally, mean values of NLR at 96 hours were 2.34±0.69 at patients with higher rates of moderate POCD at 10 days and 3.1±0.33 at patients with higher rates of severe POCD at 10 days. Last but not least, at 96 hours mean values of NLR were 3.16±0.22, 3.21±0.25 and 3.3±0.1 at patients with higher rates of severe POCD at 3, 6 and 9 months respectively.
Conclusion: Postoperative NLR may be a useful prognostic factor for the occurence of short-term and long-term POCD in patients undergoing elective non-cardiac surgery.

5545

Acute ischemic crisis of Raynaud phenomenon induced by terlipressine in a patient with scleroderma

Penedos C.[1], Palha A.[1], Ferreira C.[1]
[1]CHUP - Centro Hospitalar Universitário do Porto - Porto (Portugal)

Background: Raynaud's phenomenon secondary to scleroderma can quickly progress to catastrophic ischemic events. Determining causes of a Raynaud's crisis can be difficult during an emergency, because local vasospasm and/or more widespread vascular disease can trigger the event. The efficacy of therapies varies widely. We report a case of a severe Raynaud phenomenon secondary to terlipressine therapy.
Case Report: A 57-year-old woman came to the emergency room with a history of cutaneous scleroderma, Raynaud disease and auto-imune hepatic chirrosis with portal hypertension, classified as Child-Pugh A. She presented with upper digestive tract bleeding associated with hemodinamic instability. The patient was submitted to urgent upper digestive endoscopy (UDE) on the operation room which revealed acute active hemorraghe from esophageal varices, which were ligated and the procedure was uneventful. One hour after the first administration of intravenous terlipressine, she presented bradycardia, hypertension and severe acute rest pain on the left arm and paresthesias. The arm was cold associated with sharp demarcation in colour of the skin, the fingers were blue at rest. Elevation of the hand produced pallor and the left radial and ulnar pulses were both palpable at the wrist. The administration of paracetamol was uneffective but the pain did get better with active warming. After the second administration of terlipressine she developed the same clinical picture. We assumed a Raynaud crisis triggered by terlipressine and it was decided to do a therapeutic switch to octeoctride. There were no more recurrences of Raynaud phenomenon and the patient was transferred to Intermediate Care Unit for surveillance and continuation of therapy.
Discussion: For patients with mild vasopressive attacks, avoiding agents that can cause peripheral vasoconstriction is essential. Terlipressine has a possible toxic effect related to its vasoconstrictor action and has been associated with peripheral ischaemia and vasculitis-like lesions, like the ones observed in this case.
References:
1. Ramirez D., et al. (2011) Sildenafil in severe peripheral ischemia induced by terlipressin. A case report. Reumatologia Clinica, 7, 59-60.
Learning points: Acknowledge terlipressine side effects, contraindications and the importance of prevention and adequate treatment of acute ischemic crisis of Raynaud phenomenon induced by terlipressine.

6098

Anesthesia for bilateral diaphragmatic paralysis - What we do not know?

Lourenço S.[1], Sá A. F.[1], Martins F.[1]
[1]Centro Hospitalar do Porto - Porto (Portugal)

Background: Bilateral diaphragmatic paralysis is an uncommon cause of dyspnea which may lead to severe morbidity. Multiple etiologies are recognized as possible causes of diaphragmatic paralysis.1 However, even after an appropriate etiologic study, the causal factor may remain undetermined. We report the perioperative and anesthetic approach of this rare but very significant disorder.
Case Report: A 57 year-old man diagnosed with bilateral diaphragmatic paralysis was proposed to laparoscopic radical prostatectomy. He had no history of trauma, neurologic or neuromuscular disorder that could justify diaphragmatic weakness. Nevertheless, complementary exams supported the diagnosis of bilateral phrenic neuropathy. Anesthetic preoperative assessment was made two months before surgery. As part of preoperative otimization, we ensured patient totally compliance to non invasive ventilation (NIV) and supine position tolerability with acceptable oxygen saturations (>90%). During induction of anesthesia an adequate pre-oxygenation was accomplished, without difficulties in ventilation throughout the course of procedure. In the extubation period, patient's trunk was elevated and maintenance of adequate ventilatory volumes was ensured. In recovery room, VNI was used to achieve good oxygen saturation in supine position. He was discharged after two hours of surveillance.
Discussion: Bilateral diaphragmatic paralysis can occur in the course of severeal diseases, being usually a serious or life-threatening condition. As anesthesiologists we should be alert to some characteristic signs - unexplained dyspnea that worsens in the supine position and abdominal paradox ventilation should not be overlooked. Elevation of diaphragmatic domes, decreased pulmonar volume and bibasal atelectasis in chest radiograph, together with moderate/severe restrictive pattern in respiratory functional tests are complementary features that can help diagnosis. Eletromiography may help distinguish between neuropathic and myopathic causes. Ventilatory support is the basis of treatment of this disease and a good compliance can attenuate symptoms and play a key role in the recovery process.1
References:
1. McCool FD, Tzelepis GE. Dysfunction of the diaphragm. N Engl J Med. 2012;366(10):932-942.
Learning points: This case report highlights that with proper perioperative management and otimization, patients with incomplete diaphragmatic function can recover uneventfully following general anaesthesia.

6021

Uterine Paraganglioma: A multidisciplinary challenge

Brás A.[1], Barbosa H.[1], Coroa M.[1], Martins M.[1], Silva S.[1], Martins A.[1]
[1]Centro Hospitalar Vila Nova de Gaia/Espinho - Vila Nova de Gaia (Portugal)

Background: Paragangliomas are rare neuroendocrine tumours with extra-adrenal location. Due to catecholamine production, manifest frequently with hypertension and tachycardia. If symptomatic, surgery is the gold standard treatment, which can be challenging for anaesthesiologists. (1)
Case report: 48-year-old woman, ASA III, proposed for hysterectomy due to suspicion of uterine paraganglioma. Patient presented with hypertension paroxysms, hypersudoresis, headache, shivering and palpitations. Analytical study found a blood level dopamine 37-fold above normal and uterine uptake in F-Dopa PET scan. It was initated α and β blockers treatment a month before surgery. The surgery was performed under a balanced general anaesthesia with orotracheal intubation (OTI). Presenting an hypotensive profile after beginning of surgery, norepinephrine infusion was started. In the absence of other complications, she was extubated and transferred to PACU with suspension of perfusions and α and β blocker, remaining hemodynamically stable and asymptomatic till discharge.
Discussion: The approach to paraganglioma resection must be multidisciplinary. The endocrinologist must carefully titrate α and β blockers therapy, minimizing the impact of catecholamine production. Anaesthesiologists have an essential role to maintain intraoperative hemodynamic stability, since anaesthesia induction and paraganglioma manipulation can bring serious hemodynamic consequences. In the same way, the best surgical technique should be discussed involving all team members.(2,3)

Learning points: Preoperative evaluation of patients with paraganglioma is extremely indispensable. Simultaneously, a meticulous anaesthetic plan and a careful management patient's hemodynamic contribute to a successful approach.

References:

1. Lam AK yin. Update on Adrenal Tumours in 2017 World Health Organization (WHO) of Endocrine Tumours. Endocr Pathol. 2017;28(3):213-227. doi:10.1007/s12022-017-9484-5.
2. Naranjo J, Dodd S, Martin YN. Perioperative Management of Pheochromocytoma. J Cardiothorac Vasc Anesth. 2017;31(4):1427-1439. doi:10.1053/j.jvca.2017.02.023.
3. Ramakrishna H. Pheochromocytoma resection: Current concepts in anesthetic management. J Anaesthesiol Clin Pharmacol. 2015;31(3):317-323. doi:10.4103/0970-9185.161665.

5237

The use of atropine or glycopyrronium is not associated with a higher incidence of postoperative urinary retention

Wang M. L.[1], Huang H. H.[1], Pu H. H.[1], Chi R. C.[1]
[1]National Taiwan University Hospital - Taipei (Taiwan)

Background and Goal of Study: Atropine and glycopyrronium are common anticholinergic agents used in general anesthesia. They are also associated with postoperative urinary retention (POUR). The aim of this study was to determine whether the specific agent or the dose may increase the incidence of POUR.

Materials and Methods: From January to June 2019, patients 50 – 80 years of age who underwent elective endoscopic functional sinus surgery or parotidectomy were recruited. POUR requiring urethral catheterization was recorded during postoperative visits. The association between the use of atropine or glycopyrronium and POUR was measured using bivariate analysis. Predictors of POUR were measured using a logistic regression model adjusting for the use of anticholinergic agents.

Results and Discussion: A total of 96 patients were included in this study, with a mean age of 61.4 ± 6.8 yr. Atropine was used in 25 patients (27%), and glycopyrronium was used in 88 patients (91%). POUR was found in 7 patients (7%). The use of specific anticholinergic agents or the accumulated doses were not associated with POUR. In multivariate analysis, neither age, surgical duration, the dose of atropine, the dose of glycopyrronium, nor the dose of intravenous fluid was found to be an independent factor of POUR.

Risk Factor	Odds Ratio	*p*	95% Confidence Interval
Age	1.097	.168	.962 - 1.252
Surgical duration	1.002	.890	.979 - 1.025
The dose of atropine	.707	.778	.064 - 7.842
The dose of glycopyrronium	.134	.408	.001 - 15.543
Intravenous fluid	1.001	.345	.998 - 1.006

Table 1. Multivariate analysis of potential risk factors associated with postoperative urinary retention

Conclusion: The use of specific anticholinergic agents and the accumulated doses of current clinical practice were not associated with a higher incidence of POUR. Larger prospective studies may be necessary to confirm the results.

4362

Undiagnosed and known diabetes and their perioperative outcomes

Liew L.[1], Teo W. W.[1], Ti L. K.[1], Lean L. L.[1]
[1]National University Hospital - Singapore (Singapore)

Background: Diabetes is known to have increased morbidity and 30-day mortality in adults undergoing non-cardiac surgery, but longer term outcomes are uncertain. In addition, a large proportion of patients with hyperglycaemia that present preoperatively may not be diagnosed as diabetics. This study was done primarily to explore the prevalence of undiagnosed diabetics in our perioperative Asian population, and how undiagnosed diabetes affects both 30-day and 1-year morbidity and mortality outcomes compared to the known diabetics and non-diabetics.

Methods: A retrospective cohort study of 2106 patients aged above 45 years undergoing non-cardiac surgery in a single tertiary hospital from January 2015 to July 2015 was performed. Undiagnosed diabetics were identified (defined by HbA1c ≥6.5% or fasting blood glucose ≥7.0mmol/L), and their relevant demographic, clinical and surgical data were analysed to elicit the relationship to adverse clinical outcomes and mortality. A univariate analysis was first performed to identify significant variables with p-values ≤ 0.1, which were then analysed using Firth multiple logistic regression to calculate the adjusted odds ratio.

Results: The prevalence of undiagnosed diabetes was 7.4%. The mean and median HbA1c of known diabetics were 7.9% and 7.5%, while the mean and median HbA1c for undiagnosed diabetics were lower at 7.2% and 6.8% respectively. 36.4% of known diabetics and 20.5% of undiagnosed diabetics respectively had a random blood glucose >11.1 mmol/L. The undiagnosed diabetic group was more than three times more likely to die at one year (adjusted OR 3.46 (1.80-6.49) p<0.001). No statistically significant relationship was found between the known diabetics and 1-year mortality, however, they were at increased risks of new onset atrial fibrillation (adjusted OR 2.48 (1.01-6.25) p=0.047), infection (adjusted OR 1.49 (1.07-2.07) p=0.017) and readmission within 30 days (adjusted OR 1.62 (1.17-2.25) p=0.004), as well as 30-day mortality (adjusted OR 3.11 (1.16-8.56) p=0.025).

Conclusion: Although undiagnosed diabetics have a biochemically less severe form of diabetes than known diabetics at the point of testing, they are significantly more likely to die at the end of one year compared to known diabetics who were not found to have a mortality difference. This worrying trend highlights the importance of identifying and treating diabetes

4425

Time and cost savings from standardization and simplification of anesthesia methods for the vertebral fusion surgery

Sakai N.[1], Taruishi C.[1], Sudani T.[1]
[1]Daiyukai General Hospital - Ichinomiya, Aichi (Japan)

Background: Routine surgery by fixed surgical teams can form higher medical safety through the sharing of each practice. We examined whether standardized anesthesia management would contribute to the reduction of the occupation time and medical cost.

Methods: From April 2016 to July 2019, we performed the thoracolumbar spinal fusion (posterior lateral fusion: PLF, posterior interbody fusion: PLIF, transforaminal approach interbody fusion: TLIF) in 122 cases. Among them, 59 patients (Post group) was received perioperative anesthesia management based on a unified protocol, while 63 patients (Pre group) were administered the standard control. The protocol was included safe airway management and posture changes, early recovery from general anesthesia, improvement of post-surgical analgesia, and the unnecessary use of drugs and equipment. The cases given transfusion except for autologous blood were excluded. We compared the time in the occupation of the operation theatre, the drug cost, post-surgical nausea and vomiting, and the acquisition of standing and ambulation training on the first day after surgery. The data were assessed with the Mann-Whitney U test and a significantly different with p<0.05. Besides, the operation theatre occupation time was evaluated with ANCOVA.

Results: There was no significant difference in preoperative background factors in each patient group. The Post group stayed shorter in the operating room (300 min vs. 260 min: p <0.001), and ANCOVA showed the corrected occupation time was shorter in the Post group (p <0.001) and no interaction between the surgery time and occupation time (p=0.83). The Post group was shorter in the time from the induction to posture change (from supine to prone position)(20 min vs. 10 min: p <0.001), shorter in time from posture change (from prone to supine position) to extubation (20 minutes vs. 9 minutes: p <0.001). Anesthesia drug costs (206€ vs. 139€, p <0.001) were significantly smaller in the Post group. Post group patients completed the postoperative ambulation program faster. Still, there was no difference in the number of patients who received antiemetic administration due to postoperative nausea and vomiting (30% vs. 20%: p = 0.3).

Conclusions: The standardization and simplification of anesthesia techniques contributed to the reduction of occupation time in the operation room and drug costs.

4825

Implementation of ERAS Urology. Preliminary results and analysis

De Boer H. D.[1], Luijendijk-De Bruin D.[1], Wiarda H.[1], Schrier B.[1], Tol-Bueving A.[1], Smid-Nanninga H.[1], ERAS Study Group Martini general Hospital Groningen
[1]Martini General Hospital Groningen - Groningen (Netherlands)

Background and Goal of Study: Implementation of multidisciplinary approached ERAS programs results in a significant improvement of perioperative care in different surgical specialities. ERAS protocols result in a reduction of length of hospital stay (LOS), complications and improved outcome. ERAS was introduced in Urology in April 2018. The objective of this retrospective analysis is to evaluate outcome measures like LOS, compliance, complication rate and the pitfalls of implementing ERAS Urology.
Materials and Methods: Relevant data of a pre-ERAS and ERAS were extracted and analysed using the ERAS Interactive Audit System (EIAS) of the ERAS Society. Surgeries consisted of open partial nephrectomy and laparoscopic procedures including prostatectomy, nefro-ureterectomy, nephrectomy and radical cystectomy. Outcome measures like LOS, compliance, complication rate (up to 30 days) were compared between the two groups. The implementation process was extensively evaluated by the ERAS-team and the pitfalls in implementing ERAS in Urology identified and discussed.
Results and Discussion: Results of 150 patients could be analysed. Data are presented in Table1. The compliance increased from 45,2% to 62.4% respectively. LOS was 6.1 days vs 3.4 days for the pre-ERAS group and ERAS group. Total complications decreased from 54.5% to 24.2%. A significant decrease of postoperative pain was observed in the ERAS group compared with the pre-ERAS group, 2% vs 20%. Pitfalls of implementation were availability of staff and nurses for extensive education and training. Furthermore, several elements showed low compliance in the ERAS-group: mobilization on the day of surgery until discharge (20%-41.4%), use of carbohydrate loading (51.7%) and removal of the urethral stent (50%).
Conclusion: Preliminary results after introduction of ERAS Urology were promising. Implementation of ERAS Urology resulted in an increased compliance, a reduction of LOS, postoperative pain and complications. Availability of staff and nurses, takes more time and effort, in particular on mobilization and feeding. Further improvement is needed.

Group	Pre-ERAS	ERAS
LOS	6.1	3.6
Primary	5.5	3.5
stay (d)		
Complication (%)	54.5	24.2
Serious	3.6	2.2
Com (%)		
Compliance	45.7	62.4
Pain	20	2
n	55	95

Table 1. Results of the analysis of pre-ERAS and ERAS patients.

5039

The effect of the brochure of pediatric day surgery on the caregiver of the patient

Park Y. H.[1], Ryu C.[1], Choi J. H.[2], Park S. G.[3]
[1]Chung-Ang University Hospital, College of Medicine - Seoul (South Korea), [2]National Cancer Center - GoYang (South Korea), [3]Eulji University Medical Center - Daejeon (South Korea)

Background and Goal of Study: Caregiver's anxiety has been reported to be associated with the fear that pediatric patients feel when inducing anesthesia. The increased perioperative anxiety may be associated with adverse outcomes such as increased pain and new onset negative postoperative behavioral changes. Therefore, active interventions should be provided to alleviate the caregiver's anxiety. We hypothesized that a standard color brochure provided in the preoperative evaluation room can reduce anxiety and increase the degree of cooperation of a caregiver of pediatric patients.
Materials and Methods: Parents of the pediatric patients were randomly assigned into 2 groups. The parents or caregivers in control group received verbal explain of the day surgery process in anesthesia evaluation clinic before surgery (group C). In brochure group (group B), they get the brochure with picture and written information (Figure 1). Caregivers of both groups went back home and revisited hospital on the day of surgery. We measured the level of parents' knowledge, anxiety, and satisfaction by using a 5-score survey.
Results and Discussion: A total of 20 caregivers were enrolled. The understanding of the whole day surgery course was significantly higher in group B than group C (P = 0.0025). But the information of postoperative care was insufficient. The anxiety level showed lower tendency in group B than group C although the result was not statistically significant. The satisfaction score of caregiver was not different between two groups but showed slightly increased level (Figure 2).
Conclusion: The brochure about day surgery process with color pictures helped the caregivers to understand surgery and anesthetic care on day of surgery, however, it did not affect caregivers' anxiety and satisfaction.
References:
1. Velhote AB, Bohomol E and Velhote MC: Caregivers' reactions to preoperative procedures in outpatient pediatric surgery. Einstein 14: 403-407, 2016.
2. Fortier MA, Del Rosario AM, Martin SR and Kain ZN: Perioperative anxiety in children. Paediatric anaesthesia 20: 318-322, 2010.

4433

Management of a parturient with Posterior Reversible Encephalopathy Syndrome (PRES)

Moonen J.[1], Poelaert J.[1], Vanhonacker D.[1], Matic M.[1]
[1]UZ BRUSSEL and Vrije Universiteit Brussel - Brussels (Belgium)

Background: Posterior Reversible Encephalopathy Syndrome (PRES) is a condition linked to serveral diseases, such as pre(eclampsia). In this case there is a (rare) presentation with severe paresis of a limb. Differential diagnosis was challenging, since this could also indicatie a magnesium intoxication, complication of epidural placement or stroke.
Case Report: A G1P1A0, 28 year old woman, known with preeclampsia is admitted to the recovery room after an urgent C-section due to foetal bradycardia. She is receiving a continuous magnesium infusion and has a epidural catheter in place. During recovery she develops a headache and oral paresthesias. Parameters at this point are normal. Lab tests, with special attention to magnesium levels, are taken. The patient is given paracetamol and diclofenac, with good result. An hour later the patient develops a clear paresis of the left arm and left facial muscles. After this the neurologist is called and the patient is brought to radiology for urgent MRI scanning. Lab tests show a magnesium level of 2 mmol/l (therapeutic range 2 – 3,5 mmol/l), a LDH level of 1015 U/l (normal range 313 – 618 U/l) and a moderate trombopenia (135.000). Glycemia is normal. MRI shows bilateral areas of diffusion restriction frontoparietal and parieto-occipital. An EEG is also taken, which comes back normal. The patient is admitted to the stroke ward. Trandate is started as hypertension treatment and intensive physiotherapy is prescribed. Symptoms gradually improve over several days. Eventually there is a total recovery.
Discussion: PRES is a syndrome characterised by symptoms of headache, confusion, visual changes, paresis and seizures in combination with typical MRI findings of vasogenic edema in the subcortical white matter, predominantly localized to the posterior hemispheres. It is linked to hypertensive disorders, (pre) eclampsia and autoimmune diseases. The mainstay of treatment is treatment of hypertension, but antiseizure drugs and treatment of the underlying disease may also be necessary. Most patients have a complete recovery within two weeks. A small minority of patients have residual neurologic deficits resulting from secondary cerebral infarction or hemorrhage. (1)
References:
1. www.uptodate.com 'PRESS'.
Learning points: PRES can, in rare cases, cause paresis of the limbs. Differential diagnosis of magnesium intoxication (in case of preeclampsia), stroke and complications of epidural placement can be challenging.

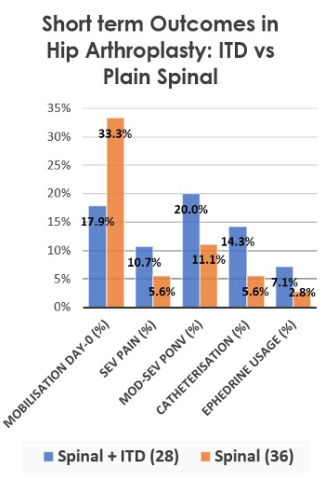
4463

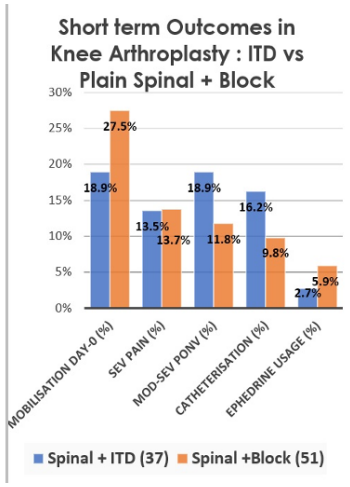
Impact of a revised ERAS protocol for lower limb arthroplasty

Samuel J.[1], Baggott M.[1], Multani M.[1], Lakshminarayan S.[1], Freer M.[1]
[1]Forth Valley Royal Hospital - Larbert (United Kingdom)

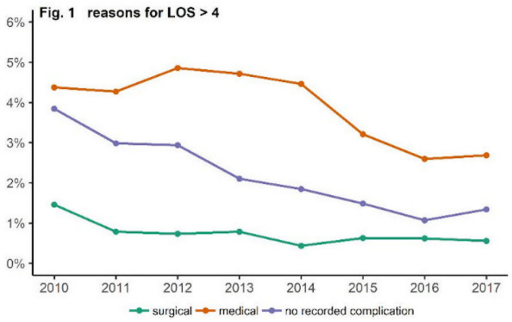
Background and Goal of Study: Forth Valley Royal Hospital performs ~400 primary hip and knee arthroplasties per year. Our aim was to introduce a new Enhanced Recovery after Surgery (ERAS) regime to improve patient outcomes and reduce length of hospital stay. We visited a local centre of excellence, reviewed their practice and adapted it to suit our hospital.
Materials and Methods: A standardised anaesthetic protocol was introduced, removing intrathecal diamorphine (ITD) and replacing it with a plain spinal for total hip replacement (THR) and a plain spinal, adductor canal block and local infiltration for total knee replacements (TKR). Oxycodone MR 10mg is given in recovery

followed by a further 2(THR) or 3(TKR) doses post operatively. During introduction of the new protocol, a prospective audit from Oct 2018-March 2019 was performed. The following short term outcomes were measured: ·Mobilisation on day of surgery; ·Pain preventing mobilisation; ·Post-operative nausea and vomiting (PONV); ·Urinary catheterisation; ·Hypotension requiring ephedrine; ·Median length of stay.
Results and Discussion: 64 patients had a THR; 68% were female, 56% had a plain spinal. Mobilisation increased and there was a reduction in pain, PONV, catheterisation and hypotension in the group without ITD. Median length of stay reduced from 3.5 days to 2 days (p= 0.031). 88 patients had a TKR; 57% were female, 58% had a plain spinal with adductor canal block. Mobilisation increased, there was minimal change in pain, a reduction in PONV and catheterisation and a mild increase in ephedrine usage in the group without ITD. Median length of stay reduced from 4 days to 3 days (p=0.031).

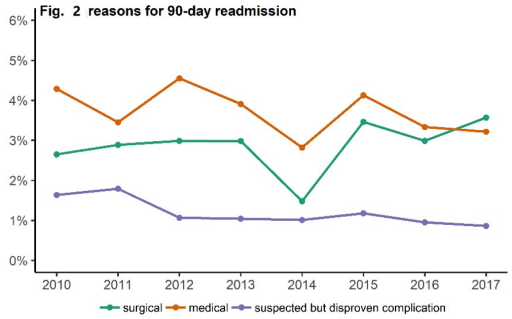




Conclusion: The new ERAS protocol has shown improvement in short term outcomes for THR and TKR. In addition to the removal of ITD, staff education, increased physiotherapy and ERAS leaflets are further interventions that may have contributed to positive changes seen. It is thought the high pain scores seen in TKR patients is due to high opiate consumption in this group pre-operatively. Plans to improve this include increasing the dose of post-operative oxycodone, and the possibility of an adductor canal catheter.



90-days readmission rates showed no monotonic trends (8.6% to 7.7%; p=0.386), except for disproven complications (1.6% to 0.9% p=0.019) (fig. 2).



Discussion: Our results are in contrast to a study from the U.K finding no time-independent benefits of national fast-track implementation on LOS and complications, but without details on perioperative care and a mean LOS of 3.7 days[2].
Conclusion: Continuous use and refinement of established fast-track protocols resulted in further monotonic reductions in LOS and morbidity. Mainly due to fewer patients with LOS > 4 days due to no or "medical" complications and fewer readmissions due to disproven complications.
References:

1. Kehlet. Lancet 2013;381:1600-2.
2. Garriga et al. Osteoarthritis Cartilage 2019:27:1280-93.

4473

Time-trends and improvement strategies in fast-track hip and knee arthroplasty – a prospective multicenter study of 36,935 procedures from 2010-2017

Jorgensen C.[1], Petersen P.[2], Kehlet H.[2], The Lundbeck Foundation Centre for Fast-track Hip and Knee Replacement Collaborative Group
[1]Rigshospitalet, University of Copenhagen, Denmark - Copenhagen (Denmark), [2]Rigshospitalet, University of Copenhagen - Copenhagen (Denmark)

Background: Enhanced recovery or "fast-track" protocols have reduced length of hospital stay (LOS) and postoperative complications in total hip and knee arthroplasty [1]. However, the effect of continuous use and refinement of fast-track protocols has not been evaluated in detail.
Methods: Cohort study from Jan 2010 to Aug 2017 within a multicenter collaboration with continuous refinement of established fast-track protocols. Complete 90-day follow-up from The Danish National Patient Registry and medical records. Primary analyzes on monotonic time-trends in LOS and 90-day readmissions. Secondary analyzes on "medical" and "surgical" complications. Test for monotonic trends was done using the Mann-Kendall test.
Results: Median LOS declined from 3 [2 to 3] days in 2010 to 1 [1 to 2] day in 2017 (p=0.049). The fraction with LOS >4 days declined monotonically from 9.7% in 2010 to 4.6% in 2017 (p=0.004). The reduction in LOS >4 days due to "medical" complications (4.4% to 2.7% p=0.108) showed no monotonic trend, in contrast to "surgical" (1.5% to 0.6% p=0.035) and no recorded complications (3.8% to 1.3% p=0.035).

4553

Macrophage Extracellular Traps Play Crucial Role in Ischemia/reperfusion Induced Liver Injury

Wu S.[1], Yao W.[1], Hei Z.[1]
[1]The Third Affiliated Hospital of Sun Yat-sen University - Guangzhou (China)

Background and Goal of Study: Hepatic ischemia/reperfusion (I/R) injury is a common complication in the clinical setting. macrophages were implicated in the disease pathogenesis of ischemia/reperfusion induced liver injury, but the precise molecular mechanism remains unclear.
Materials and Methods: Liver tissue and serum samples from patients undergoing partial hepatectomy with or without hepatic portal occlusion were used to evaluate the function of macrophage extracellular traps in I/R induced injury. Hepatic histology, serum aminotransferase level, and serum MPO, dsDNA, NE, LPO and MDA were used to examine the relationship between macrophage extracellular traps and liver injury.
Results and Discussion: In the present study, we find that macrophages released extracellular traps (ETs) comprising DNA fibers and granule proteins in patients underwent partial hepatectomy with hepatic portal occlusion (as shown in Fig. 1).
Figure 1 Immunofluorescence image of macrophage extracellular traps from patients' liver section underwent partial hepatectomy with hepatic portal occlusion; the sections show staining for DNA (blue, bottom inset), CitH3 (green, top inset), and F4/80 (red, middle inset)
Conclusion: Macrophage extracellular traps maybe a novel regulator of hepatic I/R injury.

4589

Medical utilization of Kiosk in the preoperative assessment of the ASA physical status: A pilot study

Paccaud P.[1], Momeni M.[1], Docquier M. A.[1], Van Boven M.[1], Robu C. B.[1]
[1]*Cliniques universitaires Saint Luc; Université Catholique de Louvain - Brussels (Belgium)*

Background and Goal of Study: The use of healthcare Kiosk is increasing in the medical community. However, there are scarse data on its use in a preoperative clinic.1The aim of this pilot study was to validate an electronic questionnaire designed to assess the ASA physical status.
Materials and Methods: 323 adult patients undergoing noncardiac surgery were included. A questionnaire including 20 items (yes/no) was designed and inserted in the Kiosk. The ASA score was then retrospectively estimated by an anesthesiologist not involved in preoperative visit, taking into account the total number of positive answers of the questionnaire inserted in the Kiosk. The answers to the questionnaire from the Kiosk were blinded to the anesthesiologist performing the preoperative visit. Agreement between both ASA scores provided from both anesthesiologists was analyzed using Cohen's Kappa test (κ).

1. On a daily basis, do you have difficulties climbing stairs?
2. Are you taking any medication on a daily basis (for heart, blood pressure, lungs, diabetes mellitus, thyroid, seizure)?
3. Has any member of your family had any problems after anesthesia?
4. Women only: Is there any chance that you would be pregnant at the time of anesthesia?
5. Do you take any medication to avoid blood clotting (Aspirin, Clopidogrel, Sintrom, oral anticoagulants,...)?
6. Have you ever presented any severe allergic reaction to food or to any medication?
7. Are you allergic to Latex (gloves, balloons, condoms,..)?
8. Have you previously had any problems with anesthesia?
9. Do you suffer from asthma?
10. Have you had any asthma attack in the last month?
11. If the answer to question 10 is yes, did you show nocturnal symptoms > 1 per week?
12. If the answer to question 10 is yes, did you show nocturnal symptoms > 2 per week?
13. Do you suffer from sleep apnea?
14. Have you ever presented severe bleeding after minor trauma that necessitated a surgical cauterisation?
15. Do you easily show bruises?
16. Have you ever suffered from severe bleeding after minor surgery (such as appendicetomy, tonsillectomy,...)?
17. Have you ever suffered from severe bleeding after dental extraction?
18. Do you, or do any members of your family have any bleeding disorders?
19. For women only: did you ever have to consult a doctor for severe bleeding during your menstruations?
20. For women only: have you ever suffered from severe bleeding after delivery?

Results and Discussion: Table 1 shows patients' characteristics.

	N = 323
Age (y) median (P25-P75)	43 (31-58)
Sex F;N(%)	160 (49.5)
Surgical risk N(%) high intermediate low	6 (1.9) 130 (40.2) 187 (57.9)

Table 2 illustrates the ASA scores estimated by the Kiosk answers and by the anesthesiologist involved in the preoperative visit. Agreement between both was substantially good with κ=0.628 (P<0.001).

ASA score N (%)	Kiosk	Anesthesiologist
I	169 (52.3)	144 (44.6)
II	140 (43.3)	160 (49.5)
III	13 (4.0)	18 (5.6)
IV	1 (0.3)	1 (0.3)

Conclusion: Our findings indicate that our electronic questionnaire is accurate in estimating patient's physical status. A Kiosk can be used to detect ASA I patients in whom a preoperative visit by anesthesiologist may not be necessarily essential
References:
1. Goodhart I. Eur J Anaesth 2017;34:221-228.

4622

Accuracy of Rad-67 in measuring Non-invasive Pulse CO-Oximetry Hemoglobin (SpHb) as compared with Conventional Laboratory Analysis (LabHb) in Preoperative Evaluation Clinic (PEC)

Thin T. N.[1], Ke Y.[1], Liew G. H. C.[1], Tan P. Y. B.[1], Arasu A. D.[1], Abdullah H. R.[1]
[1]*Singapore General Hospital - Singapore (Singapore)*

Background: In Preoperative Evaluation Clinic (PEC) hemoglobin (Hb) measurement is routinely performed by collecting blood specimen through venipuncture, which takes up to two hours to be processed. It causes a potentially avoidable painful and costly procedure as majority of the patients will have normal Hb values. Moreover, long waiting time for Laboratory Hb (LabHb) results may hinder timely treatment for underlying causes of anemia (Hb<13). A non-invasive spectrophotometry-based technology (Rad-67®; Masimo Asia Pacific Pte Ltd) could be used as an alternative point-of-care Hb measurement. However, there is no conclusive evidence on the accuracy of Pulse CO-Oximetry Hb (SpHb) in preoperative setting. In this study, we aim to determine the acceptable agreement between SpHb and LabHb in Asian pre-surgical population.
Methodology: This is a prospective, observational study conducted in PEC of a tertiary hospital in Singapore. SpHb and perfusion index (Pi) readings were obtained with Masimo Rad-67 Pulse CO-Oximeter and rainbow DCI-mini sensor. SpHb readings were only recorded when perfusion index was >0.75, and signal stability was high. Participant's perioperative data and LabHb values were obtained from routine preoperative assessment. The acceptable agreement limits are set as 1.0 g/dL. Pearson's correlation coefficient and Bland and Altman plot were used to evaluate the agreement between SpHb and LabHb. Linear regression model was used to determine confounding variables.
Results: 396 participants out of 400 were analyzed, 4 were excluded due to nail polish. The Pearson correlation coefficient of SpHb and LabHb was r (394) = 0.759. Bland and Altman analysis showed a bias of 0.145 of the difference between SpHb and LabHb (95%CI: 0.25, 0.039) and standard deviation of 1.07. Assuming the acceptable difference of +/- 1.0 g/dL, 132 (33.3%) were outliers, with 73 (18.4%) over estimating and 58 (14.6%) underestimating the actual value of LabHb. In predicting Hb<13, the sensitivity of SpHb is 74% and specificity is 90.2%. A liner regression showed that smoking (P<0.001) and gender (P<0.001) affect the accuracy of SpHb.
Conclusion: Non-invasive SpHb measurement with Rad-67 adequately predict LabHb value in only two third of the participants. However, it has a high specificity in predicting anemia (Hb<13). It could be used as a preliminary screening tool for low-risk pre-surgical population to minimize time-consuming, painful and costly LabHb analysis.

4638

Nonbeneficial Surgery in Patients undergoing Emergency Laparotomy

Aggarwal G.[1], Quiney N.[1], Emergency Laparotomy Collaborative
[1]*Royal Surrey County Hospital NHS Foundat - Guildford (United Kingdom)*

Background and Goal of Study: Standards of care for patients undergoing emergency laparotomy (EL) continue to improve due to quality improvement initiatives. However, mortality remains several-fold greater than following elective surgery. The aim of this study iwasto characterise patients who undergo emergency laparotomy (EL) in the UK who die soon after surgery, in order to make further recommendations to reduce mortality after EL.
Materials and Methods: Patients from the Emergency Laparotomy Collaborative (ELC)5 database from July 2014 to March 2017 were studied. Anonymised data was extracted on day of death, patient demographics, operative details, compliance with standards of care, and outcomes including mortality and length of stay.
Results and Discussion: Overall in-patient 30-day mortality was 9.8% (1 364/13 953). 38.1% of deaths occurred within 3 days of surgery. Patients who died within 3 days of surgery had significantly higher pre-operative lactate, ASA grade and P-POSSUM scores. In addition, these patients showed a greater degree of physiological derangement. The commonest surgical findings in patients who died within three days of surgery were perforation, peritonitis and bowel ischaemia. Compliance with perioperative standards of care were overall better in patients who died within three days of surgery.
Conclusion: Death within 3 days of surgery, or non-beneficial surgery, occurred in almost 40% of all postoperative deaths. Current methods of predicting mortality work poorly. Evidence suggests frailty can be highly predictive of early death. A new framework for identifying and managing patients who are likely to undergo non-beneficial surgery is identified.

4675

Feasibility study on Sarcopenia screening in preoperative patients with ultrasonographic assessment of muscle mass and functional assessment

Tan P. Y. B.[1], Chew E. S.[1], Lau D. S.[1], Kho Y. Y.[1], Abdullah H. R.[1], Sim Y. E.[1]
[1]Singapore General Hospital - Singapore (Singapore)

Background: Sarcopenia is associated with adverse health outcomes. Its diagnosis requires reduced muscle mass and function. Ultrasound (US) is a new modality for sarcopenia screening. It is advantageous as it is does not require radiation and is portable and rapid. This is a feasibility study on the use of US and functional tests to screen for sarcopenia in the elderly population preoperatively. The primary aims of the study are to assess the feasibility of using US, in terms of time taken and inter-user correlation. Other secondary aims include speed of recruitment (number approached vs number accepted) and correlation between US and functional tests. Materials and Methods: Prospective observational cohort study, involving preoperative elderly patients >= 65 years undergoing elective abdominal surgery. Patients undergo US measurement of rectus femoris (RF) muscle and distal forearm (DF) muscles by an anaesthetist and a radiographer separately on the same day. Upper limb strength was assessed via handgrip strength; lower limb strength was assessed via 6 meter-gait speed and number of stands that the patient can perform from a sitting position within 1 minute (sit-stands). Spearman test was used for inter-rater correlation, and correlation between US and function.
Results: 31 patients were approached. 10 patients were recruited between 15 July 2019 and 10 November 2019. Mean time taken for US assessment was 9.9min for each assessor; inter-rater correlation between US measurements was excellent for RF thickness, R=0.998 (p<0.001), and cross-sectional area, R=0.95 (p<0.001); however, it was poor for DF muscle thickness, R=0.23. Correlation between US and function was not significant, likely due to small sample sizes. Recruitment rate was low – 31%. Often cited reasons for declining to participate in the study were patient fatigue and lack of time.
Conclusion: US measurement of RF thickness and cross-sectional area is the most reliable method of ultrasonographic measurement of sarcopenia. It is feasible within a busy clinical setting, as measurements require less than 10min to perform, and does not require skilled sonographers to perform. More patients are needed to assess the correlation between US measurement of muscle mass and function. This feasibility study will inform the design of a larger scale prospective study to determine the prevalence of preoperative sarcopenia using US and functional tests.

4691

Early removal of urinary catheters after colorectal surgery

De Boer H. D.[1], Smid-Nanninga H.[1], Olieman A. F.[1], Pultrum B. B.[1], Wagenaar W. L. S.[1], Mateboer-Baving M.[1], ERAS Study Group Martini General Hospital Groningen
[1]Martini General Hospital Groningen - Groningen (Netherlands)

Background and Goal of Study: Early postoperative urinary catheter removal decreases urinary tract infection and accelerates patients mobilisation. However, early removal could lead to urinary retention. ERAS Society guidelines for perioperative care recommend routine transurethral catheterization for 1-3 days after colorectal surgery. The duration should be based on known risk factors for retention: male gender, epidural analgesia and pelvic surgery. Low risk patients should have routine removal of the catheter on the first day after surgery, while patients with moderate or high risk require catheterization for up to 3 days. The objective of this retrospective analysis is to investigate the need of recatheterization after removal of the urinary catheter in the recovery room due to retention.
Materials and Methods: We searched for patients in whom the urinary catheter was removed after colorectal surgery in the recovery room (early removal) or at the ward in the period between the recovery room and discharge home (late removal). The primary outcome measure was recatheterization after early removal of urinary catheters due to urinary retention (> 450 ml). The secondary outcome measure was recatherization after late removal.
Results and Discussion: Two hundred twenty six patients could be identified (in 6-month), mean age 67 y (range 22-94 y) for colon (n=132)and rectal surgery (n=94). Data are presented in table 1. Recatherization after early removal of the urinary catheter was needed in 7.5% and 11.7% for colon and rectal surgery respectively. Recatherization after late removal of the urinary catheter was needed in 4.5% and 5.3% for colon and rectal surgery respectively. No urinary tract infections were seen.
Conclusion: Early postoperative urinary catheter removal after colorectal surgery is associated with a relatively low incidence of recatheterization due to urinary retention. Early postoperative urinary catheter removal was not associated with urinary tract infection. Therefore, early removal of the urinary catheter in colorectal surgery is safe and enhances recovery after surgery.

	Colon	Rectal
n°	132	94
m/f	63/69	50/44
no catheter % (m/f)	28.8 (21/17)	2.1 (0/2)
catheter in place % (m/f)	71.2 (42/52)	97.9 (50/42)
early removal % (m/f)	47.7 (27/36)	64.9 (32/29)
recatheterization % (m/f)	7.5 (6/4)	11.7 (5/6)
late removal % (m/f)	22.7 (14/16)	31.9 (18/20)
recatheterization % (m/f)	4.5 (5/1)	5.3 (3/2)

Table 1. Characteristics of urinary catheter management in colorectal surgery

4724

Surgeons' experience and technical efficiency

Nakata Y.[1], Watanabe Y.[2], Otake H.[3]
[1]Teikyo University Hospital - Itabashi-ku (Japan), [2]Waseda University - Tokyo (Japan), [3]Showa University Hospital - Tokyo (Japan)

Background and Goal of Study: Surgeons' experience certainly improves their technical efficiency although it also causes physiological changes with aging. We hypothesized that surgeons' technical efficiency improves with increasing surgeon experience up to a point where it then decreases, which is modeled as a quadratic function of experience with a parabolic shape.
Materials and Methods: We collected data from all the surgical procedures performed at Teikyo University Hospital from April through September in 2013-2019. The dependent variable was defined as surgeons' technical efficiency scores that were calculated using output-oriented Charnes-Cooper-Rhodes model of data envelopment analysis. Inputs were defined as (1) the number of assistants, and (2) the time of surgical operation. The output was defined as the surgical fee for each surgery. Surgeons' experience was defined as the number of years since medical school graduation on the date of surgical procedure. Six control variables were selected; surgical volume, gender, academic rank (full or associate professor), surgical specialty and the year of surgery. We modeled efficiency scores as a function of experience and the square of experience. We performed multiple regression analysis using random-effects Tobit model for our panel data. The efficiency score is a limited dependent variable that lies within the range of 0 to 1, and its distribution is best described by a censored normal distribution. The right censoring limit was set at 1. A p-value < 0.05 was considered statistically significant.
Results and Discussion: We analyzed total 20,375 surgical procedures performed by 264 surgeons in 42-month study period. Their mean experience (standard deviation) was 18.9 (8.8) years. The coefficients of experience and the square of experience were not significantly different from zero (p = 0.694 and p = 0.228, respectively). The coefficients of surgical volume, gender and academic rank were also insignificant (Table).
Conclusion: Surgeons' technical efficiency is not significantly related to their experience.

Table:
Results of multiple regression analysis using an ordinary least squares model. Data are presented as mean ± standard error. No coefficients were significantly different from zero (p < 0.05).

	Dependent variable: efficiency scores (censored)		
	Coefficients	95% Confidence Interval	p-value
Experience	- 0.00132 ± 0.00339	- 0.00786, 0.00523	0.694
Experience^2	0.00010 ± 0.00086	- 0.00006, 0.00027	0.228
Surgical Volume	0.00043 ± 0.00035	- 0.00026, 0.00111	0.222
Gender	0.00377 ± 0.02418	- 0.04363, 0.05116	0.876
Rank (Professor)	- 0.03175 ± 0.02849	- 0.08759, 0.02408	0.265
Rank (Associate Professor)	- 0.00410 ± 0.02183	- 0.04688, 0.03868	0.851

4796

Effect of different time-periods of prewarming on preventing perioperative hypothermia in transurethral resection under spinal anesthesia

Becerra Bolaños Á.[1], Hernández Aguiar Y.[1], Valencia Sola L.[1], Jiménez Gil M. D. C.[1], Trujillo Morales H.[1], Rodríguez Pérez A.[2]
[1]Hospital Universitario de Gran Canaria Doctor Negrin - Las Palmas de Gran Canaria (Spain), [2]Universidad de Las Palmas de Gran Canaria - Las Palmas de Gran Canaria (Spain)

Background and Goal of Study: Perioperative hypothermia is the most common anesthetic complications, increasing the morbidity/mortality of our patients. Active prewarming with hot forced-air devices has demonstrated to be the most effective tool to prevent hypothermia, but it is only recommended in long-term surgeries and its optimal duration has not been elucidated. Both spinal anesthesia associated to the irrigation with liquids at low temperature instilled during transurethral resection (TUR) cause a decrease in the core temperature of the patient. Our aim is to assess the effect of different time-periods of prewarming on preventing perioperative hypothermia during TUR with spinal anesthesia.
Materials and Methods: Once the approval of the Ethics Committee was obtained, we carried out a double-blind randomised clinical trial in patients undergoing TUR under spinal anasthesia. Patients were randomised into four groups: those prewarmed for 15 (p15), 30 (p30) or 45 (p45) min and non-prewarmed patients (control). Prewarming was performed at pre-anesthesia room using a forced hot air blanket. Following data were recorded: age, Body Mass Index, ASA physical status, length of surgery, glycine instilled and operating room (OR) temperature. Core temperature was measured using a tympanic thermometer on arrival at pre-anesthesia room (PreT), at operating room (T0), at 15-min intervals during surgery and at the end of surgery (EndT). Results among groups were analysed using SPSS 24.
Results and Discussion: During 6 months, 215 patients were enrolled and allocated to control group (n=53), p15 (n=54), p30 (n=54) or p45 (n=54). No significant differences were found among groups regarding patient's characteristics, duration of surgery, litres of glycine, OR temperature and PreT. T0 and temperature measurements throughout surgery were significantly higher in prewarmed groups than in control group ($p<0.05$). However, no significant differences were found among different prewarmed groups. Average EndT was 34.97ºC in control group, 35.66ºC in p15, 35.72ºC in p30 and 35.74ºC in p45, being this difference significantly higher in prewarmed groups when compared to control group. No differences were found regarding EndT among prewarmed groups.
Conclusion: Preoperative warming during 15, 30 or 45 min prevent the appearance hypothermia in short duration TUR under spinal anesthesia. However, longer prewarming time-periods do not ensure higher perioperative core temperature.

4841

Discrepancy in reporting of perioperative complications

Gomes N. V.[1], Polutak A.[2], Steiner L. A.[1], Weber W. P.[2], Rosenthal R.[3], Dell-Kuster S.[1]
[1]Department of Anaesthesiology, University Hospital Basel - Basel (Switzerland), [2]Department of Surgery, University Hospital Basel - Basel (Switzerland), [3]Medical Faculty, University of Basel - Basel (Switzerland)

Background: Perioperative complications contribute to patient morbidity and high cost of medical care. Standardized reporting of perioperative complications supports decision-making regarding perioperative care. The aim of our study was to assess the discrepancy between perioperative complications, prospectively recorded within a cohort study, and a retrospective assessment based on all available health records.
Methods: This observational study included 320 patients undergoing any type of surgery at the University Hospital Basel, who were included in the ClassIntra® validation study, a classification for intraoperative adverse events. All intra- and postoperative complications were prospectively graded by the treating physicians according to ClassIntra® and Clavien-Dindo. Additionally, two physicians independently recorded all intra- and postoperative complications based on health records, blinded for each other's assessment and the prospective self-assessment. The number and severity of the retrospective recordings were compared with the prospective records.
Results: Inter-rater agreement between both physicians provided an intraclass correlation coefficient of 0.89 (95% CI 0.86, 0.91) for intraoperative and of 0.88 (95% CI 0.85, 0.90) for postoperative complications. The incidence rate in observing any intraoperative adverse event was almost twice as high after health records review than in the prospective study (IRR 1.79, 95% CI 1.50, 2.13). The grading of the most severe intraoperative complication was the same in 180 patients, higher in retro- than in the prospective data collection in 71, and lower retrospectively than prospectively in 69 patients. The incidence rate in retrospectively observing any postoperative complication was more than double than in the prospectively collected data (IRR 2.21, 95% CI 1.90, 2.56). The grading of the most severe complication was the same in 195 patients, while the grading was higher in 106 patients in the retrospective data collection and lower in only 19 patients.
Conclusions: There is a noticeable discrepancy in the number and severity of reported perioperative complications comparing retrospective with prospective data collection. Gold standard of data collection method remains uncertain. However, based on the double-blinded-assessment of two independent raters, our study renders prospective under-reporting in the ClassIntra® validation study more likely than over-reporting in the retrospective chart review.

5948

The effect of chronic medications on mortality in patients undergoing vascular surgery

Szabo A.[1], Nagy A.[1], Domokos D.[1], Eke C.[1], Gal J.[1], Szekely A.[1]
[1]Semmelweis University - Budapest (Hungary)

Background and Goal of Study: Recently, perioperative care of the patient should be also investigated regarding the long term effect of the applied medications and techniques. We aimed to investigate the role of cardiac, sedative and pain relief medication on the long term outcome after vascular surgery.
Materials and Methods: This single-center, prospective, observational study was performed in our tertiary cardiovascular surgery center, Semmelweis University, Budapest. After the approval of the local IRB, registration on ClinicalTrials.gov was performed (Identifier: NCT02224222). 199 elective vascular surgery patients were enrolled between 2014 and 2017, finally, 164 patients' data were statistically analyzed. Demographical, anthropometrical and medical data were collected. For overall surgical risk estimation, vascular POSSUM score was used. The primary endpoint was the overall mortality, and the secondary endpoint was the short-time (6 months and 1 year) mortality. Cox regression and Kaplan-Meier analyses were used.
Results and Discussion: The follow-up time was 1136 days (median, IQR 923-1398 days). 6 patients (3.7%) died in the first year and 16 (9.8%) died in the second year. 42 patients (25.6%) died during follow up. NSAIDs were used by 9 patients (5.49%), opioid derivates were used by 6 patients (3.66%), beta receptor blockers were used by 78 patients (47.56%). The analysis of preoperative drug administration and overall mortality was shown that the preoperative use of opioid derivates (mostly transdermal fentanyl or tramadol) was more often in the non-survival group (1.64% vs. 9.52%, p=0.019). Aftermath, Cox regression was performed, which was shown a higher odds for mortality in case of preoperative use of opioid derivates (OR: 3.638, 95% CI: 1.293-10.323, p=0.009). After adjusting for age, gender, vascular POSSUM similar result was found (OR: 3.775, 95%CI: 1.271-11.251, p=0.017). The use of beta-receptor blockers adjusted for vascular POSSUM was associated with a lower risk of overall mortality (OR: 0.400, 95% CI: 0.198-0.806, p=0.002).
Conclusion: According to our findings, chronic opioid use could predict worse survival after vascular surgery, in this manner, we could take further steps to identify these patients and keep them under strict control. Using beta receptor blockers could be protective in vascular surgery patients.

Patient Safety

5881

Using HFMEA (Healthcare Failure Mode and Effect Analysis) to Improve Drug Administration Safety in Anesthetized Patients

Hsieh Y. H.[1], Wu S. H.[1], Cheng K. I.[2]
[1]Kaohsiung Municipal Ta-Tung Hospital , Kaohsiung City 801,Taiwan (R.O.C.) - KAOHSIUNG (Taiwan), [2]Kaohsiung Medical University Hospital, Kaohsiung Medical University - Kaohsiung (Taiwan)

Background and Goal of Study: Drug-related adverse events accounted for most and as much as 35% of the total events in the Taiwan Patient Safety Reporting System. The most reported causes were as the followings: a lack of standard operating procedure, an incomplete prescription, overloaded work, and unclearly conveyed oral medical orders. “Improving drug administration safety” therefore was set as one of the International Patient Safety Goal (IPSG).The average drug administration times for one patient was six in our unit. And there were 2 events of drug administration error in recent one year. This project used HEMEA as the tool and proposed an improvement program.
Materials and Methods: We used the Healthcare Failure Mode and Effect Analysis (HFMEA) as the tool, and finally decided whether an implantation of improvement measures was needed by decision tree.The targets were set as the followings: 1. Drug administration error rate dropped from two events per year to zero event per year. Reason: Because the possibilities of causing severe injuries or death existed, no margin was allowed; 2. Rate of repeating medical orders during drug administration above 95%; 3. Rate of confirmation of doctor’s reply during drug administration above 95%. We built a team in April, 2017. Then we drew the flow chart, and ran the hazard analysis. The hazard factors were calculated, and a decision tree analysis was done. The Risk Priority Numbers (RPN) was 489. The improvement measures were as the followings: modifying the procedure protocol documents, establishment of an audit mechanism, education courses, making drugs icons and posts, a consistence of drugs placement, and an exclusive place for drugs and syringes.
Results and Discussion: We re-evaluated the RPN in February 2017, and it dropped from 489 to 365. A 25.6% decline was seen. And drug administration error events dropped from two events per year to zero event per year. The rate of repeating medical orders during drug administration was 100%. The rate of confirmation of doctor’s reply during drug administration above 100%.
Conclusion: Continuous implementation and auditing are necessary. HFMEA could be used as one of the teaching and training topics for new-coming colleagues. The first-time experience might be somewhat subjective. We believe strengthening the reliability of the analysis table is the future direction to work while using HFMEA.

5582

Learning form Excellence as a basis to improve the quality of patient feedback to theatre staff

Hill M.[1], Boekestein K.[2], Henry M.[2], Mosforth V.[2], Yip K. W.[2]
[1]Plymouth General Hospital - PLymouth (United Kingdom), [2]Plymouth Medical School - Plymouth (United Kingdom)

Background and Goal of Study: Learning from Excellence builds on the theory of Safety II where there is a focus on how teams reliably get things right rather than a traditional Safety I focus on when things go wrong. Using this more Appreciative Inquiry approach to patient feedback we aim to test if this has a more positive effect on staff morale. Positive feedback is an important means to shift conversations to support teams to flourish, counter staff burnout and improve patient care.
Materials and Methods: Previous safety culture measurement in 30+ theatres of a 900+ bed tertiary hospital has demonstrated that only 37% of theatre staff receive positive feedback on the work that they are doing. Staff were asked to complete a baseline questionnaire asking specifically about patient feedback. Using questions previously tested in the maternity unit we iteratively tested the questionnaire to assess if patients gave more positive feedback that was attributed to a named staff member. We will also identify the best method to give this feedback to staff and understand the barriers to collecting the feedback and giving it to staff.
Results and Discussion: The safety culture data demonstrated that over 60% of theatre staff do not perceive that they receive meaningful, frequent or useful feedback about the work that they do. Further questioning of 2 specialist theatre teams identified that 47% were unaware of the current patient feedback mechanisms and only 20% had received any form of feedback. In September 2019 there were no named members of staff in the current patient feedback system. Using the new questions 25% had a named job role and 25% a named staff member. This allows more targeted feedback to individuals. We intend to test ways to increase the positive feedback to named staff members and the best way to feed this back to staff. We anticipate having full results for Euroanaesthesia 2020.
Conclusion: We believe that will demonstrate the feasibility of taking the principles of Learning from Excellence to improve the patient feedback to named members of staff and identify the best methods to achieve this. We hypothesise that this will improve the theatre teams’ culture by reinforcing positive behaviours, and has the potential to improve patient outcomes and experience.
References:
1. Learning from Excellence. https://learningfromexcellence.com.
2. Safe and Reliable Healthcare. http://www.safeandreliablecare.com.

5533

MEDIALISATION THYROPLASTY: Alternative strategy of sedation according to material available; When safety determines modus operandi

Aracil N.[1], Kabiri Sacramento M.[1], Saez Ruiz E.[1], Martinez-Hurtado E.[1], Navarro Perez R.[2], Abad-Gurumeta A.[1]
[1]Hospital Universitario Infanta Leonor - Madrid (Spain), [2]Hospital Universitario Clínico San Carlos - Madrid (Spain)

Background: Medialisation thyroplasty is a surgical procedure that sometimes requires “speech monitoring” during the intraoperative period. Many strategies have been used for anesthesic management. We present our experience at a time when the current drug of choice, dexmedetomidine, was not available for these procedures in our hospital.
Case report: We present a case of a patient referred to our team for local anesthesia and sedation during a routine type 1 thyroplasty (medialization laryngoplasty) for repair of recurrent laryngeal nerve injury following total thyroidectomy. The case was managed with Midazolam/Fentanyl with the addition of a continuous perfusion of Remifentanyl and Propofol. BIS (Bispectral index), respiratory frequency and level of sedation by Ramsay score (ranging from 2-4 according to surgical phase requirements) were used for monitoring. Patient and surgical teams expressed a high level of satisfaction.
Discussion: Medialisation laryngoplasty is a surgery scheduled for glottal insufficiency caused by vocal cord paralysis1. It repositions the anterior larynx by placing an alloplastic material in the paralyzed vocal fold and it involves creating a window in the ipsilateral thyroid ala. Some surgeons perform the intervention with general anesthesia and direct visualization to verify medialization2. In other centres, the suitable placement is verified by intraoperatory voice monitoring, besides direct visual inspection. The latter requires an awake and cooperative patient, with no devices that may limit vocal chord visualization. Dexmedetomidine has been considered the best option in recent years3, but it is not always available. A further pharmacological strategy, of adjustable dose and with short half-life such as propofol and remifentanyl, is ideal and may be an option when safety is paramount.
References:
1. Donnelly M et al. Anaesthesia for thyroplasty. Can J An 1995/42:9/pp813-5. 2. Karmarkar A et al.
2. Thyroplasty under total intravenous anaesthesia with intermittent positive pressure ventilation. Eu J An 2007;24:1041–1044.
3. Riedi de Andrade L et al. Sedation using dexmedetomidine and remifentanil with local anesthesia for intraoperative speech monitoring: a case report. Rev Bras An. 2018;68(5):521-523.
Learning points: Continuous perfusion of Remifentanyl and Propofol can be a safe optimal alternative for cases in which collaboration of the patient and a deep plane of sedation are both necessary.

4382

The sterile cockpit, how are we doing in anaesthetic? A survey of practise in a district general hospital

Townley S.[1], Restall D.[1]
[1]Hampshire Hospitals NHS Trust - Winchester (United Kingdom)

Background and Goal of Study: In 1993 , the Federal Aviation Administration in the US introduced the ‘sterile cockpit rule’ precluding pilots from non-essential conversation during the critical phases of flight. In Anaesthetics the concept of ‘the sterile cockpit’ during the critical phases of induction and emergence has gained traction as the importance of human factors in critical incidents has been realised. Background noise can be deleterious to the safe provision of anaesthesia. It is can

be distracting, impair effective communication and become a barrier to effective team working. Moreover, excessive noise on emergence from anaesthesia can affect the quality of patients' recovery through post-operative delirium in addition to adverse neuro-humeral responses.The goal of this study was to survey noise during the induction and emergence of anaesthesia which typically occurs in the anaesthetic room and theatre room respectively.
Materials and Methods: Mean noise data was collected from 30 episodes of induction and emergence across a variety of surgical specialties. The anaesthetic team were blinded to the recordings to ensure normal practise was captured. Induction measurements commenced at pre-oxygenation and ended at transfer to theatre. Emergence recordings commenced as surgery ended through to transfer from theatre.
Results and Discussion: Noise levels were consistently lower(64.1dB) during induction when compared with emergence (78.5dB). Multiple simultaneous staff conversations, door slamming and manipulating surgical instruments were the main contributors . Mean noise recorded during emergence was loud enough to drown out effective communication between anaesthetist and assistant or patient. Furthermore, Peak noise generated was louder than that of an alarming anaesthetic work station. Noise during induction was largely generated by alarming monitors and patient focussed conversation between anaesthetist and assistant. Noise impacts on the quality of patient's emergence leading to post-operative confusion, disorientation and cardiovascular stress responses. The anaesthetic room environment is culturally quieter.
Conclusion: The 'sterile cockpit' rule was evident during induction but not emergence from anaesthesia. An educational package focussing on situational awareness of the extended theatre team could help to mimic the induction environment for anaesthetists and their patients.

4793

A step further from the WHO checklist-The importance of debriefing in managing a complex patient with Duchenne's Muscular Dystrophy in a District General Hospital in the UK

Abdul Ghafoor R.1, Seneviratne R.[1]
[1]North Middlesex University Hospital NHS - London (United Kingdom)

Background: We would like to highlight how the effective use of debriefing and checklists helped manage a complex patient with Duchenne's Muscular Dystrophy (DMD) for emergency endoscopic retrograde cholangiogram (ERCP) in a District General hospital.
Case Report: A 23yr old boy with DMD presented as an emergency for the above procedure. Due to his condition it was decided by the Gastroenterology team for the procedure to be done in theatre. He was diagnosed with DMD at a young age, has been on steroids for the last 12 years and is wheelchair bound. His FVC was 1.92L, has mild cardiomyopathy and an ejection fraction of 60%. Due to severe upper and lower limb contractures prone positioning normally adopted for the procedure was unsuitable. The endoscopic team working in an unfamiliar environment of theatre with anaesthetists and theatre staff can pose clinical and nonclinical issues. Debriefing with team members, use of the WHO checklist improved communication, highlighted clinical, equipment and post procedure issues. Preparation for positioning, use of a vapour free machine, TIVA for intubation avoiding muscle relaxants, arterial line insertion, having Dantrolene in case of unexpected signs of rhabdomyolysis that can compound the management of such a complex patient were some of the anaesthetic issues highlighted. The outcome was a successfully extubated patient at the end of the procedure who was discharged with outreach support to the ward.
Discussion: We would like to highlight the importance of debriefing as a team and the performance of the WHO checklist correctly in reducing human error and improving the care of a patient with Duchenne's Muscular Dystrophy. Evidence from National Audit Projects, NAP 5 specifically has reinforced that human factors, non-technical skills along with checklists reduce errors and improve patient safety. To streamline debriefing we have introduced in addition a new form which proved to be invaluable in this complex scenario which helped in better team working.
Learning points: Debriefing highlights important clinical and nonclinical factors which are significant in the total care of a patient especially when presenting as an emergency with a rare condition as Muscular Dystrophy in a DGH.

5058

Retrospective observational study on perianesthesia nurses in Japan and anesthesia-related complications

Ohyama A.[1], Koga M.[1], Ide Y.[1], Tanaka N.[1], Mihara T.[2], Goto T.[1]
[1]Yokohama City University Hospital - Yokohama (Japan),
[2]Yokohama City University Hospital Center for Novel and Exploratory Clinical Trials - Yokohama (Japan)

Background and Goal of Study: In Japan, anesthesia management has traditionally been performed exclusively by physicians. However, since 2010, postgraduate courses to train nurses in providing anesthetic care have started. The graduates are called perianesthesia nurses (PANs). There are approximately 20 PANs, of which 3 provide anesthetic care under the direction and supervision of anesthesiologists at our hospital. This is the first study to evaluate the safety of anesthetic care provided by PANs.
Materials and Methods: This study was performed with the approval of our institutional ethics committee (B190100001). All patients aged 18 years or older that underwent surgical anesthesia and had an American Society of Anesthesiologists physical status classification (ASA-PS) of I or II, including emergency cases in our hospital between May 2017 and November 2018 and who did not meet the exclusion criteria were enrolled. The patients were divided into two groups according to whether the PAN was involved. The frequencies of anesthesia-related complications were recorded based on the Patient Safety Indicators (PSIs) developed by the Agency for Healthcare Research and Quality in the United States (table 1). Critical accidents, intraoperative hypotension, and desaturation were also examined. The Mann-Whitney U test, $\chi 2$ test, and Fisher's exact test were used for the comparisons.
Results and Discussion: Out of 3944 cases, 554 cases had PAN-involved (PAN group). The PAN group has significantly fewer cases with ASA-PS-IIE classified patients. The frequencies of anesthesia-related complications in the PAN group were similar to the not related group (table 1). Hypotension occurred in 2 cases (2/554=0.4%) in the PAN group and 14 cases (14/3390=0.4%) in the not related group. However, no statistically significant differences were found. No critical accidents and intraoperative desaturation occurred in either group.
Conclusion: The involvement of PANs in anesthesia management under the supervision of anesthesiologists did not produce a statistically significant difference in anesthesia-related complications. No serious complications, such as critical accidents, were observed.

5559

Survey to assess operating room personnel reported improved confidence and performance after In-Situ Interprofessional Operating Room Simulations

Brzezinski Sinai Y.[1], Kaplan G.[2], Fiszer E.[2], Almog O.[2], Weiniger C. F.[2], Levy N.[2]
[1]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel),
[2]Division of Anesthesia, Intensive Care and Pain Medicine, Tel Aviv Medical Center - Tel Aviv (Israel)

Background and Goal of Study: Following a 2-year period of In-Situ Interprofessional Operating Room Simulations (IPORS) for Anaesthesiologists, nurses and ancillary staff, we conducted a survey to assess the OR personnel point of view regarding this program.
Materials and Methods: In-Situ IPORS of crisis events were performed since 2016 in the Tel-Aviv Souraski Medical Center, Israel. The simulations were conducted weekly, duration-30 minutes, during working hours, with support from OR personnel and management. In-Situ IPORS took place in an actual OR, utilizing available equipment and setting. After a 5 minutes briefing, each simulation included a 10-15 minutes scenario depicting perioperative emergency with a mock patient. This was followed by 10 minutes debrief focusing on communication and non-technical skills (teamwork/ situation awareness). Over 90 In-Situ IPORS were conducted in a 2-year period. An anonymous electronic survey, 10-Likert scale questions, was sent by email to 200 OR personnel, including anaesthesiologists (n=89) and OR nurses (n=111).
Results: Survey responses were submitted by 48 OR nurses and 55 Anaesthesiologists (n=103, 51.5%). Among the responders, 80 (77.7%) have participated in > one In-Situ IPORS. Selected survey questions and results are presented in Figure-1. Thirty-six responders reported involvement in managing a real emergency after participating an In-Situ IPORS. When asked to assess the effect of In-Situ IPORS, most of the participants (25/36, 69.4%) stated that the simulation had improved teamwork and their personal performance during the subsequent emergency situation. The survey responses were similar between professions, seniority or age groups (data not presented).

Conclusions: In-Situ IPORS enhanced confidence and teamwork as reported by the participants, and strongly contributed their performance during real crisis. Most responders stated that routine In-Situ IPORS is important and should be mandatory for providers at all levels. In-Situ IPORS were implemented and highly acclaimed by our OR personnel. Weekly In-Situ IPORS are routinely conducted in our OR to the current date.

6213

In situ high fidelity simulation for training and empowering an operating room team for an eventual malignant hyperthermia episode

Mendes J.[1], Telo M.[1], Ferreira R.[1], Bello Dias M. B.[1], Pimentel I.[1]
[1]Hospital da Luz Lisboa - Lisboa (Portugal)

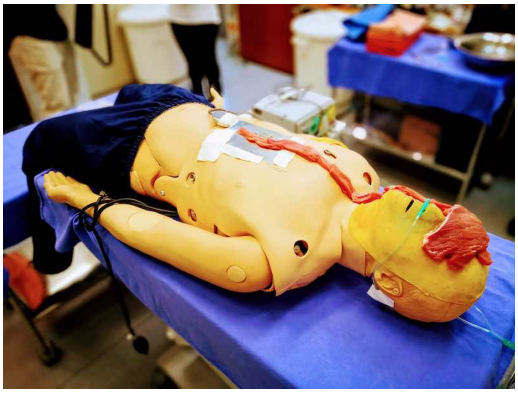
Background and Goal of the Study: During the last decades, in situ simulation has grown exponentially, improving clinical performances and outcomes. We describe a case in which we designed a simulation scenario consisting of a malignant hyperthermia (MH) episode. This was run in the operating room (OR) by a 7-member team that would be responsible, in a week, for a patient with a known ryanodine receptor mutation. We assessed if health professionals showed increased self-confidence in managing such an event after running this simulation scenario, for which we used high-fidelity SimMan® 3G simulation mannequin, by Laerdal.
Materials and Methods: All participants answered a pre-simulation questionnaire. Sociodemographic data and OR experience was recorded initially. Members were also asked to self-assess, using a 1-10 scale, their (1) competence, (2) assurance and comfort, and (3) knowledge on specific roles and duties, in case an MH episode occurred. They then run the simulation scenario and reassessed themselves on the same issues. Pre and post-simulation scores were then compared.
Results and Discussion: Team members were aged 24-52 years. 3/7 (42.9%) had > 10 years' of OR experience but only 1 (14.3%) had been present in an MH episode before. Initial scores on self-perceived competence on MH, self-perceived comfort if in need of managing an MH case and self-perceived knowledge regarding each member's specific roles and duties in case an MH episode occurred were 5.71±1.98, 5.14±1.77 and 6.00±2.45, respectively (1-10 scale). After simulation was run, scores increased by an average of 3.10 ($p<0.01$) – 8.71±0.36 ($p<0.01$), 8.57±0.43 ($p<0.01$) and 8.86±0.55 ($p=0.025$), separately. All members found in situ simulation useful (all scored 10/10) and changes in MH's institutional protocol and emergency cart were proposed and applied.
Conclusion: In situ simulation increases health professional's self-perceived competence and confidence when managing an MH episode and allows changes in MH's institutional protocol and emergency carts, which may ultimately improve clinical outcomes when MH episodes occur.
References:
1. Goldshtein, D. In situ simulation and its effects on patient outcomes: a systematic review. BMJ Simulation & Technology Enhanced Learning. 2019. 0:1–7.
2. Sorensen, A. Training for teamwork through in situ simulations. BMJ Innovation. 2015. 1:144.

5243

The occurrence of fire in a manikin model of oculoplastic surgery

Balbino M.[1], Matayoshi S.[2], Katayama E.[2], Teles J. G.[2], Komatsu M. A.[2], Uchida E.[2]
[1]Centro Universitário São Camilo - Sao Paulo (Brazil),
[2]Universidade de São Paulo - Sao Paulo (Brazil)

Background and Goal of Study: Fire in the operating room is a catastrophic event. We develop a manikin model to study the influence of oxygen flow, degerming solutions, drying time, and the sterile field placement in the occurrence of fire and explosion.
Materials and Methods: Pieces of pork meat covered the manikin's face, along with adjacent pieces toward the manikin's abdomen, to emulate the path for the electric scalpel. Nasal cannula provided different oxygen flows (figure 1). The surgeon then applied the degerming solution over the pork meat and arranged the surgical fields. We then started to cauterize the meat, emulating a real facial surgery. The variables included the oxygen flow (from 3L/min to 6L/min), the degerming solutions (10% hydroalcoholic povidone-iodine, 10% aqueous povidone-iodine or 0.5% alcohol-chlorhexidine), the surgical field arrangement (covering mouth and nose or face uncovered), and the drying time for the solutions (30 seconds, one, two and three minutes). Two cameras on tripods shot all the experiments, on both sides of the manikin (two videos are available).



Results and Discussion: We obtained flames on three occasions: using 0.5% alcohol-chlorhexidine (6L/min of oxygen flow and 30 seconds and one minute of drying time), and 10% hydroalcoholic povidone-iodine (6L/min of oxygen flow and one minute of drying time). There was no fire with aqueous povidone-iodine. The fire appeared only when the surgical field covered the mouth and nose. One of the videos shows fire inside the airway.
Conclusion: Our findings represent some critical hazards the surgeons and anesthesiologists must consider when dealing with a real scenario of oculoplastic surgery.
References:
1. Connor MA, Menke AM, Vrcek I, Shore JW. Operating room fires in periocular surgery. Int Ophthalmol (2018) 38: 1085.

5729

Do you dare to anesthetize on board in a sailboat in half of the atlantic ocean? Experience on board "Juan Sebastian Elcano", Spanish Armada School vessel

Navarro-Suay R.[1], Díaz-Viudes A.[1], López-Soberón E.[1], Castillejo-Pérez S.[1], García-Cañas R.[1], Tamburri-Bariain R.[1]
[1]Hospital Central de la Defensa - Madrid (Spain)

Background and Goal of Study: The Spanish Navy school ship is a 92-year-old vessel named Juan Sebastián Elcano, in honor of the first sailor who went around the world sailing, this year celebrating the 500th anniversary of that feat. The staff is approximately 250 men and women, including a general practitioner, general surgeon, anesthesiologist, nurse and paramedic. The objective of this study is to describe the ship's healthcare and anesthetic capabilities, as well as analyze the anesthetic procedures that were carried out during the 2019 trip.
Materials and Methods: Retrospective descriptive analysis carried out during the year 2019 of the medical assistance provided, using sociodemographic and control variables, qualitative and quantitative variables. It also describes the anesthetic material on board and the surgical procedures performed. Appropriate permits have been obtained.
Results and Discussion: The on-board operating room has a Drager Fabius Tiro® anesthesia tower, gas station (oxygen, nitrous oxide and air), monitors, defibrillator, electrocardiograph, ultrasound, portable respirators, infusion pumps, hemogram analyzer, biochemistry and coagulation. In compliance with 2011 year Helsinki safety regulations there is material for airway (direct laryngoscopy, laryngeal masks, fastract mask, laryngeal tube, airtraq®, frova and cricotomy set), hemorrhage control (red blood cell concentrate, octaplex®, fibrinogen, tranexamic acid, CaCl2), malignant hyperthermia treatment (dantrolene), local anesthetic poisoning treatment (lipid solution), infection treatment, anaphylactic shock treatment, medication labeling, anesthesiological documentation and on-board check. Also, regional anesthesia (epidural, intradural, combined, nerve plexus and ultrasound) can be performed. During the analysis period, only general anesthesia was performed for a perianal infection based on logistic and patient criteria. On three occasions, local anesthesia was performed with sedation for hand wounds.
Conclusion: Anesthesia performance in an oceanic environment depends on logistic and personal factors. Authors recommend that the anesthesiologist have naval experience and be trained to practice anesthesia on board. The material and capabilities of the vessel allow for urgent procedures on this vessel.
Acknowledgements: Spanish Navy.

6237

Patient safety in colorectal surgery ERAS protocol: hospital stay, complications and economic impact

Abad-Gurumeta A.[1], Abad-Motos A.[1], Ripollés-Melchor J.[1], Saez-Ruiz E.[1], Paseiro G.[1], Fuenmayor M. L.[1]
[1]Hospital Universitario Infanta Leonor - Madrid (Spain)

Background and Goal of Study: The implementation in recent years of ERAS protocols in abdominal surgery is supported by scientific evidence and it is very important for patient safety. In our hospital, a multidisciplinary work group was created since 2015 for the application of ERAS protocols in colorectal surgery. Our objective was to analyse in colorectal surgery, the average hospital stay, complications and its economic impact since the Pre-ERAS period, the beginning of its application (initial ERAS) and the most recent period (consolidated ERAS).
Materials and Methods: This audit of colorrectal surgery was analysed from our hospital database from 2013 to 2018. We studied Pre-ERAS Period (2010-2013, Initial ERAS period (2013-2015), Consolidated ERAS period (2016-2018).The average standard hospital and critical care unit stay, complications in colorectal surgery of the hospital's own database were analysed. The differences in average hospital stays were compared with the calculation of the average cost in euros (2019) of standar hospital and critical care unit stay day.
Results and Discussion: The average of total hospital stay was: Pre-ERAS Period (2010-2013) n=360, of 13 days (2 days critical care unit stay and 11 days of standard hospital stay). Initial ERAS period (2013-2015) n=319, was 11 days (1.5 day critical care unit stay and 9.5 standar hospital stay). Consolidated ERAS period (2016-2018) n=376, was 6.5 days (1 of critical care stay and 5.5 of standard hospital stay).(59.8%) patients developed at least one complication in the Pre ERAS group, versus (51.10%) in the Post-ERAS group . More patients in the Pre-ERAS group developed moderate or severe complications (31.9% vs. 22.26%, p = 0.009); and severe complications (15.5% vs. 5.3%; p < 0.0001). The estimated cost of the average standar hospital stay per day in 2019 was 256 euros; 1,637 euros for critical care unit. The cost per patient was: Pre-ERAS group 6,090, initial ERAS 4,887.5 and consolidated ERAS 3,045 euros. What is a saving comparing the consolidated group with the pre-ERAS and initial ERAS of 3,045 and 1,842.5 euros respectively. The consolidation of ERAS protocols in colorectal surgery would mean an economic reduction of 50% compared to Pre-ERAs and an initial 38% ERAS attending only medium stays.
Conclusion: The consolidated application of the ERAS protocols based on scientific evidence had an important patient safety and economic impact on the health system.

6132

Incidence of residual neuromuscular blockade and postanaesthesia care unit complications

Fernandes A. L.[1], Lopes M.[1], Mendonça M.[1], Costa D.[1], Zenha S.[1], Freitas S.[1]
[1]Hospital Central do Funchal - Funchal (Portugal)

Background and Goal of Study: Postoperative residual neuromuscular blockade (RNMB) continues to be a prevalent problem in the postanaesthesia care unit (PACU) despite the use of short acting neuromuscular blocking agents, availability of appropriate monitoring and neuromuscular blockade reversal drugs. The incidence of RNMB is estimated at 26% in Portugal1. This study aims to assess the incidence of RNMB and its perioperative impact in our hospital.
Materials and Methods: After approval by the institutional ethics committee, a prospective observational study was conducted for 6 months, including consenting adult patients scheduled for elective surgery, requiring general anaesthesia and neuromuscular blocking agents. Upon arrival at the PACU, neuromuscular blockade was assessed with a TOF-Watch SX® device. Three readings were made and the average train-of-four (aTOF) value was recorded. RNMB was considered when aTOF<0.9. The primary outcome was to assess the incidence of postoperative RNMB. The secondary aim was to investigate the association between PACU complications and the TOF ratio upon arrival at the PACU.
Results and Discussion: 104 patients were included in the study. RNMB incidence was 16.3%. Clinical signs of RNMB (failure to lift the head and inability to do tongue protrusion for 5 seconds) were associated with an aTOF < 0.9 (35.3% vs 8%, p=0.002). Patients with RNMB had more critical respiratory events, namely severe hypoxemia, defined by a peripheral capillary oxygen saturation <90%, (35.3% vs 3.4%, p=0.000). Hypothermia occurring intraoperatively and at admission at PACU was associated with an aTOF<0.9 (p=0,008 and p=0,000, respectively). Richmond Analgesia and Sedation Score at admission and Aldrete Score upon discharge were lower in patients with RNMB (p=0.011 and p=0,003). PACU and hospital stay were longer in patients with RNMB (160 min vs 105 min, p=0.003; 6 days vs 3 days, p=0,002).
Conclusion: Despite the limitations of this study, it is evident that RNMB remains a common problem that must be prevented and treated promptly, since it is associated with important complications, such as severe hypoxemia, with critical implications for patients. Moreover, it is associated with longer PACU and hospital stays, with its inherent risks and costs.
References:
1. Esteves S et al. Incidence of postoperative residual neuromuscular block in the postanaesthesia care unit: an observational multicentre study in Portugal. Eur J Anaesth 2013.30,243-9.

5602

Guideline for managing Deep Brain Stimulators's in the OT-'Stimulating' Safe anaesthesia

Anderson W.[1], Cody C.[1], Ranganath A.[1]
[1]James Connolly Memorial Hospital - Dublin (Ireland)

Background and Goal of Study: The increasing use of Deep brain stimulators (DBS) for a variety of movement, pain and psychiatric disorders will inevitably result in them being encountered more frequently by the anaesthesiologist. The increasing prevalence of these devices among the general population poses a new challenge for the unfamiliar anaesthesiologist when such patients present for elective and emergency surgery.
Material and methods: Here we describe the management of a 630yo gentleman with Parkinson's disease and an implanted DBS, who presented for an emergency reverse shoulder replacement having fractured his Humerus in a motor vehicle collision. The patient had a device to turn off the DBS however could not use it. The unfamiliarity of the clinical staff with the device resulted in the inability to deactivate the DBS for surgery. This resulted not only in patient monitoring issues, a risk in itself but also a potential risk to the patient with regard to diathermy and damage to his Basal Ganglia. The lack of a formal guideline in our institution for such cases prompted a literature review and production of a local guideline. The aim of this is to provide the anaesthesiologist with a step by step guide in order to provide safe anaesthesia and decrease morbidity in this specific patient population.

5159

Anaphylaxis drugs and equipment availability at Oxford University Hospitals NHS Foundation Trust: an audit

Spangenberg A.[1], Murphy L.[1], Dare O.[2]
[1]John Radcliffe Hospital - Oxford (United Kingdom),
[2]John Radcliffe Hospital - Oxford (United Kingdom)

Background and Goal of Study: The NAP6 audit of perioperative anaphylaxis (NIAA/RCoA) made recommendations for the drugs and equipment that should be immediately available in the event of anaphylaxis during anaesthesia1. We audited the availability of anaphylaxis equipment in 108 non-theatre locations across three major Oxford hospitals (John Radcliffe Hospital, Churchill Hospital, and Nuffield Orthopaedic Centre) and aimed to analyse how prepared each clinical area was in the event of anaphylaxis, with a view to creating a standardised high quality anaphylaxis kit based on the NAP6 recommendations, to improve its management.
Materials and Methods: A list of all 171 clinical areas equipped with a resuscitation trolley was generated and a visual audit undertaken during July 2019 in 108 locations (63%). Data were collected about: availability and form of anaphylaxis medications; availability of additional equipment recommended in NAP6; signposting and security of storage location; availability of a national anaphylaxis algorithm; and completion of daily checks.
Results: · 33(31%) were not storing anaphylaxis medications in a secure location; · 20(19%) had no signage to indicate the medication storage location; · 59(55%) did not keep anaphylaxis medications together in a marked box; · 9(8%) had no intramuscular Adrenaline available, and 33 (31%) did not stock second-line anaphylaxis drugs; · 21(20%) did not store the needles and syringes required for administering Adrenaline; · 78(72%) had no printed anaphylaxis algorithm; · 17(16%) had no equipment for collecting serum tryptase samples; · 51(47%) had not documented the required daily check of anaphylaxis medication.
Conclusion: Few locations stored the drugs, equipment, and protocols required to rapidly manage anaphylaxis according to national guidelines, with a small but alarming number stocking no Adrenaline, and the majority having no access to guidance for managing this time critical situation. This demonstrates a clear need for standardisation of anaphylaxis equipment across clinical areas, for example with a kit containing the drugs, equipment and guidelines recommended by NAP6. A kit proposal is currently being created, with the intention of a staged introduction

across clinical areas, and in-situ simulation to optimise contents and layout before a Trust-wide rollout.

References:
1. Cook T, Harper N. Anaesthesia, Surgery and Life-Threatening Allergic Reactions. London; Royal College of Anaesthetists: 2018.

4380

Implementation of nursing care protocol in anesthesia and its effect on safety and teamwork climate

Lemos C. D.[1], De Brito Poveda V.[2]
[1]University of Sao Paulo-School of Nursing - Sao Paulo (Brazil),
[2]University of São Paulo-School of Nursing - São Paulo (Brazil)

Background and Goal of Study: Using anesthesia care protocols can organize and standardize operating room nurse's work, improve the exchange of information, highlight the importance of the operating room professional and contribute to patient safety and prevention of adverse events. This study aims to analyze the safety and teamwork climate of professionals involved in the anesthetic procedure before and after the implementation of an anesthesia nursing care protocol.
Materials and Methods: A quasi-experimental study with a pretest-posttest design, developed in three stages in the operating room of a private hospital in São Paulo, involving anesthesiologists and assistants nurses. In the first and third stages, the "Safety Attitudes/Operating Room Version (SAQ/OR) and the "Team Climate Scale (TCS)" questionnaires were applied to all professionals included in the study. In the second stage, the care protocol defined as a Patient Safety Checklist: Nursing in Anesthetic Procedure (PSC/NAP) was implemented by nurses for a period of six months, in surgeries of adult patients undergoing general anesthesia. Data were analyzed using descriptive statistics and linear mixed effects regression model.
Results and Discussion: Nineteen (30.1%) nurses and 44 (69.8%) anesthesiologists participated in the study, with the implementation of the protocol in 282 anesthetic procedures. Differences in safety climate perception were observed among professionals, with mean SAQ/OR score variation from 62.5 to 69.2 and significant change (p=0.02) among anesthesiologists in the management perception domain. As an effect of the implementation of the protocol, there was an increase in the SAQ/OR score, on average 4.12 points, related to the factors nurse position (β = –2.11), age (β = 0.26), gender male (β=−3,62) and work experience (β= 0,22). Nurses and anesthesiologists showed a significant increase in the mean score on the TCS questionnaire (p=0.01) after the intervention, with emphasis on the "Team Participation" (p=0.004) and "Task Orientation" (p=0.04) domains, which generated an increase of 60.09 points and was related to the professional experience factor (β= −0.12).
Conclusion: The implementation of the nursing care protocol CSP/EPA generated changes in the perception of safety and teamwork climate of nurses and anesthesiologists.

4570

Should electronic anaesthetic record systems (EARS) be made mandatory for all surgical procedures?

Weatherhead W.[1], Gupta P.[2], Chung A.[3]
[1]Harrogate District Hospital - Harrogate (United Kingdom),
[2]Leeds General infirmary - Leeds (United Kingdom),
[3]Newcastle University - Newcastle (Australia)

Background and Goal of Study: The purpose of this study was whether it should be mandatory to implement electronic anaesthetic record systems (EARS) by evaluating the accuracy (percentage difference) between the manually documented data and electronically generated data.
Materials and Methods: Data was prospectively collected for forty patients who had their AAGBI recommended basic monitoring parameters recorded manually on the anaesthetic chart every five minutes. After the patient was discharged to the patient ambulatory care unit (PACU), a 30-minute time interval within the patient's intraoperative period was selected randomly on the anaesthetic chart. The manual documentation of heart rate, SP02 (haemoglobin saturation), systolic and diastolic blood pressure was compared with the corresponding electronic readings recorded automatically on the anaesthetic machine. Microsoft® office 2010 excel was used to analyse the data.
Results and Discussion: There was a mean difference of 11.2% (s.d. 7.14%) between all electronically produced and manually recorded parameters. The range of absolute percentage difference between electronically produced and manually recorded observations was 39.54% (Figure 1). The interquartile range of absolute percentage difference between electronically produced and manually recorded variables was 7.61%. The difference between the manual and electronically recorded data was not significant (p value 0.14, two-tailed t test).
Conclusion: Our study shows a statistically insignificant (p value >0.05) difference of 11.2% between electronic and manual documentation of basic monitoring parameters. This suggests that EARS is not mandatory but should be used wherever available.

4592

Informed consent for surgical patients in an University Hospital: an obligation for all procedures

Vieira A.[1], Santos S.[2], Infante C.[1], Castro M.[1], Martins I.[1], Costa G.[1]
[1]Centro Hospitalar Universitario de Coimbra - Coimbra (Portugal),
[2]Centro Hospitalar Universitário de Coimbra - Coimbra (Portugal)

Background and Goal of Study: Informed consent (IC) is fundamental in patient care.(1,2) It works as a safeguard of patient's rights and minimizes the chance of legal actions against the physician.(1) The portuguese standards for IC are available for public consultation.(3) The aim of this study was to assess the quality of consent form fulfilment in patients undergoing surgery, identify common mistakes and potential areas for improvement.
Materials and Methods: Prospective audit was carried out in september 2019 with the analysis of clinical files from patients who undergone elective and emergence surgery. The consent forms were reviewed for the following information: fulfilment of consent, patient signature, description of procedure, objective and potential benefits, complications and risks associated. 202 clinical files were randomly selected.
Results and Discussion: Only 47% of the clinical files were filled. Other results were: unsigned consents 55%; absence of procedure's description 53%; only 23% had the descrition of goals, potentials benefits, complications and risks. Merely 1% had information about the anesthesia technique. With these alarming results we felt the need to improve the performance of consent form completion. It's important to remind that IC it's not just a piece of paper, it belongs to a process of patient's clarification and empowerment, raising satisfaction. On the other hand, interventions in this process will enhance the quality of health care provision and as a result, surgeons and anaesthesists will be better protected in legal matters.
Conclusion: The quality of the already existing IC protocol is less than ideal. We'll be sharing these results with all stakeholders involved in the process, this is essential for raising awareness of institutional need of the IC, given its binding and legal nature. We should involve all departments and discuss the best way to create a standardize protocol so the IC could reach all patients. It's urgent and pertinent to elaborate an anesthetic consent form. After these interventions a new audit should take place.

References:
1. Bajada S, Dwamena S, Abdul Z, et alImproving consent form documentation and introduction of procedure-specific labels in a district general hospital. BMJ Open Quality 2017;6.
2. Norma da DGS nº 015/2013 de 04/11/2015. Consentimento informado, esclarecido e livre dado por escrito. Direcção Geral Saúde, Portugal.

4829

Assessing supervision in Forth Valley Royal Hospital using 'The Cappuccini Test'

Samuel J.[1], Mcaleer K.[1], Hawkins M.[1]
[1]Forth Valley Royal Hospital - Larbert (United Kingdom)

Background and Goal of Study: The case of Frances Cappuccini has highlighted the importance of a robust system for supervision of non-consultant level anaesthetists. Our aim was to use 'The Cappuccini Test' to assess the level of supervision given to SAS (Staff Grade, Associate Specialist and Speciality Doctors) and trainee anaesthetists in Forth Valley Royal Hospital (FVRH). Trainees working independently have a named supervisor who is twinned with a competent assistant, so available if required. There is a 'starred' consultant for other issues, including problems from SAS anaesthetists, and if the named consultant is not available. Supervisors are highlighted at the team brief, identified on the rota, and written on the whiteboard, so the whole team is aware who to contact in an emergency.
Materials and Methods: Between July and August 2018, theatre lists with trainees acting independently were identified. Each trainee was asked if they knew who their supervisor was and how to contact them. The supervisor was then contacted to ensure their pager was working, asked if they were aware who they were

supervising, what list the trainee was covering and if they could assist if required. The 'starred' anaesthetist was also contacted to check if they were aware they were 'starred', if their pager was working, and if they could help if needed.
Results and Discussion: 17 theatre lists were audited. 100% of trainees knew who was supervising them and how to contact them. 1 supervisor could not be contacted via their pager as the battery no longer worked. 100% of supervisors knew who they were supervising and what list their trainee was covering. 94% were available to attend if there was an emergency. The 'starred' anaesthetist knew they were starred, had a working pager, and would be available if there was an emergency 100% of the time.
Conclusion: Compared to data presented at 'Anaesthesia 2019' (showing only 37% of independent trainee lists audited across 7 Trusts could answer yes to all above questions), we have an effective system in FVRH for supervision of non-consultant anaesthetists. Identifying a specific person allows trainees to discuss predicted issues/ concerns and to feel confident help would be available. Though a pager system may seem old fashioned, it avoids contact problems that could be associated with network/ Wi-Fi signal. We also have a Fast Page system to alert people to come directly to the theatre, minimising time wasting during an emergency.

5329

Peer responders: the second victims' programmes clue

Magaldi Mendaña M.[1], Perdomo J. M.[1], Gomar C.[1], Tena B.[1], Gomez L.[1], Feu F.[1], SIMCLINIC
[1]Hospital Clinic of Barcelona, University of Barcelona - Barcelona (Spain)

Background and Goal of Study: The development of second victim programmes is paramount in line with the growing culture of safety and opening disclosure of adverse events. Experience from important groups such as that of Johns Hopkins demonstrate that a first effective and accessible support source to second victims is necessary. The so-called "peer responders", should have tools to help them emotionally and detect unusual second victims course. These skills are known as "psychological first aid". The aim of this study is to assess health professional's perception of the second victim phenomenon as well as the colleagues' capability to become peer responder.
Materials and Methods: Different health professionals (nurses, training residents, anaesthesiologists, paediatrics and clinical assistants) were invited to respond anonymously an online survey between 2017 and 2019.
Results and Discussion: 130 (28.44%) residents and 327 (71.56%) health professionals completed the survey. 84% of responders were women, mostly nurses and anaesthesiologist (71% and 20.4%, respectively). When it comes to years of experience, 69% reported more than 10 years. Regarding the peer responder perception, almost 67% had faced a second victim situation as helpers. Despite 75% had actively sought ways to help them, 90,5% considered they did not have enough tools to help the second victim. Finally, only 39% believed their institution have an opening disclosure of adverse events, while the remaining 61% affirmed there is still a punitive, evasive or silent culture.
Conclusions: - Almost 2/3 parts of residents and professionals have faced a second victim situation. - Unfortunately, although most of peer responders sought to help second victims, they considered not to have enough skills. - Therefore, institutional training, educational and organizational programs are urged to enable their professionals to act effectively as peer responders for a second victim.
References:
1. Edrees H et al. Implementing the RISE second victim support programme at the Johns Hopkins Hospital: a case study. BMJ Open. 2016;6(9):e011708.

5935

Cappuccini Test for Clinical Supervision, its application in practice

Enohumah K.[1], Shelton C.[1], Ruslan N.[1]
[1]Tameside General Hospital - Manchester (United Kingdom)

Background and Goal of Study: In October 2012, Frances Cappuccini, died from airway complication following Caesarean delivery of her baby. The coroner argued that 'The supervision arrangements in respect of [the anaesthetist] were undefined and inadequate and no-one was aware who was supervising him and their availability'. In 2018, Cappuccini Test was proposed and four questions (Appendix) were directed at the trainees and SAS doctors working alone and at their supervisors (1). The aim of the audit was to ascertain the level of supervision of the trainees/SAS doctors (supervisees) and theatre activities awareness by the consultant (supervisor) during an on call duty.
Materials and Methods: In our department we have the CLWRota system in use. This makes it easy to access anaesthetics staff phone numbers and contact staff directly. All anaesthetic trainees and staff grade doctors (supervisees) on call were contacted via their phones or through hospital bleep system. In addition to the proposed four questions (1) we asked the supervisors further questions to gauge the level of situation awareness of the supervisee's on call work activities. The audit lasted 2 weeks.
Results and Discussion: During the audit period we were able to contact 16 supervisees (5 trainees and 11 SAS doctors)and 8 consultants. During the audit period of the out-of-hours on call, 90% of supervisee (100% of trainees, 79% of staff grades) were able to correctly identify their supervisors. Similiarly, 90% of supervisors correctly identified their supervisee (96% of trainees, 83% of staff grades). The supervisors were contactable immediately in 80% of the time. In 73% of the time, the supervisors have some level of awareness of what the supervisees were doing (80% for trainees, 65% for staff grades) in theatre.
Conclusion: Our audit highlighted areas of good level of supervision for our trainess and SAS doctors and a good supervisors' awareness of theatre activities out of hours. However, we are still concerned with the small number of inability of trainees/SAS doctors to contact supervisors with potential serious patient safety issues. We have recommended a routine supervisor-supervisee 'check-in' at the start of duty.
References:
1. Bogod D. The Cappuccini Test. RCoA Bulletin 2018;114:36–37 (bit.ly/RCoA-CappTest).
2. Kenyon C and Beattie J. Putting the Cappuccini test into practice. RCoA Bulletin 2019;116:46–47.

5928

A virtual early warning score using "fuzzy logic" – MEDIWARN

Scicluna J.[1], Sciberrras S.[1], Attard Cortis P.[1], Laferla G.[1], Scuderi V.[2], Nicosia S.[2], Interreg Italia Malta Mediwarn
[1]Mater Dei Hospital Malta - Msida (Malta), [2]Azienda Ospedaliero Universitaria Policlinico Vittorio Emanuele - Catania (Italy)

Background and Goal of Study: The regular measurement of vital parameters by nurses and evaluating them by using an Early Warning Scores (EWS) is crucial in detecting deteriorating patients. This allows a timely attempt at optimisation, reducing patients' morbidity and mortality and potentially sparing critical care beds. However, EWS use is limited by human factors such as availability, subjectivity, tiredness and costs. The aim of our project is to devise a wireless system which calculates a parameter severity score directly and alerts medical practitioners via common handheld devices. This system has been coined as 'MEDIWARN'.
Materials and Methods: We reviewed data sets from ambulatory tests such a Holter ECG, sleep labs and monitored in-patients to analyse the variability of data and establish criteria for normal patient parameter ranges for heart rate, oxygen saturation, respiratory rate, blood pressure and temperature. We have also used real live values available on the MIMIC-III Clinical Database to corroborate our initial data set. We hence devised an algorithm based on "fuzzy logic" electronic principles that will allow early detection and warning of patient deterioration. The results were compared statistically to traditional early warning scores to establish reliability and validity of this new system.
Results and Discussion: Purposely designed computer simulators indicate that the Mediwarn algorithm is a useful tool that can be used to detect early deterioration using common non-invasive parameters. We intend to use the MEDWARN "fuzzy logic" in a future trial on patients in comparison to traditional methods.
Conclusion: This innovative project will be advantageous to traditional methods to detect timely intervention in deteriorating patients, in acute medical and surgical wards. This quasi automatic system will also help in reducing staff and medical costs.
References:
1. MIMIC-IIIClinical database https://physionet.org/content/mimiciii/1.4/, Johnson, A., Pollard, T., Mark, R. (2016). MIMIC-III Clinical Database. PhysioNet. doi:10.13026/C2XW26, Beth Israel Deaconess Medical Center in Boston, Massachusetts.
2. Ross, Timothy J. Fuzzy logic with engineering applications. John Wiley & Sons, 2005.
3. Early Warning Score, https://www.england.nhs.uk/ourwork/clinicalpolicy/sepsis/nationalearlywarningscore.
Acknowledgements: European Development Regional Funds, as part of the INTERREG V-A Italia – Malta collaboration.

5871

Would the Surgical Safety Checklist Prevent Anaesthesia Patient Safety Incidents?

Panadero Del Olmo L.[1], Heras Hernando V.[2], Heras Hernando V.[1], Gisbert De La Cuadra L.[1], Real Valdés R.[1], Arnal Velasco D.[1]
[1]Hospital Universitario Fundación Alcorcon - Alcorcon (Spain), [2]Hospital Universitario Fundación Alcorcon - Alcorcon (Spain)

Background and goal of the study: The Surgical Safety Checklist (Checklist) has proved to reduce mortality and complications in surgical patients (1). Despite its proved benefits, Checklist implementation and compliance are variable and inconsistent (2). Aim: to describe the patient safety incidents (Incidents) avoidable through a well-executed Checklist. Describe the Incidents where the Checklist prevented or reduced the patient harm.
Materials and Methods: We retrospectively studied the Incidents reported during 2018 in the Spanish Anaesthesia Incident Reporting System (SENSAR). We selected those Incidents that had all corrective actions implemented (closed incidents). From these, two authors performed a manual review of those reported from the surgical area (operating room or pre-anaesthesia space) searching for incidents that could have been avoided through a Checklist or those that the Checklist actually prevented or minimized harm. In case of discrepancy, a third author participated in a discussion to reach a consensus.
Results and Discussion: In a database of 109 hospitals, 1427 incidents were reported in 2018. Of these, 211 were closed incidents that took place in the surgical area (Fig). Among this group, 67 (31,75%) were related to the Checklist (Table). The most common type of Incident related to the Checklist were those regarding equipment and medication.
Conclusions: Anaesthesia Incident reports are frequently related to Checklist and its better implementation could further reduce or avoid harm. Incident Reporting Systems can provide a qualitative description to highlight the Checklist success histories or its gaps.
References:
1. Haynes AB. N Engl J Med. 2009;360: 491-9.
2. Gillespie, B. M. Implement Sci. 2015;10: 137.

5767

Incidence of local anesthetic systemic toxicity (LAST) in a high complexity hospital

Aponte-Gatica J. F.[1], Sommer Alias D`abate M. J.[1], Waldhorn M.[1], Salgado S. S.[1], Stinga J. L.[1], Teijido C. A.[1]
[1]Hospital Italiano de Buenos Aires - Ciudad Autónoma de Buenos Aires (Argentina)

Background and Goal of Study: Local Anesthetic Systemic Toxicity (LAST) can occur in any situation local anesthetic are used. The incidence of severe systemic toxicity varies, from 1:500 to 1:10000. In most adverse event reports, incidence LAST is described as 1:10,000 for epidural anesthesia and 1:1000 for peripheral nerve blocks. Therefore, we wanted to describe LAST's incidence in our institution surgical areas.
Materials and Methods: A retrospective analysis of 2018 was made using the clinical records and pharmacy records. We included all regional anesthetic techniques found in the anesthesia clinical records. Excluded were the cases where local infiltration or intravenous LA were used. From the pharmacy records we obtained the ID from patients who received lipid infusion as treatment. Then, a review of those clinical records to confirm the LAST event associated with regional. We calculated the general incidence of LAST in 2018, per surgical area, and per regional anesthetic technique.
Results and Discussion: A total of 4964 regional anesthesias were performed in year 2018; 2365 spinal, 1023 epidural, 1575 peripheral nerve blocks. Six patients required lipid infusion; 3 cases of LAST were associated to regional anesthesia (1 TAP Block in Central Operating Room (OR), 1 femoral nerve block in Orthopedics OR, 1 epidural anesthesia Obstetrics OR). The other three cases were: 1 case of lidocain venous continuous infusion, 2 cases of use by the surgeon (these cases were excluded). General incidence was 0.6 /1000. Incidence per regional anesthesia was 0.9 /1000 per epidural anesthesia; 0/1000 for spinal anesthesia; 1.2/1000 per peripheral nerve block. We can say that our incidence of LAST is in concordance with other reports. As study limitations we believe that there can be subclinical complications, non diagnostic by anesthesiologists; being the data collection based on records, the incidence may be underestimated because of unreported and sub registry. However, with our method, we were able to detect case of LAST not reported by the anesthesiologist and not related to regional anesthesia.
Conclusion: Further investigation in this area is needed, and using LAST incidence as quality and safety indicator should be considered.

4799

A systematic review with meta-regression and meta-analysis of perioperative mortality in older patients

Braz L. G.[1], Braghiroli K.[1], Einav S.[2], Morais A.[1], Porto D.[1], Braz M.[1], Anaesthesia Cardiac Arrest and Mortality Study Commission
[1]Department of Anaesthesiology, Universidade Estadual Paulista (Unesp), Botucatu, Brazil - Botucatu (Brazil), [2]Shaare Zedek Medical Centre and Hebrew University, Faculty of Medicine - Jerusalem (Israel)

Background and Goal of Study: Population ageing around the world is increasing dramatically. The percentage of patients classified as ASA physical status ≥ 3 has increased with age and older patients contributed to 1/3 of all surgeries1. This is the first review on global perioperative mortality rates in older patients according to country Human Developed Index (HDI) and time. We tested the hypothesis that perioperative mortality rates are related to country HDI status and have decreased by time.
Materials and Methods: The Institutional Review Board deemed the study exempt from review. A systematic review was performed using electronic databases to identify studies in which older surgical patients presented perioperative mortality rates. Observational studies that reported perioperative mortality rates up to the seventh postoperative day in patients aged ≥ 60 were included. Perioperative mortality rates were analysed by time and country HDI status using a fixed-effects model to perform meta-regression. A random-effects model was applied to perform proportion meta-analysis to compare perioperative mortality rates by country HDI (low-HDI versus high-HDI) and by time periods (pre-1990 versus 1990-2019).
Results and Discussion: Twenty-five studies from 12 countries with more than 4 million anaesthetic procedures were included. Perioperative mortality rates decreased over time (P = 0.031) but not according to country HDI status (P = 0.26) by meta-regression. When comparing pre-1990 to 1990-2019 by meta-analysis, in high-HDI countries, the rate per 10,000 anaesthetics of perioperative mortality decreased from 100.85 before 1990s to 12.98 in 1990-2019 (P < 0.0001). Any analysis could be performed in low-HDI countries since no study evaluated perioperative mortality before 1990s. In the period 1990-2019, perioperative rates were not different between low- and high-HDI countries (P = 0.40). Both meta-regression and proportion meta-analysis showed similar trends of perioperative mortality.
Conclusion: There is a decrease in perioperative mortality over time but not according to country HDI. There is evidence that perioperative mortality rates have declined over the past 55 years in the older patients, highlighting that perioperative safety is increasing regardless of HDI countries.
References:
1. Deiner S, et al. J Am Geriatr Soc 2014;62:829-35.
Acknowledgements: CAPES.

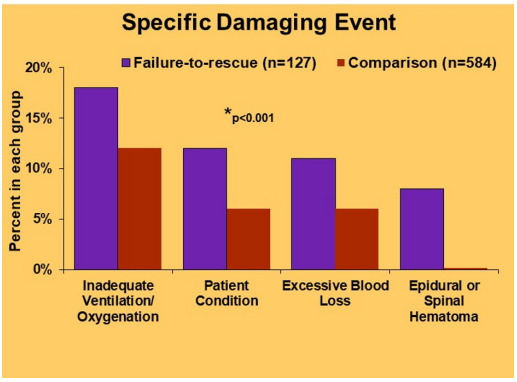
5209

Failure-to-rescue as a contributor to high severity outcomes in anesthesia malpractice claims

Domino K.[1], Zhu M.[1], Mincer S.[1], Posner K.[1]
[1]University of Washington School of Medicine - Seattle (United States)

Background: Failure-to-rescue (mortality after a surgical complication) strongly contributes to surgical mortality. As anesthesiologists provide postoperative management and critical care, anesthesia care may be a factor affecting failure-to-rescue. We utilized the Anesthesia Closed Claims Project database (Anesthesia Quality Institute/American Society of Anesthesiologists) to study clinical factors associated with postoperative deterioration resulting in permanent, disabling outcomes or death.
Materials and Methods: Inclusion criteria were 1) patient sustained permanent disabling outcomes or death (injury severity score 6 to 9) after anesthesia for surgical, obstetric, or non-operating room procedures and 2) the event occurred from 2005 or later in the database of 11,034 claims. Failure-to-rescue claims, defined as deterioration event in the post-anesthesia care unit [PACU] after the first hour of care, the ward, or the intensive care unit, were compared to other high severity claims (comparison group) by chi square, Fisher's exact, or Mann Whitney tests.
Results and Discussion: Of 127 failure-to-rescue claims, the damaging event occurred in the PACU (n=19, 15%), ward (n=69, 54%), and intensive care unit (n=39, 31%). Compared to the comparison group (n=584), failure-to-rescue patients were sicker (ASA 3-5: 70% vs. 60%, p=0.044) and more often underwent orthopedic surgical procedures (35% vs. 25%, p=0.020). Sex, age, obesity, emergency procedures, and severity of injury were not different between the two groups. Inadequate ventilation/oxygenation, excessive blood loss, epidural/spinal hematoma, and patient condition were more frequent damaging events in the failure-to-rescue claims (Figure).
Conclusions: Nearly a fifth of claims for severe adverse events were associated

with a failure-to-rescue after postoperative patient deterioration. The types of damaging events in failure-to-rescue anesthesia malpractice claims highlight the importance of timely recognition and treatment of postoperative respiratory depression, postoperative surgical bleeding, epidural or spinal hematoma, and patient comorbidities to improve surgical patient safety.



6109

Residual neuromuscular blockade - concerns regarding monitoring practice

Fernandes A. L.[1], Lopes M.[1], Mendonça M.[1], Costa D.[1], Zenha S.[1], Freitas S.[1]
[1]Hospital Central do Funchal - Funchal (Portugal)

Background and Goal of Study: Neuromuscular block monitoring is an essential tool to prevent residual neuromuscular blockade (RNMB) and its postoperative complications. The level of neuromuscular recovery to ensure patient safety is a train-of-four ratio (TOFr) >0,9. The only way to define precisely RNMB requires the measuring TOFr using quantitative neuromuscular monitoring devices1. Hence, the use of such devices should be encouraged as part of the anaesthetic plan. The aim of this study was to assess the incidence of RNMB and the use of TOF monitors in our hospital.
Materials and Methods: After approval by the institutional ethics committee, a prospective observational study was conducted for 6 months, including adult patients scheduled for elective surgery under general anaesthesia (GA) with neuromuscular blocking agents. Upon arrival at the postanaesthetic care unit (PACU), neuromuscular blockade was evaluated using a TOF-Watch SX® device. Three readings were made and the average train-of-four (aTOF) value was recorded.
Results and Discussion: 104 patients were enrolled in the study. RNMB was detected in 7 patients (16,3%). TOFr was <0,6 in one patient, <0,7 in one patient and <0,8 in 5 patients. No intraoperative neuromuscular block monitor was used in 89,4% of the patients. Clinical weakness (failure to lift the head and inability to do tongue protrusion for 5 seconds) correlated with an aTOF<0.9 (p=0.002). Severe hypoxemia, defined by a peripheral capillary oxygen saturation<90%, was also associated with RNMB (p=0.000).
Conclusion: At our hospital, neuromuscular block monitors are used in a minority of patients undergoing GA and neuromuscular block, perhaps because of low availability of such monitoring devices. Studies show that monitoring of neuromuscular block is essential and that clinical signs are unreliable for safe extubation1,2. RNMB is associated with critical events and one way to prevent them is to use neuromuscular monitoring in all patients receiving neuromuscular blocking agents2. This study shows the long path to make this monitoring standard of practice.
References:
1. Murphy, GS et al. Residual Neuromuscular Block: Lessons Unlearned. Part I: Definitions, Incidence, and Adverse Physiologic Effects of Residual Neuromuscular Block. Anesth Analg. 2010; 111(1), 120-28.
2. Murphy, GS et al. Residual Neuromuscular Block: Lessons Unlearned. Part II: Methods to Reduce the Risk of Residual Weakness. Anesth Analg. 2010; 111(1), 129-40

4615

Intrathecal Morphine: When the unexpected happens

Nunes J.[1], Miguel da Cunha A. S.[1], Saraiva A.[1]
[1]Portuguese Institute of Oncology Lisbon - Lisbon (Portugal)

Background: Esophagectomy is a major surgical procedure associated with severe postoperative pain. Thoracic epidural analgesia has been considered the gold standard for pain management after open
esophagectomy.
Case Report: A 50-year-old man, classified as an ASA III physical status and diagnosed with esophageal adenocarcinoma was scheduled for an Ivor-Lewis esophagectomy.The patient's medical history included recent upper digestive hemorrhage, mild anemia and chronic hepatic disease. A preoperative abdominal ultrasound revealed heterogenous hepatic structure and mild signs of portal hypertension. After placing ASA standard monitors, 650 mcg lumbar intrathecal (IT) morphine were administered and general intravenous anesthesia ensued. Shortly after the beginning of the laparoscopic abdominal time it was realized that there were signs of micronodular hepatic cirrhosis and portal hypertension. After multidisciplinary discussion it was decided not to proceed with the esophagectomy. After 3h under observation in the post-anesthesia care unit he displayed no signs of respiratory depression, variation in conscious status, nausea, vomiting or pruritus. The patient was then transferred to a high-dependency post-anaesthetic care unit where he under surveillance for 24h. The next day he was discharged with no complications recorded.
Discussion: IT morphine can be a powerful adjunct in a multimodal analgesic approach. Dosing consideration should take into account the expected noxious stimulus the patient will be subjected. In the context of a clear intensity reduction of such stimulus, careful observation is required for early detection and treatment of possible dose related side effects due to their high risk.
References:
1. Jacobson, L. (1988). Anesthesia & Analgesia, 67(11), 1082-1088.
2. Apfelbaum, J. (2016). Anesthesiology, 124(3), 535–552.
Learning points: When choosing the IT opioid dosage, one should opt for the lowest efficacious dose in order to prevent dose related side effects. In the case described, it would have been expected a high risk of manifestation of such effects. The fact that it was not so might point us to an important interindividual variation. The ASA guidelines regarding single-injection hydrophilic neuraxial opioids state that all patients should be monitored for adequacy of ventilation, oxygenation, and level of consciousness for a minimum of 24h after administration.

4576

Extradural fentanyl overdose- experience from inadequately labeled drug practice

Djurdjevic Svraka A.[1], Svraka D.[2], Kovacevic P.[2], Kovacevic T.[2], Zlojutro B.[2]
[1]General Hospital Gradiska - Gradiska (Bosnia and Herzegovina), [2]University Clinical Center Republic of Srpska - Banjaluka (Bosnia and Herzegovina)

Background: Mediaction errors are a major safety issue in perioperative medicine, intensive care, emergency and pain medicine. Recent observation study has put it as high as one in 20.(1) Drug administration error case report could provide benefitial knowledge of correlation between single dose of extradural opioide and severity and duration of respiratory depression. Absorption and distribution from epidural space is difficult to measure.
Case Report: A 52 y old women was scheduled for elective colon cancer surgery. Due to anesthesia protocol,epidural catheter was placed before induction in OETA for intraoperative analgesia with local anesthetic and for postoperative analgesia. After induction in OETA, administered a 4ml of 2% lidocain and monitored a vital sign.10 min later,anesthesia nurse replaced lidocain 10ml syringe with fentanyl. The anesthesiologist did not notice the switch sinces both syringes had white labels with hand written drug names which consenquently led to inject 6ml of fentanyl into epidural catheter. Next 4 hours patient did not breath spontaneusly, therefore we changed our anesthesia plan and postoperativelly she was admited ICU for prolonged mechanical ventilation and monitoring.
Discussion: Besides case reports, there is lack of information about correlation between neuraxiale fentanyl single dose and extent and duration of respiratory failure in practice. Virtually the only mechanism for drugs to make their way into the CSF from the epidural space is by diffusion across the spinal meninges, a small minority of drugs will penetrate the systemic circulation and then appear in the CSF after diffusing out of the spinal cord.(2)Opioids have delayed effect. Extradurraly administered 100mcg fentanyl causes profound respiratory depression occured 100 min later.(3)
References:
1. Nanji KC et al.Evaluation of perioperative medication errors and adverse drug events. Anesthesiology 2016;124:2534.

2. Burm,AGI.'Clinical pharmacokinetics of epidural and spinal anaesthesia'.Clinical pharmacokinetics 16.5(1989):283-311.
3. Jordan S.,Pharmacology for midwives.Red globe press.2010.;93.
Learning points: There are two different situations about adverse event caused by respiratory depression due to neuraxial fentanyl overdose. One is patient with secured airway who would not have hemodynamic instability caused by fentanyl. Second is unsecured airway which is breathless situation for anesthesiologist but breathless and life treatening for patient.

4633

A Retrospective Register Study to Investigate the Influence of Neuromuscular Block Reversal on 30-Day Readmission Rates

Vuoti S.[1], Reinikainen K.[2], Narasimha K.[2]
[1]University Of Oulu - Oulu (Finland),
[2]Chembrain LTD - Kauhava (Finland)

Background and Goal of Study: Unplanned hospital readmissions could be an indication of suboptimal clinical procedures and have been previously shown to cause increased costs to the society. Identifying sources of readmission is therefore important to improve patient safety and enhance patient flow in a clinical setting. Muscle relaxants are routinely applied to facilitate endotracheal intubation, improve surgical working conditions and decrease respiratory adverse events. The aim of this study was to investigate whether reversal of neuromuscular block influences the rate of 30-day readmissions in a University Hospital setting.
Materials and Methods: This was a retrospective, non-interventional registry study that included all laparoscopic procedures conducted between 2013-2018, which involved the use of a neuromuscular blocking agent. Social registries were in addition used to define the use of primary care health services during a 30 day period after the surgery. The depth of neuromuscular block was estimated using the dose of rocuronium. Primary outcome was the rate of readmission during 30 days after the surgery. Secondary outcomes were length of post-operative hospital stay, postoperative complication type and use of primary healthcare services.
Results and Discussion: 316 out of 3787 patients (8.3%) were readmitted within 30 days of their surgery. Of those patients, 11.8 % were categorized as receiving a deep neuromuscular block based on their rocuronium dose. 59.1 % of the 316 patients received a reversal agent. The post-operative hospital stay was significantly shorter (6.2 ± 1.7 days vs. 8.4 ± 4.1 days, $p < 0.01$) for patients who were categorized as having a deep block and were adequately reversed. There were no differences in hospital stay between groups that received a reversal agent vs. no reversal agent. The most common causes of readmission were post-operative pain or infection. The patients receiving a deep block and a reversal agent utilized less primary care services during the 30-day post-operative period in comparison to patients who received a moderate block (5.3 % vs. 31.2 %). Patients who received a reversal agent had less primary care visits than patients who were not reversed (10.6 % vs. 25.4 %).
Conclusions: The incidence of readmission was lower among patients who received a deep neuromuscular block and a reversal agent. The use of a deep block and a reversal agent were both associated with less primary care visits.

5662

Postoperative residual curarization in recovery for surgical patients

Muthukumaraswamy M.[1], Badrinath M.[1], Kamaraj R.[1], Sandhar T.[1], Bijral S.[1], Kumaravel V.[1]
[1]Medway Maritime Hospital - Gillingham (United Kingdom)

Background and Goal of Study: The recomendation for safe standards of monitoring during anaesthesia and recovery by the AAGBI (The Association of Anaesthetists of Great Britain and Ireland)is : The use of peripheral nerve stimulators is mandatory for all patients receiving neuromuscular blockade drugs. The reliable guarentee of return of safe motor function is evidence by a Train-Of -Four Ratio >0.9.The goal of the study is -* To do a survey regarding use of neuromuscular blockade and monitoring with Quantitave or Quantitative NMJ monitors - Note : The Qualitative NMJ monitors are in prevalence in our Department . There is but one Quantitave MNJ monitor in our department. *To study the incidence of post extubation residual curarization in recovery with use of a Qualitative NMJ monitor following Qualitative monitor use in theatres . The patients were extubated folowing clinical signs and TOF Ratio > 0.9.
Materials and Methods: *We sent out a survey using an online tool with 100responses. *We assessed and monitored the patients in recovery with a Quantitave NMJ monitor to quantify the degree of residual curarization after the surgery. All patient was extubated in theatres by the Anaesthetist on clinical signs and with the aid of a Qualitative NMJ monitor showing a TOF Ratio>0.9. *Data was collected from 50 patients who had surgery with neuromuscular blockade with the parameters noted being - 1.Age 2.Sex 3. Comorbidities 4.BMI 5. Temperature 6. Duration of Surgery 7.Timing and dosing of NMBA 8. Timing and dosing of Reversal*Train of Four ratio of the adductor pollicis muscle to ulnar nerve stimulation at the wrist using a Quantitaive NMJ monitor in recovery.
Results and Discussion: * ASA - 1 - 26% 2- 56% 3 - 18% * Muscle Relaxant -Atracuruim-16% Rocuronium- 80% Mivacurium- 4%* TOF Ratio - >0.9 -32% <0.9-46% <0.7 -22% * TOF Ratio<0.9 and BMI - <30 - 59% and BMI > 30 - 41% * TOF Ratio<0.9 and Sugamadex- >0.9-64% <0.9 - 36%. *The survey revealed 21 responses from different grades of anaesthetists.
Conclusion: Significant Number patients had residual NM blockade in recovery-22%(TOF<0.7)which leads to inadequate respiratory muscle recovery- This can lead to airway issues/hypoxia/awareness/pulmonary complications. The availability of quantitave NMJ monitor will lead to avoidance of above complication and maintain patient safety.

5652

Life after sugammadex: incidence of residual neuromuscular blockade in a post-anaesthetic care unit. A prospective, blinded study

Lima De Morais L.[1], Carmo Pinheiro A.[1], Pratas A.[1], Windels A.[1], Fernandes P.[1]
[1]Hospital Espirito Santo Evora EPE - Evora (Portugal)

Background and Goal of Study: Neuromuscular blockers (NMBs) are used in everyday anaesthetic procedures to facilitate endotracheal intubation and optimize surgical conditions. Proper reversal of its effect is essential to prevent postoperative complications such as upper airway collapse and ventilatory impairment. This study aimed to determine the incidence of residual neuromuscular blockade (rNMB) in the Post Anaesthetic Care Unit (PACU) of a public hospital in Portugal.
Materials and Methods: The selected patients underwent general anaesthesia and antagonism of muscle relaxation according to train-of-four ratio (TOFr) at extubation with a muscle relaxant antagonist. Patients were monitored using TOF Scan® and TOFr measurements were performed upon admission and discharge from the PACU. The drugs and doses administered were sole responsibility of the anaesthesiologist in the room and there was no interference from those responsible for the study. The muscle relaxant and antagonist used, demographic and anthropological data, classification of physical status according to the American Society of Anaesthesiology (ASA PS), TOFr at the times of extubation, admission and discharge from PACU, as well as other complications at the PACU, were recorded and analysed with descriptive statistics.
Results and Discussion: 42 patients met the eligibility criteria. Mean (SD) age was 50.4 (21.6) years and 61.5% of patients were female. 45% were classified ASA PS II and 40% ASA PS III. In all patients, neuromuscular blockade was performed using Rocuronium and its reversal using sugammadex. There were no episodes of rNMB in the PACU as all patients presented TOFr ≥ 90 % at admission and discharge. The mean TOFr was similar at admission was (96.6%; range: 91% - 100%) and at discharge (97.5%; range: 90% - 100%). No postoperative complications were reported in the PACU. The absence of rNMB in our study is consistent with an international study and with the trend shown in others.
Conclusion: This study confirms that sugammadex is an agent that assures full recovery of neuromuscular blockade. Nevertheless, the possibility of rNMB occurrence, and the potentially fatal complications that may arise from it, cannot be excluded, stressing the importance of reversal according to TOFr.

4719

Are preoperative fasting recommendations safe? About one case of unusual full stomach: peri operative haematemesis

Brogly N.[1], Valenti B.[1], Villar T.[1], Alsina E.[1], Puertas J.[1], Matute E.[1]
[1]Hospital Universitario La Zarzuela - Madrid (Spain)

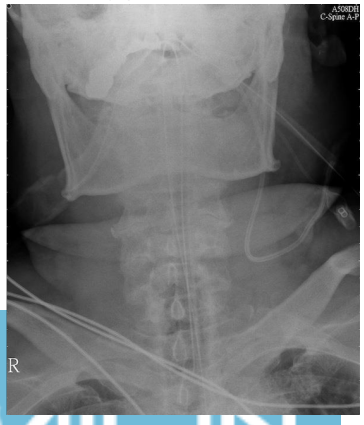
Background: The ESA guidelines recommend 6h of preoperative fasting (POF) for solids and 2h for clear fluids in adults. We present a case of perioperative haematemesis, which interfered with POF.
Case Report: This 34-year old patient scheduled for an outpatient surgical hysteroscopy, only had a history of asthma and atopic dermatitis, and no gastro-intestinal symptoms. she had received instructions for POF preoperatively. On the day of surgery, while she was waiting to be transferred to the operating room (OR), 30 minutes before surgery, she drank 200mL of water. When arriving in the OR, this inobservance of the POF was detected during checklist. A 10mg intravenous dose of metoclopramide was administered and surgery was delayed for 2 hours. The patient was informed and the anaesthetic plan was changed. Two hours after, a spinal anaesthesia was performed uneventfully and the patient went through surgery without incident. At the end of surgery, the patient began to be agitated and complained of dizziness and nauseas. 2mg of IV Midazolam plus 4mg IV ondansetron were administered. Surgery was finalized and she was transferred to the PACU. Few minutes after admission to the PACU, she presented an episode of haemetemesis which did not require blood transfusion, even though her haemoglobin had dropped 3g/dL. A sclerosis of a bleeding gastric ulcer was performed, and she was admitted to the UCI. During her stay in the ICU, she developed a pulmonary embolism and a pulmonary infection. After a favorable evolution, the patient was discharged to the ward after 6 days, and home on day 14.
Discussion and Conclusion: The emergence of an haematemesis as the revealing sign of a gastric ulcer in the perioperative period is a very infrequent sign of full stomach. The respect of guidelines for POF does not guarantee that the patient has an empty stomach. The performance of preoperative stomach ultrasound screening might help to assess gastric content preoperatively 1. The checklist, which is recommended by the OMS and the ESA 2, permits to detect risky conducts of the patients, take corrective measures, to avoid further complications. Finally, stress ulcer prophylaxis might help to avoid this complication, even though it is not indicated in low risk patients 3.
References:
1. CJA 2015; 62(11):1188;1195.
2. EJA 2010; 27: 592; 597.
3. Curr Clin Pharmacol 2010 Nov; 5(4):288-97.
Learning points: Gastric Ulcer can reveal in the perioperative period by an acute haemorrhage.

4408

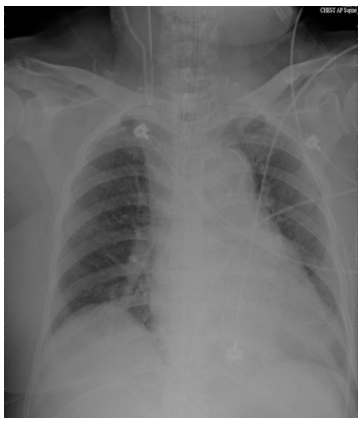
Intravascularly cephalad malposition of central venous catheter via jugular vein, 2 case reports

Zeng Y. S.[1]
[1]Tainan ChiMei Medical Center - Tainan (Taiwan)

Background: Ultrasound-guided CVC catheterization has gain popularity due to its lower rates of complications.
Case Report: The 1st case: A 70-year-old man underwent emergent transcatheter arterial embolism in the hybrid OR. CVC catheterization under conventional landmark technique via left internal jugular vein was done smoothly after the operation. Postoperative C-spine plain film showed CVC went cephalad to left internal jugular vein via external jugular vein.



The 2nd case: A 70-year-old woman underwent spinal surgery. CVC catheterization via right internal jugular vein (RIJV) was done under real-time ultrasound guidance before the operation. There was some resistance when advance the guide wire once, but then advanced smoothly. Postoperative chest X-ray showed that CVC went cephalad direction after a short distance it entered RIVJ.



Discussion: In one systemic review, complication rate of CVC insertion might up to 13.5% without ultrasound guidance and decreased to 4.0% under ultrasound guidance.1 In another meta-analysis, prevalence of CVC malposition was 6.8% on average.2 In one of our cases, CVC was inserted under ultrasound guidance, but malposition still happened. Cephalad placement via right internal jugular vein is very rare. Even under real-time ultrasound guidance CVC insertion, CVC malposition could happen. One should check not only whether the residence of guide wire but the direction of it.
References:
1. Bernd Saugel et al.,Crit Care 2017;21(1):225.
2. Jasper M. Smit et al.,Crit Care 2018;22(1):65.
Learning points:
1. Complications still happen under ultrasound guidance CVC insertion.
2. After guide wire and catheter insertion, one should still check whether the posistion is correct or not by chest radiograph, vascular ultrasound, TEE, continuous ECG or fluoroscopy.

4409

Bilateral tension pneumothorax with massive subcutaneous emphysema after diagnostic colonoscopy in a patient with ulcerative colitis: a case report

Yew M.[1], Wu S. Z.[2], Chen Y. H.[2], Chen J. Y.[1]
[1]Chi Mei Medical Center, Tainan, Taiwan - Yongkang district, Tainan (Taiwan), [2]Liouying branch, Chi Mei Hospital, Tainan, Taiwan - Yongkang district, Tainan (Taiwan)

Background: In previous reports, some patients suffer bilateral tension pneumothorax after colonoscopy1. We report a case with ulcerative colitis(UC) also had catastrophic complications with bilateral tension pneumothorax after colonoscopy.
Case Report: A 44 years old man, with history of UC, was scheduled for diagnostic colonoscopy under monitored anesthesia care. His vital signs were stable. Before colonoscopy, we gave him propofol infusion under TCI, Ce: 4.0–7.0 μg/ml. The colonoscopy revealed diffuse ulcers, compatible with UC. A 4 cm polypoid mass impacted over the sigmoid colon. However, the operator suspected air leakage from the equipment because inadequate air inflation persisted during procedure. He took 40 minutes for biopsy. When the patient woke up, he complained of dyspnea, chest pain, neck pain, and abdomen distension. Physical examination found crepitus in bilateral neck and chest, and no breathing sound bilaterally. Meanwhile, HR increased to 124 bpm, SpO2 decreased to 87% under oxygen mask. Chest X-ray showed bilateral pneumothorax, needle decompression was performed bilaterally. A computed tomography scan showed as figure, so bilateral chest tube was placed. The patient was admitted to intensive care unit for conservative treatment. However, sepsis and peritoneal signs developed 3 days later, and the biopsy pathology reported adenocarcinoma. Total colectomy and protective ileostomy was performed. Finally, he was discharged 7 weeks after surgery. His pneumothorax and subcutaneous emphysema were resolved without any clinical sequelae.
Discussion: Ulcerative colitis is a risk factor for colon perforation during colonoscopy2. Persistent inadequate air inflation during colonoscopy is a warming sign of colon perforation. The massive air entry via the colonic perforation leading to passage into the retroperitoneal space causing pneumoretroperitoneum, pneumomediastinum, pneumothorax, and subcutaneous emphysema3.

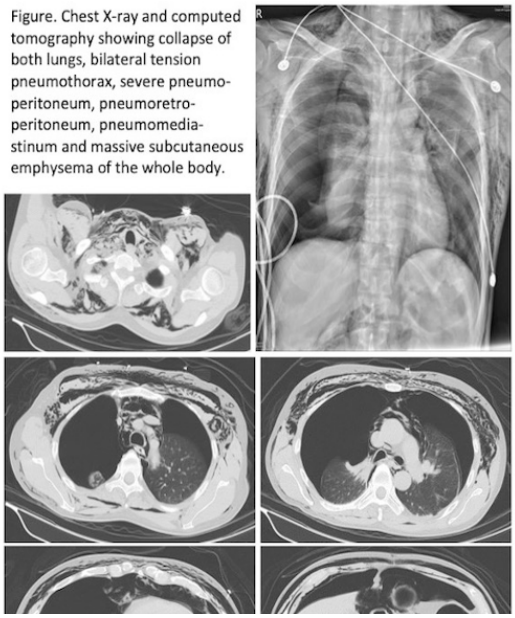


Figure. Chest X-ray and computed tomography showing collapse of both lungs, bilateral tension pneumothorax, severe pneumoperitoneum, pneumoretroperitoneum, pneumomediastinum and massive subcutaneous emphysema of the whole body.

References:
1. Tseng WC, et al.JCA 2016:432–5.
2. Makkar R.Gastroenterol Hepatol 2013:573–83.
3. Tiwari A, et al.Case Rep Gastroenterol 2017:256–64.

Learning point: Inadequate air inflation during colonoscopy is a warming sign of colon perforation.

5670

Postural change-related movement of peripherally inserted central catheter's (PICC) tip may cause potentially severe cardiac arrhythmias: A report of 2 cases.

Ito T.[1], Hascilowicz T.[1], Utsumi I.[1], Mio Y.[1]
[1]*The Jikei University School of Medicine Daisan Hospital - Tokyo (Japan)*

Background: Safety of peripherally inserted central catheters (PICCs) has been widely accepted and introduction of magnetic tracking and ECG-guided tip confirmation systems (TCS) has allowed PICCs to be inserted bedside even without confirmatory X-ray or fluoroscopy. The TCS relies on ECG signals collected from the catheter guidewire and facilitates positioning of the catheter's tip near the cavoatrial junction (CAJ), which is currently considered as the most optimal site for catheter tip placement. Notwithstanding reported safety of PICCs, complications related to tip placement have not been sufficiently studied. We present 2 cases of severe cardiac arrhythmias that occurred under general anaesthesia upon changes in patient body position.
Case Report: Case 1. A 44-year-old woman, 155cm, 62kg, was scheduled for laparoscopic adrenalectomy. Following induction of general anesthesia, she was placed in the left lateral decubitus position. Frequent ventricular extrasystoles were detected on the EGC tracing and disappeared when the patient's position was restored to supine. Case 2. An 86-year-old woman, 148cm, 55kg, was scheduled for VA shunt reconstruction. After induction of general anesthesia, a persistent type 2 atrioventricular block developed immediately after both patient's arms were raised in the prone position. The AV block resolved after lowering the arms back to the previous position. Patients' past histories did not include any arrhythmias and in both cases PICCs were inserted the day before surgery using the ECG-guided TCS with catheter tips placed near the CAJ. Informed concern statements were obtained.
Discussion: Tips of relatively long PICCs can displace due to extensive arm or body movements and these displacements might range up to 2.2 intercostal spaces. Arrhythmias caused by body movement-related PICC tip displacements have not been reported but our report clearly indicates that they are possible. With proper monitoring they were immediately detected and managed; however, had they occurred in no ECG monitoring settings, they could have led to potentially fatal complications. Some preventive measures, such as arm rising or body position changes, taken immediately after PICC insertions might be necessary to detect arrhythmias and early adjust the position of the catheter tip.
Learning points: Postural changes may cause severe and potentially fatal arrhythmias if PICC tip is placed near the CAJ, which is the currently recommended position.

5705

Peri-cardiac arrest during endoscopic retrograde cholangiopancreatography – deep sedation or general anesthesia?

Gregório M.[1], Fonseca J.[1], Silva E.[1]
[1]*Centro Hospitalar de Leiria - Leiria (Portugal)*

Background: ERCP has evolved from being a simple diagnostic procedure to a therapeutic one where the anaesthesiologist has become a vital member of the team. Many of the patients are unfit for surgery and at high risk for sedation-related adverse events. Sedation or general anaesthesia is generally indicated for the increasingly complex, long and painful procedures being performed1.
Case Report: A 83 year-old male of ASA physical status class 3, with controlled hypertension, obesity and dementia was posted for ERCP due to acute cholangitis caused by gallstones. A target controlled infusion (TCI) was iniciated with 300 mg of propofol and 25 mg of ketamine and a effect-targeting model was used and adjusted acording to the patient's haemodinamic state and painful stimulus of the procedure. Approximately 50 minutes later, oxygen desaturation to SpO2 50% developed, the procedure was interrupted and the patient moved to a dorsal decubitus position. Face mask ventilation was tempted without any improvement so tracheal intubation was performed after rocuronium administration. Concomitant bradycardia issued and a total of atropine 4,5mg, ephedrine 10mg and adrenaline 0,4mg i.v. were administered. Perfusion of noradrenaline initiated. Patient's vital signs were restored. The patient was transferred intubated to the PACU where he stayed for 10 hours under vigilance. He was successfully extubated after 3 hours. Myocardial infarction type 2 was diagnose with the elevation of troponin from 39,5 to 1156 pg/mL. No complications occurred during the post-sedation period and the patient was discharged 4 days after ERCP.
Discussion: Anesthesia in a nonoperating room has always been risky. Some advocate that in patients at high risk for sedation-related adverse events undergoing ERCP, endotrachael anesthesia is associated with significantly lower incidence of adverse events, without impacting procedure duration, success, recovery or in-room time2.
References:
1. DOI 10.1007/s10620-013-2849-9.
2. DOI. 10.1016/j.gie.2018.09.001.
Learning points: Anesthesia outside the operating room was many risks and appropriate measures should be taken in order to minimize those risks; Sedation strategies for ERCP based on the grade of complexity of the procedure as well as on patient characteristics should be developed in order to achieve the perfect balance of patient comfort, safety and endoscopy unit efficiency.

5877

Postoperative ST depression caused by secondary hypokalemia to salbutamol overdose

Maroño Boedo M. J.[1], Gonzalez Paniagua C.[1], Guereca Gala A.[1], Ganuza Martínez E.[1], Martínez Ruiz A.[1]
[1]*Hospital Universitario de Cruces - San Vicente de Barakaldo (Spain)*

Background: Salbutamol is a frequently used bronchodilator drug not without adverse effects. We present a case of postoperative ST depression secondary to moderate hypokalemia due to salbutamol1.
Case Report: 39-year-old obese male presents bilious vomiting and bronchoaspiration with severe bronchospasm and secondary hypoxemia after anesthetic induction for drainage of a perianal abscess. Hydrocortisone and 100 mcg of intravenous salbutamol are administred during surgery associated with multiple administrations of inhaled salbutamol through the endotracheal tube. Once the intervention finished, is transferred to Anesthetics Intensive Care Unit for progressive withdrawal of mechanical ventilation. Upon arrival at the unit, presents sinus tachycardia, generalized ST depression and QT prolongation. Arterial gasometry shows mixed acidosis and moderate hypokalemia (2.7mEq/L). Potassium chloride is slowly administered with correction of kalemia levels and progressive correction of EKG abnormalities. There was no significant elevation of troponins and the echocardiogram performed did not show signs of myocardial dysfunction. The patient was discharged to ward at 48 hours.
Discussion: Salbutamol has an important bronchodilator effect due to β2 adrenergic stimulation. Also activates the Na-K-ATPase pump that catalyzes the entry of potassium into the cell, decreasing plasma levels.
Each dosage of inhaled salbutamol contains up to 0.1mg of drug. Repeated administration associated with intravenous infusion can produce toxic plasma concentrations and increase the risk of side effects2,3.
References:
1. Hartman S. Merkus P, Maseland M, et al. Hypokalaemia in children with asthma treated with nebulised salbutamol. Archives of Disease in Childhood 2015;109:970-

972.
2. Viera AJ, Wouk N. Potassium Disorders: Hypokalemia and Hyperkalemia. Am Fam Physician 2015 Sep 15;92(6):487-495.
3. De Sequera Ortíz P, Alcazar Arroyo R, Albalate Ramon M. Alteraciones del Potasio. En: Lorenzao V, López Gómez JM (Eds)Nefrología al Día.http://www.nefrologiaaldia.org/es-articulo-trastornos-del-potasio-201.
Learning points:
- Hypokalemia should be included in the differential diagnosis of ST depression.
- Salbutamol overdose is associated with the increase of side effects, as tachycardia and hypokalemia, without producing a greater bronchodilator effect.
- The presence of protocols in the surgical area for emergency management reduces errors in drug administration and increases patient safety.

5916

Case report: Could the notion of allergic contact dermatitis caused by newspaper ink have foreseen a double cardio-pulmonary arrest following the induction of anesthesia?

Viaene K.[1], Vanlergberghe C.[2]
[1]UZ BRUSSEL and Vrije Universiteit Brussel - Brussels (Belgium), [2]UZ Brussel - Brussels (Belgium)

Background: The occurrence of an anaphylactic reaction is a great concern, because it may be potential life threatening 1.
Case Report: A 74-year old ASA II patient was scheduled for an operation under general anesthesia (GA). She has had two uneventful interventions under GA in the past. Anesthesia was induced with sufentanil, lidocaine and a TCI of propofol. Within 30 sec after administration of rocuronium the patient developed severe bronchospasm with cardiovascular collapse and a generalized erythema. Tracheal intubation was performed. Bolus doses of epinephrine up to 500 µg, promethazine 50 mg IM, methylprednisolone 1000 mg IV, ranitidine 50 mg IV and fluid resuscitation were administered. As the patient developed an asystole, CRP was initiated. After 30 min CRP and a total dose of 3 mg epinephrine the patient regained a " Return of Spontaneous Circulation" (ROSC). A continue infusion of norepinephrine was started, ipratroprium bromide and salbutamol aerosols were given, Suggamadex was administered as antidote and surgery was postponed. For transfer to ICU, 5 mg midazolam IV and 10 mg cis-atracurium IV were given followed by a second episode asystole requiring CRP during 10 min and administration of 2 mg epinephrine before patient regained ROSC. An echocardiography showed a Takotsubo syndrome. Plasma tryptase levels were positive. Skin tests, performed 4 weeks later showed a positive response to rocuronium and cis-atracurium. Afterwards the patient mentioned a contact dermatitis for newspaper ink and difficulties with detergents. 6 weeks later patient was operated under locoregional anesthesia.
Discussion: Quaternary ammonium groups are ubiquitous epitopes contained in many drugs and chemicals3. Many patients with allergic disorders have elevated levels of total IgE2. Recognition of these ubiquitous epitopes may account for the extensive cross-reactivity between NMBAs even other chemical structures.
References:
1. Dewachter P et al Perioperative Anaphylaxis: What Should Be Known, Curr Allergy Asthma Rep 2015: 15: 21.
2. Wilfox T et all. Anaphylaxis in the 21st century: phenotypes, endotypes, and biomarkers. J Asthma and Allergy 2018: 11: 121-142.
3. Di Leo E et al: Focus on the agents most frequently responsible to peroperative anaphylaxis. Clin Mol allergy 2018; 16: 16.
Learning points: Dismissing a possible allergy is an error that cannot be made, an extensive allergy anamnesis is primordial for good clinical practice.

5917

Case report of an anaphylactic cardiac arrest in perioperative period caused by ceftriaxone – a challenging diagnosis and an ineffective allergy notification

Rouxinol-Dias A. L.[1], Silva R. P.[1], Sousa M.[1], Vieira F.[1]
[1]Centro Hospitalar São João E.P.E. - Porto (Portugal)

Background: The diagnosis of perioperative anaphylaxis is a difficult challenge, since the patient is often under general anesthesia, with anesthetics that can mask anaphylaxis cardiovascular effects, covered by surgical drapes that hide mucosal and cutaneous signs. After anaphylaxis, notification of the event, is extremely important to prevent recurrence1.
Case Report: We report an intraoperative anaphylaxis caused by ceftriaxone in a 65 year old male, ASA IV, with elevated cardiovascular risk (risk class IV in the RCRI of Lee2), recently referred for implantation of CRT-D. The patient was submited to combined anesthesia for a nephrectomy due to severe kidney cyst bleeding refractory to conservative measures, with history of previous uneventful general anesthesia. After induction and ceftriaxone administration, patient presented with sudden low etCO2, followed by rapid onset hypotension, tachycardia, desaturation, with cardiorespiratory arrest within 1 minute with PEA. Immediate removal of surgical drape unveiled discrete erythematous papules in the upper limbs. The patient recovered after immediate and successful approach in the OR, comprising a total of 3mg of adrenaline and 4 cicles of ALS, and was discharged after 27 days in good health with CRT-D. Unfortunately, and despite the application of several alert strategies after the event, the patient died nearly two months after discharge, due to cardiac arrest after re-administration of ceftriaxone in the same hospital in the urgency department.
Discussion: The undesirable outcome of this case should lead to improvements in the drug allergy alert system. This case could also raise the discussion about the prescription management system itself, proposing that it should alert and prevent the prescription of drugs to patients that are being studied for possible allergic reactions.
References:
1. Yim, R. An update on PERIOPERATIVE ANAPHYLAXIS. Anaesthesia, Tutor. Week 324, 1–6 (2016).
2. Duceppe, E. et al. Canadian Cardiovascular Society Guidelines on Perioperative Cardiac Risk Assessment and Management for Patients Who Undergo Noncardiac Surgery. Can. J. Cardiol. 33, 17–32 (2017).
Learning points: This case not only exposes the difficulties of predicting and diagnosing perioperative anaphylaxis during intraoperative period, but it also shows that it is necessary to rethink notification and alert strategies for suspected allergies.

6047

Transient spinal cord injury without radiografic abnormality (sciwora) after laparotomy nephrectomy surgery in lumbotomy position: a case report

González Del Pozo I.[1], Vullo A.[1], Almagro Vidal I.[1], Sánchez López A.[1], Vila González M.[1], Navarro Suay R.[1]
[1]Hospital Central de la Defensa Gomez Ulla - Madrid (Spain)

Background: The acronym SCIWORA describes clinical symptoms of traumatic myelopathy with no radiographic or computed tomographic features of spinal fracture or instability. Based on reports, SCIWORA is responsible for 6-19% and 9-14% of spinal injuries in children and adults, respectively (1). Recent findings underline the prognostic role of early Magnetic Resonance Imaging (MRI) for adult patients with SCIWORA (2). We describe a case of SCIWORA after nephrectomy surgery.
Case Report: A 34-year-old patient with xanthogranulomatous pilonephritis underwent left nephrectomy surgery by subcostal laparotomy in lumbotomy position, which lasted four hours. We performed a general anesthesia with invasive blood pressure monitoring and the patient maintained an optimal gas exchange, hemodynamic stability and spontaneous diuresis > 0.5 ml/kg/h. After extubation in the operating room, the patient manifested bilateral lower limb pain, tactile and thermoalgesic sensory deficit and motor deficit below L1, compatible with an anterior spinal cord syndrome. An urgent MRI was performed in which there was no evidence of medullary radiological alteration and the patient began to recover the sensory and motor deficit 60 minutes after the end of the intervention, reaching full recovery at 90 minutes.
Discussion: SCIWORA is a clinical-radiological condition in which the injury to the spinal cord is caused by a contusion or ischemia due to temporary occlusion of vertebral arteries followed by a spontaneous return of vertebrae to their original position. The objective of this case report is to describe, for the first time in the literature, a transient spinal cord injury secondary to surgical aggression that includes lumbotomy position and possible compression of the vertebral arteries secondary to the size and manipulation of the kidney.
References:
1. Szwedowski D, Walecki J. Spinal Cord Injury without Radiographic Abnormality (SCIWORA) - Clinical and Radiological Aspects. Pol J Radiol. 2014. 79:461-4.
2. Boese CK, Müller D, Bröer R, et al. Spinal cord injury without radiographic abnormality (SCIWORA) in adults: MRI type predicts early neurologic outcome. Spinal cord. 2016. 54:878-83.
Learning points: SCIWORA is a rare clinical condition that can occur after external aggression, among which we must take into account surgical aggression secondary to the patient's position and / or medullary ischemia secondary to a temporary occlusion of spinal vascularization.

6240

Anaesthetic implications of a patient with cold urticaria – a case report

Gregório M.[1], Fonseca J.[1], Sendino C.[1]
[1]*Centro Hospitalar de Leiria - Leiria (Portugal)*

Background: Cold urticaria consists of an allergic imune response after cold exposure with symptons ranging from pruritic wheals to life-threatening angioedema, bronchospasm or anaphylactic shock1. This case report focuses on the anaesthetic implications of a patient with cold-induced urticaria with systemic reactions who had been advised to carry an adrenaline autoinjector.
Case Report: A 16 year-old male was scheduled for a pilonidal cystectomy. He gave a clear history of cold-induced urticaria, including labial edema after eating ice-cream and generalized urticaria, facial angioedema and syncope after submersion on sea water. Following a immunoallergology evaluation, a ice cube test was performed and revealed positive. He was also being investigated for Alport syndrome due to gross hematuria and sensorineural hearing loss. His home medication included enalapril, methylprednisolone aceponate and bilastine SOS. No previous history of surgical or anaesthetic procedures, The team was informed of his condition and a subarachnoid block was performed with 8 mg of hyperbaric bupivacaine. For skin preparation prior to the neuraxial block, povidone-iodine solution was used as an alternative to alcohol containing solutions, and light touch instead of ethyl chloride spray was used to assess the level of the sensory block. Normothermia was maintained with forced air warming blankets and careful monitoring of core and ambient temperature in the operating room. The surgical procedure progressed without complications and the patient went home the following day.
Discussion: Cold urticaria poses underestimated challenge for anesthesiologists. Proper preoperative assessment is crucial to prevent life-threatening events, as angioedema or anaphylaxis2. This case highlights that many procedures which may not typically be considered harmful to patients, may have serious and potentially life-threatening implications for a patient with cold urticaria.
References:
1. doi: 10.3389/fmed.2017.00222.
2. doi: 10.1016/j.ijoa.2018.09.009.
Learning points: Cold urticaria is a rare and potentially deadly disease; alcohol-free solutions are better for skin preparation in these patients; maintenance of normothermia is crucial to avoid any kind of complications in patients with cold-urticaria.

4458

Nasogastric tube placement - are we doing it wrong?

Vieira I. R.[1], Rebelo C.[1], Pereira C.[1], Silva A.[1], Assunção J. P.[1]
[1]*Centro Hospitalar Tondela- Viseu - Viseu (Portugal)*

Background: The placement of a nasogastric tube is a very common procedure in the anesthesiologist's clinical practice. However, even though there are several serious complications described in the literature, the common practice continues to be placing it using blindly and not monitor its final position with proven tests. Moreover, most tubes are placed in the anesthetized patient, making impossible an early warning sign that something might be wrong.
Case Report: A 45-year-old man, ASA III, underwent partial glossectomy for excision of a thyroglossal canal cyst. At the end of surgery, nasogastric tube was placed for postoperative enteral feeding. The placement was linear and uneventful. The next day, during the first feeding attempt the food progression was found to be impossible. To solve the problem, an attempt to mobilize the tube was made, a maneuver that was immediately interrupted because of impossibility of movement associated with pain and discomfort of the patient. A head and neck radiograph was performed, which evidenced the inadequate positioning of the feeding tube that was curled up in the nasal mucosa, pharynx and larynx, with several knots. Hence, the patient was taken to the OR and anesthetized for its removal by the surgeon under direct visualization. A new nasogastric tube was placed using direct visualization through the nasal mucosa and then by video laryngoscopy to the esophagus.
Discussion: The positioning of a nasogastric tube could have serious complications. Knots and kinking are the most frequent and can cause mucosal lesions or perforations. However, hydrothorax, pneumothorax and pneumonia, esophageal and gastric perforation caused by nasogastric tubes have all been described1. Its well established that final positioning of the nasogastric tube must be confirmed. The current gold-standard for its verification is radiography. However, there are several papers describing ultrasonography as a fast, simple and sensitive method to accurately verify the positioning of the tube2. It's the authors opinion that an effort should be made to always verify nasogastric tubes, preferably using ultrasonography, which would allow a faster and safer assessment.
References:
1. Sanaie S, et al. Nasogastric tube insertion in anaesthetized patients: a comprehensive review. Anestezjol Intens Ter. 2017
2. Zatelli M, Vezzali N. 4-Point ultrasonography to confirm the correct position of the nasogastric tube in 114 critically ill patients. J Ultrasound. 2017

4843

Opioid-induced respiratory depression in patients monitored by capnography and pulse oximetry during fentanyl-based intravenous patient-controlled analgesia

Koike M.[1], Kondo I.[1], Prodigy
[1]*The Jikei University School of Medicine - Tokyo (Japan)*

Background and Goal of Study: Opioid induced respiratory depression (OIRD) is one of common adverse effects of opioid in the surgical patients during the postoperative period.Some reports have shown that continuous capnography and pulse oximetry monitoring reveals frequent desaturation and bradypnea during intravenous patient controlled analgesia (IVPCA). One of the risk factors for postoperative OIRD is background opioid infusion.The aim of this observational cohort study was to assess the incidence of respiratory depression (RD),using continuous capnography and pulse oximetry monitoring during fentanyl-based IVPCA.
Materials and Methods: After IRB approval and written informed consent,122 subjects were enrolled in the study in a prospective cohort study.They received fentanyl-based IVPCA with background infusion after surgery.We monitored noninvasive end-tidal CO2 ,RR and SpO2 with Capnostream™ respiratory monitor (Medtronic) after operation until next morning.Each subject was clinically monitored per standard of care.The monitor was blinded and alarms silenced.We investigated RD episodes during respiratory monitoring and its total time.Data suggestive of RD episodes included any of following :etCO2≥ 60 mmHg for ≥3minutes,or RR≤ 5 breaths for ≥ 3minutes,or SpO2≤ 85% for ≥ 3minutes ,or Apnea episode lasting > 30seconds.Data comparison between patients with and without ≥ 1 OIRD episode was perfomed.Variables collected included gender, height, weight, operating time and STOP-BANG score.
Results and Discussion: 93 of the 122 patients(76%) were included the study. The incidence of OIRD was 25.8% (24/93).The average age for the RD groups (69 ± 9) was significantly higher than the average age for the non-RD group (58 ± 16) (P=0.004).There was no difference in BMI,operating time, STOP-BANG score between two groups.Despite the incidence of RD was high,there was no patient who required clinical interventions for suspected RD.OIRD occured not only within 2 hours after discharge from the recovery room but also frequently within 2h after lights out in the ward.There are more episodes of hypopnea(88 episodes) than hypoxia(13episodes).The fall in SpO2 only occurs after a few minutes when respiration stops.With capnography, CO2 waveform ceases as soon as apnea occurs.CO2 monitoring provides early detction of airway obstruction.
Conclusion: Continuous of capnography and pulse oximetry can aid in patient management and safety for fentanyl-based IVPCA.

4925

Chronic pain theraphy with opioids in non-cancer patients may be associated with cognitive impairment

Lotowska-Cwiklewska A.[1], Kosciuczuk U.[2], Jakubów P.[2], Czyzewska J.[2]
[1]*Medical University of Bialystok Clinical Hospital - Bialystok (Poland),*
[2]*Medical University in Bialystok - Bialystok (Poland)*

Background and Goal of Study: Brain - Derived Neurotrophic Factor (BDNF) is one of the newest markers of regenerative abilities and neurodegenerative disease of human brain, which can be also used as biomarker in clinical practice. Its reduced plasma concentration is associated with cognitive impairment, addiction and opioid tolerance. The aim of the study was to investigate the impact of chronic pain theraphy with opioids on cognitive functions and BDNF level of non-cancer patients.
Materials and Methods: The project was approved by Ethical Comitee of Medical University in Białystok (Poland). Group of 36 patients suffering from chronic low back pain and treated with opioid theraphy (study group) and group of 14 healthy volounteers (control group) were included in our study. Both groups had anthropometrical parameters taken, as well as information about duration of opioid theraphy, type of opioid, total dose and form of application were registered from study group. In both groups measurement of BDNF were performer using Enzyme-Linked Immunoabsorbent Assay (ELISA) test dor BDNF (Immunodiagnostik, Germany). Data were analyzed using non-parametric tests.
Results and Discussion: The median BDNF value in study group was 9.56 – 14.73 ng/ml and compared to control group with median BDNF value 23.89 - 29.61 ng/mL . In patients with oxycodone, BDNF levels were significantly lower than in patients

with buprenorphine or tramadol, (p<0.005). Levels of BDNF serum concentration were positively correlated with age and daily dose of opioid. Opioid use may result in decrease of cognitive function, addiction and increasing opioid tolerance. Correlation between different opioid analgetics used in non-cancer patients and their cognitive function and opioid tolerance is not well studied in chronic pain non-cancer patients. Opioid dependency correlation with BDNF level was investigated in opiate-use disorder patients.
Conclusion: Tramadol and buprenorphine had the least impact on BDNF serum level in examined patients, as well as on cognitive function or dependency development. Oxycodone causes a lowering of the level of BDNF correlated with decrease of cognitive functions, which is particulary visible in elderly patients.

5423

A new rat model of chronic cerebral hypoperfusion resulting in early-stage vascular dementia

Wang J.[1]
[1]Tianjin medical university - Tianjin (China)

Background and Goal of Study: Currently, most vascular dementia models are established by occluding one or both carotid arteries to reduce the cerebral blood flow mimicking chronic cerebral hypoxia. Due to the sudden blood flow interruption, the gradual narrowing of the carotid artery cannot be completely imitated. This paper aims to establish a model of bilateral carotid stenosis with mild cognitive dysfunction and mild white matter changes to simulate patients with vascular pre-dementia.
Materials and Methods: Aged (18months) Wistar rats underwent bilateral common carotid artery stenosis (BCAS) or occlusion (BCAO) surgery or were sham-operated (control group). Cerebral blood flow (CBF) in the frontal cortices was measured using Doppler flowmetry. Cognitive function impairments were detected with the Morris water maze test on day 30 after surgery. Cerebral magnetic resonance imaging (MRI) detected changes in fractional anisotropy (FA) to assess the white matter injury in rats on day 30 after surgery. Additionally, histological studies were performed at 30 days after surgery.
Results and Discussion: The mortality was 11% (30/34) in the BCAS group. At 2 h, the CBF values (ratio to preoperative values) were significantly decreased to 77.3 ± 13.4% in the BCAS group but to 37.3 ± 12.5% in the BCAO group. In the BCAS group, the microscopic structure of the hippocampal CA1 region changed slightly after 30 days. The difference between the escape latencies in the BCAS model and control groups was significant less than that in the model group ($P < 0.05$). The hnRNPA2 and GABAAR-α1 expression levels were significantly decreased in the hippocampus of BCAS rats compared to that of control animals. Fluorescence stainings for glial fibrillary acidic protein revealed that the space of injured neurons was filled by Astrocytes in the brain of BCAS rats, and this phenomenon was even more pronounced in the BCAO group. In MRIs, the FA values in the hippocampus and cortex of BCAS rats were slightly decreased, and these changes were more pronounced in BCAO rats.
Conclusion: Severe bilateral carotid stenosis induced mild cognitive dysfunction and slight structural changes in the brain of aged rats. This study established successfully a chronic cerebral hypoperfusion model.

5524

Effect of the administration of Hydroxyethil starch on the recovery of renal function in laparoscopic living donor nephrectomy

Zattera L.[1], Benítez-Cano A.[1], Aguilera L.[1], Diosdado A.[1], Rivera P.[1], Carazo J.[1], Department of Anesthesia and Intensive Care, Hospital del Mar, Barcelona
[1]Hospital Del Mar - Barcelona (Spain)

Background and Goal of Study: Currently, the use of hydroxyethyl starch (HES) solutions has been restricted due to their potential association with the development of renal failure in certain clinical settings. In this sense, its administration as a perioperative strategy to avoid hemodynamic compromise during laparoscopic living donor nephrectomy (LLDN) is questioned. The main objective of this study is to compare the recovery of renal function in patients undergoing LLDN with and without perioperative administration of HES.
Materials and Methods: Retrospective single-center observational study (January 2010 - December 2017) of patients undergoing LLDN. Two groups were defined: group H includes patients who received 6% HES 130 / 0.4 within 24 hours of the perioperative period and in group N those who did not receive it. The main variable is the recovery of renal function by compensating the remaining kidney one year after the nephrectomy. We evaluated this compensation using the renal compensation rate [RCR = (eGFR per year of nephrectomy / eGFR predonation) * 100], with eGFR being the estimated glomerular filtration rate. Other variables collected: demographic data, amount of HES administered (ml / kg weight) and eGFR using the CKD-EPI equation at different times (predonation, discharge, 1 month, 3 months 6 months and one year). Quantitative variables are expressed as mean and standard deviation; categorical variables as a percentage. Comparisons were established between the groups described by Student's t -Test for continuous variables.
Results and Discussion: A total of 89 donors were included (group H = 65 / group N = 24). Demographic characteristics were similar in both groups. In group H, the amount of HES administered was 17.24 ± 5.6 ml / kg, in any case exceeding the maximum recommended dose (30 ml / kg). No statistically significant differences were found between both groups in the eGFR measured at the different time intervals (p> 0.05). The RCR (%) in group H was 67.7 ± 8.72 vs. 65.1 ± 7.3 in group N (p = 0.72).
Conclusion: Perioperative administration of HES in patients undergoing LLDN does not appear to compromise the recovery of renal function one year after surgery.

5716

Usefulness of Dexmedetomidine for Anesthetic management of patients with Myasthenia Gravis

Taura S.[1], Tsukamoto M.[2], Yokoyama T.[3]
[1]Kyushu University - Fukuoka (Japan), [2]Kyushu University Hospital - Fukuoka (Japan), [3]Kyushu University - Fukuoka (Japan)

Background: Dexmedetomidine (DEX) is a lipid-soluble alpha2-agonist, and DEX-base is distributed into the brain through the brain blood barrier. DEX exerts sedative and analgesic effect with less respiratory depression. Myasthenia gravis (MG) is an autoimmune disease, and it is characterized in increase of the antibody to the acetylcholine receptor at neuromuscular junction. Patients with MG complain of fatigue and muscle weakness. Anesthesiologists should pay attention to prevent weakness of respiratory muscles during perioperative period.
Case report: We experienced 2 patients with MG. First case was 69 year-old male, 175 cm in height and 79 kg in weight. He had taken pyridostigmine and prednisolone for 3 years, but he still could walk by himself. The patient underwent fenestration of the mandible tumor. Nasotracheal intubation was facilitated by fentanyl 75 micro-g, DEX 4 micro-g/kg/hr and topical anesthesia with lidocaine, and completed under spontaneous respiration by fiberscope as the lower teeth showed severe mobility due to the tumor. Anesthesia was maintained with propofol and remifentanil. Second case was 89 year-old female, 138 cm in height and 33 kg in weight. She has 20 years history of MG, and had taken prednisolone. She had serious systemic muscle weakness and cannot stand. She had undergone tracheostomy because of frequent aspiration pneumonia. The patient underwent TMJ arthroplasty. Lidocaine was used for topical anesthesia. Remifentanil 0.05 micro-g/kg/min and DEX 4 micro-g/kg/hr facilitated the exchange of the tracheal tube. Anesthesia was maintained with 0.4-0.5% sevoflurane, nitrous oxide, DEX 0.2-0.4 micro-g/kg/hr and Remifentanil 0.05 micro-g/kg/min. Spontaneous respiration was maintained well during surgery.
Discussion: No muscle relaxant was administered in both cases to prevent the progression of the muscle weakness. No benzodiazepine was administered also considering muscle relaxant effect. DEX has analgesic effect, and the combination of DEX and nitrous oxide is useful to reduce opioid dose in the second case. Spontaneous ventilation was maintained well.
References:
1. Katsumi N, Kunisawa T, Suzuki A, Kurosawa A, Takahata O, Iwasaki H. Perioperative management of a patient with myasthenia gravis using dexmedetomidine. Masui. 2009;58:1450-2.
Learning points: The combination of DEX and nitrous oxide may be useful to reduce opioids use and to maintain spontaneous respiration.

5793

Use of oxygen therapy in the Postanaesthesia Care Unit and neuromuscular blocking agents monitoring and reversal in the OR in a tertiary hospital

Clusella A.[1], Dominguez A.[1], Navarro S.[1], Jiménez Y.[1], Martí A.[1], Moret E.[1]
[1]Hospital Germans Trias i Pujol - Badalona (Spain)

Background/Goal of Study: Transitory arterial hypoxemia is one of the most common respiratory complications after anaesthesia that is usually treated with oxygen therapy (OT). Incomplete recovery of neuromuscular function may impair pulmonary and upper airway function and contribute to adverse respiratory events in the postanaesthesia care unit (PACU). Aim of the study was to analyse the use of OT in the PACU and neuromuscular blocking agents(NMBAs) and reversal in the OR in a tertiary hospital.
Materials/Methods: This was a prospective, descriptive, observational study. After obtaining institutional Ethics Committee approval and written informed consent, all consecutive adult patients scheduled for any type of surgery under general anaesthesia (GA) or sedation were included during 3 months (August-October 2019). Data recorded were: demographics, comorbidities and variables according to the ARISCAT criteria, type of surgery and anaesthesia, use of NMBAs monitoring/reversal, SpO2 at different times and postoperative use of OT and vital signs. Student's t-test and Chi-square test were used for analysis using SPSS®. Data are presented as absolute numbers and/or percentages. A p-value<0.05 was considered to be statistically significant.
Results/Discussion: A total of 101 patients were included(57.4% women, mean age was 63.6±14 ys, ASAI16%, II62%, III23%, GA 69.3%, smokers 23.8%, respiratory comorbidities 24.8%).64.4% underwent thoracic or abdominal surgery (mean duration 2 h in 48.5%).Mean preoperative baseline SpO2 was 96.1±9.8%; mean SpO2 at arrival to PACU was 95,1±9.1%. In the PACU OT was given in 61.4% of the cases using nasal cannula; it was maintained 1 h in 53% and in 24.8% when discharge to ward. We observed that in 34% of the patients coming from OR arrived to PACU with a SpO2<96% and oxygen therapy was not given, while in 56.3% of the patients presenting SpO2>96% oxygen therapy was administered. On the other hand, NMBAs were used in the OR in 63.4% of the GA; neuromuscular reversal with suggamadex was performed in 61.4% of the patients while only in 32.7% of the GA a neuromuscular blockade monitoring was performed intraoperatively.
Conclusions: In our setting, an inappropriate use of OT in PACU and an inadequate use of NMBAs monitoring and reversal in OR were observed. It is crucial to design specific protocols of oxygen therapy administration in our PACU and neuromuscular monitoring and reversal in the OR in order to improve patients outcome.

5808

Postoperative coagulation disorders in major hepatectomies: safety of epidural catheter for perioperative analgesia

Adalid I.[1], Vallés J.[1], Beltrán S.[1], Larrañaga L.[1], Rivera H.[1], Álvarez J.[1]
[1]Hospital Del Mar - Barcelona (Spain)

Introduction: Coagulation disorders can appear after liver surgery. In major resections, these disorders appear more frequently. Accidental withdrawal of an epidural catheter in these conditions could increase spinal haematoma incidence1. The aim of our study is the evaluation of epidural catheter safety, having into account the evolution of coagulation parameters in major and minor hepatectomies.
Material and methods: We performed a retrospective review of a prospective, unicenter, observational database including all patients who get hepatic surgery from January 2015 to November 2019. Patients were classified into major hepatectomy or minor hepatectomy groups. Demographic preoperative data, bleeding and transfusion requirements, fluids administration and evolution of coagulation parameters (prothrombin time [PT], partial thromboplastin time [aPTT] and platelets count [PC]) were analysed. For safety analysis, we considered the institutional laboratory thresholds and the accepted in some hepatic surgery centers1. Statistical analysis included Student's t test or Chi-square to compare both groups (level of significance, p<0,05)
Results: 73 patients were recruited, 15 of them were excluded for missing coagulation data. The 58 included were classified into major surgery (19 patients) and minor surgery (39 patients) groups. There were no statistically significant differences in demographic data (age, body mass index, sex, ASA status, preoperative coagulation parameters) and intraoperative data (bleeding, fluid administration) between the two groups. All patients in major surgery group presented at least one coagulation parameter out of normal laboratory range (PT<80%, aPTT>32 seconds, PC<150.000/mm3), compared to 64% of minor surgery patients (p=0.001). Regarding the thresholds accepted in some hepatic surgery centers (PT<43%, aPTT>40 seconds, PC 80.000/mm3), 21% of patients in major surgery group presented at least one coagulation parameter affected, compared to none of minor surgery patients (p=0.009).
Conclusion: According to our results, the worsening of coagulation parameters in the postoperative period of major hepatectomies, makes unsafe the insertion of an epidural catheter for pain control.
References:
1. Jacquenod P et al. Incidence and risk factors of coagulation profile derangement after liver surgery: Implications for the use of epidural analgesia. A retrospective cohort study. Anesth Analg. 2018;126(4):1142–7.

6005

Accuracy of iThermonitor Wireless Thermometer in Intraoperative Temperature Monitoring

Wu W. W.[1], Liu J.[1], Zhang W. S.[2]
[1]West China Hospital, Sichuan University - Chengdu (China), [2]Sichuan UniversityWest China Hospital, Sichuan University - Chengdu (China)

Background and Goal of Study: Intraoperative hypothermia is one of the most common anesthesia related complications. iThermonitor is a new type of electronic thermometer, which has advantages of noninvasive, continuity, simple operation and could be used for conscious patients. This study aimed to analyze the consistency between iThermonitor and esophageal.
Materials and Methods: Patients undergoing lower abdominal surgery in West China Hospital from September 2018 to February 2019 were included. The esophageal temperature and iThermonitor were continuously monitoring under the condition of upper body external heating blanket. The consistency between iThermonitor and esophageal temperature monitoring was compared. Bland-Altman analysis was used to assess the consistency between core temperature and iThermonitor. P<0.05 was considered statistically significant.
Results and Discussion: A total of 10304 temperature points were recorded of 79 patients. Difference value between esophageal and iTh temperature is 0.19± 0.30℃ and correlation between the two temperatures is 0.842 (P<0.001). The proportion of difference value less than 0.5℃ between the two temperatures is 84.71%, and the accuracy is ±0.59℃. In subgroup analysis, group A (operative time<120min, n=23), group B (operative time:120-180min, n=38) and group C (operative time>180min, n=18), the correlation coefficient between esophagus and iThermonitor are 0.70 (P<0.001), 0.85 (P<0.001), and 0.85 (P<0.001), respectively. The differences between esophageal and iThermonitor temperature within ±0.5℃ is 80.86%, 87.75% and 87.47%, and Bland-Altman analysis shows accuracy are ±0.66℃, ±0.59℃ and ±0.54℃ for the above three groups, respectively. This result may suggested that iThermonitor need a measurement stabilization process.
Conclusion: When temperature sensor is covered by the external heating blanket iThermonitor was not affected. The accuracy is significantly lower when operative time less than 120min. iThermonitor were stable and well consistent with esophageal temperature when operative time is longer than 2 hours.
Acknowledgements: We thank the Chinese Evidence-based Medicine Center West China Hospital, Sichuan University for providing statistical consultation.

5695

Comparison between open source and trained neural network model in face detection for critical ill patients

Takaki S.[1], Sato A.[1], Yokose M.[1], Goto T.[1]
[1]Yokohama City University Hospital - Yokohama (Japan)

Background and Goal of Study: Rapid response system is one of the strategies to prevent in-hospital emergency. This early intervention is known to improve patient's prognosis, but medical staffs are required triage to activate the system. For triage, early warning score (EWS) with vital signs and patient's consciousness are often used. Although vital signs are automatically collected from biological monitoring system, consciousness level are difficult to obtain automatically. The aim of this study is to consider the usage and possibility of face detection system by camera monitoring to evaluate patient's consciousness automatically.
Materials and Methods: We prospectively collected data of patients who were admitted to ICU in Yokohama City University Hospital from July 2018 to March 2019. 2000 images were randomly extracted from recorded video clips of ICU patients who agreed to this study. We used three types of face detection model: haar cascade, Multi-task Cascaded Convolutional Networks (MTCNN), Single Shot MultiBox Detector (SSD), former two models are open-sourced model, and latter model is based on convolutional neural network (CNN) of ICU images. We calculate the success rate of detecting the patients face or eyes with these models.

Results and Discussion: Randomly selected 25 images of 25 patients were used for comparison. Accuracy of face detections were 16% with haar cascade, 40% with MTCNN, and 84% with SSD. In addition, accuracy of eyes detections were 4% with haar cascade, 36% with MTCNN, and 48% with SSD. These results indicate the efficacy of trained CNN, especially based on ICU. ICU patients are often in quite unique situation, such like oxygen therapy, intubated patients, extracorporeal circulation, and more. When it comes to face detection, devices around the face can be obstacle. Thus, it makes sense that SSD, a trained CNN based on ICU, can be more clinically accurate. More detailed training about, for example, face direction, illumination, and types of oxygen therapy devices, will be required for higher accuracy.
Conclusion: The trained neural network model based on ICU images was able to detect patient's face with higher success rate than other detecting models. If the face detection model become able to recognize patient's eye opening too, it can lead to possibility of automatic system to calculate EWS and be a continuous monitoring, warning system not only for patients, but also for medical staffs.

5425

A feasibility study of simultaneous and accurate measurement of all vital signs of a remote wireless monitoring system

Posthuma L. M.[1], Van Der Sande M.[1], Visscher M.[1], Hollmann M.[1], Preckel B.[1]
[1]Amsterdam UMC, location AMC - Amsterdam (Netherlands)

Background and Goal of Study: Continuous wireless monitoring systems are developed to earlier detect patient deterioration on the ward. Previous studies showed that specific vital signs were accurately measured by these systems >50% of time.1-3 We investigated the feasibility of measuring respiratory rate, heart rate and temperature simultaneously using Sensium Vitals®. Feasibility was defined as simultaneous and accurate measurement of all three vital signs together in at least 50% of time.
Materials and Methods: SensiumVitals® was installed at a surgical ward. After informed consent, patients undergoing non-cardiac intermediate of high-risk surgery were included. The SensiumVitals® patch was fixed on the patient's chest using standard ECG electrodes, and patch data were send to a server. In case measurement of any vital signs was interrupted, an error message is generated and send to the server.
Results: Data from 32 patients were analyzed: in 90% of all data points there was appropriate connection of the ECG-electrodes to the patient. Of these 90% of data, the system registered in a mean of 37% (32.685 of 89.437) time points valid data for all three parameters simultaneously, with a range of 4-73%. Heart rate had an availability of 90% (range 53-99%), temperature of 71% (range 8-98%) and respiratory rate of 54% (range 25-86%). Differences were found between daytime and nighttime, with more availability during the night for all measurements (fig. 1).
Discussion: In only 37% of valid measurements, all three vital signs were available. There is little clinical evidence that determines the minimum simultaneous availability in order to identify patient deterioration. Using trends of vital signs has been suggested to identify deteriorating patients, but with only one third of the data constantly available, it will be difficult to discriminate trends.
References:
1. Breteler et al, BMJ Open 2018.
2. Hernandez-Silveira et al. BMJ Open 2015.
3. Posthuma et al. J Clin Monit Comp 2019.

Geriatric Anaesthesiology

4944

Incidence and risk factors of postoperative delirium after orthopaedic surgery in the Irish population: a cross-sectional study

Lam D.[1], Joyce K.[1], Iohom G.[1]
[1]Cork University Hospital - Cork (Ireland)

Background and Goal of Study: Postoperative delirium is associated with increased risk for morbidity, cognitive deterioration and delayed rehabilitation. The incidence of postoperative delirium after orthopaedic surgery has been reported to be between 28-52% (1) and its aetiology remains poorly understood and is believed to be multi-factorial (2). The objectives of the study are to determine the incidence of immediate postoperative delirium after orthopaedic surgery and to identify preoperative and perioperative characteristics in older adult patients undergoing elective or emergency orthopaedic surgery that predisposes them to developing postoperative delirium.
Materials and Methods: Design: This single-centred prospective observational study was conducted at the preoperative unit and post-anaesthesia care unit at Cork University Hospital. Patients: 43 participants were included in the study. Inclusion criteria:1) Sixty years and older; 2) Scheduled for elective or emergency orthopaedic surgery; 3) Possessed the ability to provide informed consent; and 4) Proficient in English. Exclusion criteria: patients with a history of delirium. Primary measurement: CAM-ICU was used pre- and postoperatively to assess for delirium.
Results: The incidence of immediate postoperative delirium in the study population was 7%. Risk factors for the development of postoperative delirium included an individual's previous psychiatric history (p = 0.003), whether inotropic support or reversal of neuromuscular blockade was required intraoperatively (p = 0.018 and p= 0.019, respectively).
Conclusions: Elderly patients undergoing orthopaedic surgery are at considerable risk of developing postoperative delirium. Risk factors included individuals with a previous psychiatric diagnosis or diagnoses, the requirement of intraoperative inotropes, and general anaesthesia. In order to prevent the development of postoperative delirium, it is critical for older patients to be assessed regularly for psychiatric conditions and cognitive status prior to orthopaedic surgery. Care should be taken to minimise blood pressure fluctuations and periods of hypotension intraoperatively.
References :
1. Dyer CB, Ashton CM, Teasdale TA. Postoperative delirium. A review of 80 primary data collection studies. Arch Intern Med. 1995;155:461–5.
2. Inouye SK. Delirium in older persons. N Engl J Med. 2006 Mar 16;354(11):1157–65.

5953

Establishment of Preoperative Predictive Model for Postoperative Delirium in Elderly Patients Enduring Non-cardiac Surgery

Yang J.[1], Tang Y.[1], Zhou J.[1]
[1]West China Hospital, Sichuan University - Chengdu (China)

Background and Goal of Study: In order to identify high-risk patients early and improve the prognosis of patients with POD, this study aims to establish a preoperative predictive model of POD in elderly patients enduring non-cardiac surgery.
Materials and Methods: Delphi method and literature analysis were used to design a POD risk prediction model. For establishing the model, the POD risk index of patients was evaluated according to the score, and prospective cohort study was conducted. A total of 545 patients aged over 65 underwent the non-cardiac surgery were recruited. Demographic data, clinical history and risk factors of delirium were collected within 48 hours before operation. Patients were followed up daily from 1-3 days after operation to evaluate the occurrence of POD and record other important clinical outcomes. And then, the patients were followed up by telephone at 7 days, 1 and 3 months after operation to evaluate the long-term cognitive function and prognosis. The discrimination of the model was tested by drawing the receiver ROC and calculating the AUC. The calibration of the model was evaluated by Hosmer-Lemeshow goodness-of-fit test.
Results and Discussion: The model consisted of 9 item and was expressed by POD risk index with 11 points. In the validated study, 489 patients were included in the model and the overall incidence of POD was 6.13%, including 2.75% in orthopaedics, 2.44% in gastrointestinal surgery, 10.48% in hepatobiliary and

pancreatic surgery, and 10.95% in thoracic surgery. Postoperative delirium was associated with low preoperative cognitive function score and a history of delirium (P<0.05). The POD risk index was significantly correlated with TICS-m score on the 7th and 1st month after surgery, ICU admission, length of stay and hospitalization expenses (P<0.05).
Conclusion: Postoperative delirium risk predictive model established in this study can effectively predict the occurrence of delirium in elderly patients enduring non-cardiac surgery, and high POD risk index is associated with lower postoperative cognitive function score, higher ICU admission, longer length of stay and increased hospitalization costs.

4876

Change in biomarkers of postoperative cognitive decline in elderly under general anaesthesia using isoflurane or desflurane

Khanna P.[1], Haritha D.[2], Kashyap L.[2], Ray B. R.[2], Anand R. K.[2], Maitra S.[2]
[1]AIIMS, New Delhi - Delhi (India), 2AIIMS, New Delhi - New Delhi (India)

Background: POCD was attributed to the inflammatory stress response which can lead to synthesis of multiple cytokines mainly interleukin – 1 (IL-1), interleukin - 6 (IL-6) and tumor necrosis factor – α (TNF –α) from the activated fibroblasts and endothelial cells. The amyloid β (A-β) concentrations in the hippocampus and amygdala were found to be associated with memory and learning disturbances and Isoflurane was shown to increase the concentration of amyloid β by altering Amyloid Precursor Protein. Hypothesis: Due to different pharmacokinetic profiles, there might be a difference in POCD in elderly under GA with Isoflurane and Desflurane.
Goal: The objectives of this pilot study were to assess change in biomarkers of POCD in elderly patients receiving isoflurane and desflurane like IL-1, IL-6, TNF alpha, amyloid – β and S100.
Material and Methods: The Prospective observational parallel group study was carried out in 40 patients of age between 60 to 80 years without any previous psychiatric illness undergoing open abdominal surgery under general anaesthesia and epidural of anticipated duration of more than 2 hours were included in the study.
Results and Discussion: Data from 35 patients, 18 in isoflurane group and 17 in desflurane group were analysed.Changes in the biomarkers of POCD in patients who received isoflurane or desflurane is tabulated (1&2).
Conclusion: We cannot substantially conclude that Isoflurane nor Desflurane is a better inhalational agent. We recommends future studies with more sample size exploring the various aspects of POCD in a more uniform population with a fixed protocol of anesthesia and surgical procedures .
References:
1. Parades S, Cortinez L, Conteras V, Silbert B, POCD at 3 months in adults after Non Cardiac Surgery: a Qualitative Systematic Review. Acta anaesthesiologica Scandinavica 60 (2016) 1043- 1058.

5057

Effect of perioperative dexmedetomidine and added to postoperative patient controlled analgesia on processed electroencephalogram and delirium in elderly patients undergoing hip surgery

Lee I.[1], Ji S.[1], Kim Y.[1], Lim B. G.[1], Kong M. H.[1], Korea University Guro Hospital, Department of anesthesiology and Pain Medicine
[1]Korea University Guro Hospital - Seoul (South Korea)

Background and Goal of Study: Postoperative delirium (POD) is associated with adverse clinical outcomes in elderly patients. Monitoring of processed electroencephalogram may prevent POD, probably optimization of anesthetic depth. Dexmedetomidine could reduce POD. The objective of this study is to assess processed EEG during the perioperative period including postoperative recovery and to investigate whether the dexmedetomidine infusion during surgery, recovery period and up to postoperative 48 hours, added in intravenous patient-controlled analgesia (PCA) could reduce POD in elderly patients undergoing hip surgery.
Materials and Methods: Sixty patients older than 65 years undergoing hip surgery were randomized to dexmedetomidine group (Group D; n=30) and control saline group (Group C; n=30). Patients in each group received dexmedetomidine 0.2-0.5 μg/kg/hr or 0.9% normal saline from anesthesia induction until recovery period at post anesthesia care unit (PACU). Postoperatively, the PCA (fentanyl 20 μg/kg with [Group D] or without [Group C] dexmedetomidine 10 μg/kg with a total volume of 50 ml) was programmed to deliver a background infusion rate of 0.5 ml/hr and a 0.5 ml bolus on-demand, with a lockout interval of 15 min. The incidence of POD, relative EEG band powers, pain scores, rescue analgesic amount, and adverse events were assessed.
Results and Discussion: The incidence of delirium at PACU of group D was lower than that of group C (20% vs. 46.7%, P = 0.028). The incidence of delayed delirium on postoperative day in group D was lower than in group C (6.7% vs. 26.7%, P = 0.038). During surgery, the relative band power of delta wave of group D was lower than that of group C (40.45 ± 2.00% vs. 47.42 ± 2.89%, P = 0.006). At PACU, the relative band power of beta activity of group D was lower than that of group C (14.08 ± 2.512% vs. 20.73 ± 3.652%, P = 0.039). Group D patients stayed in the hospital during a shorter time than in the group C (12.63 ± 0.93 days vs. 16.20 ± 1.50 days, P = 0.036). Pain score, rescue analgesic amount and adverse events including hypotension and bradycardia were not significantly different between the two groups.
Conclusion: The dexmedetomidine infusion during surgery and PCA administration reduced POD in PACU, the incidence of delayed delirium in ward and the length of hospital stay. Dexmedetomidine also lessens the relative band power of delta wave of EEG during surgery.

4993

Validation of The Telephone Interview for Cognitive Status and Montreal Cognitive Assessment against neuropsychological assessment for postoperative cognitive dysfunction in the elderly (The TINMAN study)

van Zuylen M. L.[1], Geurtsen G. J.[1], Ten Hoope W.[2], Willems H. C.[1], Preckel B.[1], Hermanides J.[1]
[1]Academic Medical Center - University of Amsterdam - Amsterdam (Netherlands), [2]Rijnstate Hospital - Arnhem (Netherlands)

Background and Goal of Study: Increased aging and (multi)morbidity will ultimately result in more surgery in the elderly. Postoperative cognitive dysfunction (POCD) in older adults occurs frequently and has been related to both postoperative morbidity and mortality1. Extensive and time consuming neuropsychological assessment (NPA) of patients is still the gold standard for diagnosing POCD. This requires time consuming face-to-face administration, which is not always feasible. The Telephone Interview for Cognitive status (TICS) and The Montreal Cognitive Assessment (MoCA) have been suggested2 as useful and patient friendly screening tools for diagnosing POCD. They have since been used3 for detecting POCD but have not been validated in this context. We aim to validate the TICS and MoCA questionnaires with NPA as gold standard.
Materials and Methods: This is a single centre prospective cohort study. 120 patients will be included. The study population consists of patients of 65 years and older without previously diagnosed cognitive impairment, undergoing elective surgery in the Amsterdam UMC, location AMC. Main study endpoints are clinimetric evaluation (reliability, validity) of the TICS and MoCA. Bland–Altman plots and Spearman rank correlation analysis shall be performed to examine agreement and pre- and postoperative relation for the TICS, MoCA and NPA. The area under the curve, sensitivity and specificity will be determined.
Results and Discussion: Up until now 48 patients are included. At time of the conference we will present our data on the entire cohort of 120 patients.
Conclusion: The results of this validation study will potentially lead to the availability of two additional validated POCD screening tools. These screeners can be used in the preoperative evaluation of older adult patients to screen for both pre-existing and postoperative cognitive dysfunction.
References:
1. Steinmetz J et al.; ISPOCD Group. Long-term consequences of postoperative cognitive dysfunction. Anesthesiology. 2009 Mar;110(3):548-55.
2. Needham MJ et al.. Postoperative cognitive dysfunction and dementia: what we need to know and do. Br J Anaesth. 2017 Dec 1;119(suppl_1):i115-i125.
3. NeuroVISION Investigators. Perioperative covert stroke in patients undergoing non-cardiac surgery (NeuroVISION): a prospective cohort study. Lancet. 2019 Sep 21;394(10203):1022-1029.

5033

Identification of the Potential Key CircRNAs in Elderly Patients with Postoperative Cognitive Dysfunction

Gao R.[1], Li M.[1], Wang Q.[1], Liu J.[1], Zhu T.[1], Chen C.[1]
[1]West China Hospital of Sichuan University - Chengdu (China)

Background and Goal of Study: Postoperative cognitive dysfunction (POCD) is considered as a severe postoperative complication among elderly patients. Here we probed differentially expressed circRNAs using microarray assay in POCD patients, aiming to find potential key circRNAs related to the occurrence of POCD.
Materials and Methods: Patients over 65 years of age scheduled to undergo cardiac surgery under general anesthesia and cardiopulmonary bypass were enrolled. By neurocognitive evaluation, they were divided into two groups, non-POCD (NPOCD) and POCD group. The patients' blood sample was obtained 3 days after surgery. Neuropsychological tests were conducted on the day before and 3 days after surgery. The protocol consisted of the MMSE, Digit Span Test, Trail Making Test, Word Memory Test, Brief Visuospatial Memory Test-Revised, Symbol-Digit Modalities Test and Verbal Fluency Test. The incidence of POCD was defined by a deterioration of one standard deviation of baseline score in at least two tests. For circRNA microarray analysis, 3 POCD and NPOCD serum samples were randomly selected. CircRNAs having fold changes >2 and p-values <0.05 are selected as the significantly differentially expressed.
Results and Discussion: The distribution of log2 ratios were similar in the tested samples (Fig. 1A). The results of hierarchical clustering showed distinguishable circRNA expression profiling, indicating circRNAs have a different expression pattern in POCD (Fig. 1B-C). The Volcano plot was performed to visualize the significant differences between POCD and NPOCD group (Fig. 1D). Besides, the distributions of differentially expressed circRNAs in human chromosomes showed that most circRNAs were transcribed from chr1, chr2, chr5, chr10, chr11, and chr16 (Fig. 1E). The microarray data showed 210 circRNAs were differentially expressed in POCD group. Among them, 133 circRNAs were upregulated and 77 were downregulated. The top 5 upregulated and downregulated circRNAs were presented (Table 1).
Conclusion: Our study revealed the expression profile of circRNAs in POCD, suggesting their potential involvements in POCD pathogenesis and use as biomarkers for POCD diagnosis.

FIGURE 1

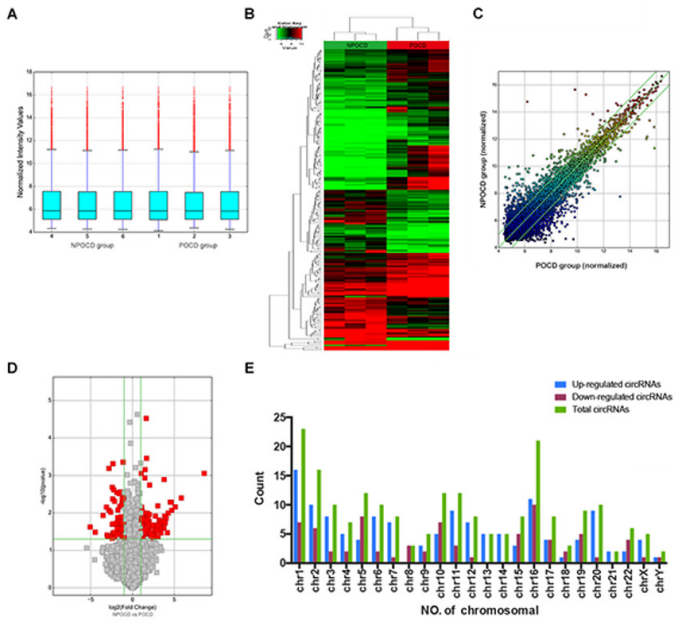


TABLE 1

CircRNA ID	Fold change	*P*-value	Chromosome	circRNA type	Best transcript*	Gene symbol
Upregulated						
hsa_circRNA_001145	380.60	0.00088	chr20	intronic	ENST00000317619	CPNE1
hsa_circRNA_101138	57.11	0.00399	chr12	exonic	NM_130466	UBE3B
hsa_circRNA_030050	34.52	0.00692	chr13	exonic	NM_172373	ELF1
hsa_circRNA_061570	25.71	0.00848	chr21	exonic	NM_003024	ITSN1
hsa_circRNA_401117	24.89	0.00521	chr12	exonic	NM_015394	ZNF10
Downregulated						
hsa_circRNA_005537	33.66	0.02375	chr5	exonic	NM_001790	CDC25C
hsa_circRNA_092522	22.01	0.03269	chr22	exonic	uc003hlx.3	GRAMD4
hsa_circRNA_012989	11.52	0.01164	chr1	exonic	NM_015017	USP33
hsa_circRNA_005458	8.67	0.00703	chr2	exonic	ENST00000447760	AC114755.7
hsa_circRNA_050545	8.28	0.03876	chr19	exonic	NM_005499	UBA2

4682

Combination of anaesthesia and surgery decreases glutamate-mediated excitatory synaptic transmission in pyramidal neurons of the mouse anterior cingulate cortex

Matsumoto Y.[1], Furue H.[2], Fujino Y.[1]
[1]Osaka University Graduate School of Medi - Suita Osaka (Japan),
[2]Hyogo College of Medicine - Nishinomiya (Japan)

Background and Goal of Study: Postoperative delirium (POD) is an acute syndrome of inattention and disordered cognition. Although there are some prevailing pathophysiological hypotheses, its neuropathogenesis remain largely unknown. One of these hypotheses is neurotransmitter imbalance, such as excessive dopamine or reduced acetylcholine availability. Glutamate is the major excitatory neurotransmitter in the human brain and is thought to affect cognition control. Therefore, we hypothesized that glutamate transmission in the brain sites involved in cognition would be changed in POD. The anterior cingulate cortex (ACC) plays important roles in attention and cognition. In this study, we investigated how glutamate-mediated excitatory synaptic transmission was changed following anaesthesia and surgery (Anaesthesia/Surgery) in pyramidal neurons of the ACC.
Materials and Methods: Under isoflurane anaesthesia, laparotomy was performed in 2-3 months old mice. We used a battery of behavioral tests (buried food test, open field test, and Y maze test) at 24 hours before and at 6, 9 and 24 hours after Anaesthesia/Surgery and calculated composite Z scores to evaluate the severity of behavior impairment. After the behavioral tests, we performed whole-cell patch-clamp recordings from pyramidal neurons in the ACC of brain slices and recorded spontaneous excitatory postsynaptic currents (sEPSCs). Statistical significance was determined using unpaired t-test.
Results and Discussion: The mean value of composite Z scores in Anaesthesia/Surgery group was significantly higher than in control group at 6 and 9 (but not 24) hours, suggesting worse performance in Anaesthesia/Surgery group. Therefore, we used Anaesthesia/Surgery group as animal models of POD. Pyramidal neurons in the ACC had a resting membrane potential of ~70 mV in control and aesthesia/Surgery groups. Under the voltage-clamp mode, they exhibited spontaneous EPSCs in both groups. The frequency of EPSCs in Anaesthesia/Surgery group was significantly lower than that in control group. The amplitude, rise time, and decay time were not different between both groups. The present results suggest that glutamate synaptic transmission in pyramidal neurons of the ACC decreased following anaesthesia and surgery.
Conclusion: Excitatory synaptic transmission in pyramidal neurons of the ACC in the POD model is presynaptically decreased without changing any functions of postsynaptic glutamate (AMPA) receptors.

5170

Frailty assessment in planned surgery

Hernández Aguiar Y.[1], Becerra Bolaños Á.[2], Santana Ortega L. M.[2], Hernanz Rodríguez G. M.[2], Padrón Ruiz O. M.[2], Rodríguez Pérez A.[3]
[1]Hospital Universitario de Gran Canaria Doctor Negrín - Las Palmas (Spain), [2]Hospital Universitario de Gran Canaria Doctor Negrín - Las Palmas (Spain), [3]Universidad de Las Palmas de Gran Canaria - Las Palmas (Spain)

Background and Goal of Study: Frailty is associated to a higher risk of perioperative complications, increasing mortality, hospital length of stay and worsening postoperative quality of life. To successfully care frail patients during the perioperative period, it is necessary to identify them and to assess frailty degree. We aim to evaluate the prevalence of frailty in planned surgery population and its association with perioperative morbidity and mortality.
Materials and Methods: Once the approval of our Ethics Committee was obtained, we carried out a prospective observational study including 55 patients older than 65 years old submitted to planned surgery. Following data were recorded: Charlson Index (CI), ASA physical status, postoperative complications, hospital length of stay, unplanned admission to ICU, need for hospital readmission, and mortality. Geriatric assessment was performed using Minimental Test (MMT), Barthel Index (BI) and Edmonton Scale (ES). Data were analyzed using SPSS 24.
Results and Discussion: From patients enrolled (41.8% female, 58.2% male), 54.5% were older than 75 years old and 20% older than 80. ASA physical status distribution was: I 1.8%, II 58.2%, III 40%. Average CI, BI and ES were 5.3+2.1, 86.1+25 and 5.8+3.7, respectively. A statistically significant relationship was found when performing Pearson Correlation among different geriatric assessment scales: ES vs BI (r –0.67 p<0.001), ES vs CI (r 0.38 p=0.004), ES vs MMT (r –0.65 p<0.001), BI vs CI (r –0.3 p=0.027), BI vs MMT (r 0.76 p<0.001) and CI vs MMT (r –0.32 p=0.019). A statistically significant relationship was found between a higher number of postoperative complications and higher values in ES (r 0.49 p=0.0001),

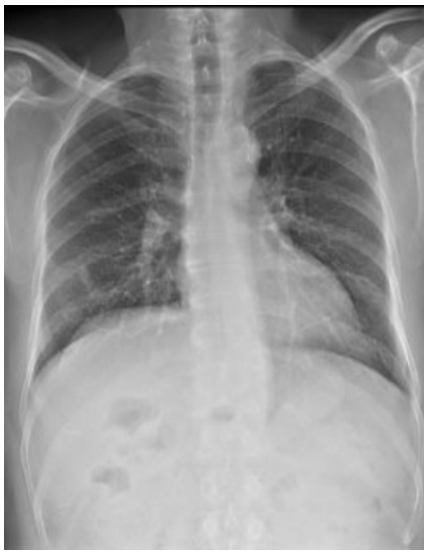
lower values in MMT (r –0.41 p=0.002) and lower BI (r –0.52 p<0.0001).However, we did not find any significant association between postoperative complications and CI (p=0.09). A higher value in ES was statistically associated to delirium (p<0.00001), respiratory failure (p=0.004) and postoperative infection (p=0.011) in patients suffering from postoperative complications. When comparing postoperative mortality or unplanned admission to ICU and different geriatric assessment scales no significant association was found.
Conclusion: Preoperative frailty is associated to a higher number of complications and hospital length of stay. The use of frailty scales like ES is more appropriate than morbidity scales in these patients to predict complications.

4765

Fragility in geriatric patient and pneumothorax under general anesthesia

Sergin D.[1], Derbent A.[1], Geriatric Patient
[1]Ege University School Of Medicine - Izmir (Turkey)

Background: Spontaneous pneumothorax is a rare and vital complication that can develop during general anaesthesia. We share our experience in a geriatric patient with primary spontaneous pneumothorax in the postoperative period.
Case Report: A 70-year-old male,166 cm, 69 kg, ASA II class patient with no history of smoking and coronary artery pathology was operated. Following the standard anaesthesia induction, he was intubated with a 5.5 number spiral intubation tube. Anaesthesia was maintained with 2% MAC sevoflurane and remifentanil infusion, and ventilation was provided by VCV (tidal volume: 350mL, frequency: 20 / min, FiO2: 50%). ETCO2: 40-42mmHg and SpO2:97-98% were observed during the operation. Hemodynamics remained stable. The operation lasted 35 minutes. The patient was extubated 3 minutes after the surgery. In the postoperative period, the patient with SpO2:%97-98 complained of dyspnea and chest pain. His ECG was normal; respiratory sounds decreased in his right lung, and chest radiograph confirmed pneumothorax in his right lung. Air was aspirated from the right hemithorax using an intravenous catheter; tube thorocostomy and CSAD were inserted. SpO2: 99-100% was observed after the procedure. The patient with tube torocostomy was observed for 5 days and it was removed on the 6th day. He was discharged on the 7th postoperative day.
Discussion: High-volume low-pressure cuffed intubation tubes are used as an anesthesia technique in laryngeal microlaryngoscopy to provide good surgical vision and manipulation. The use of a small endotracheal tube enables ETCO2 monitoring, positive pressure ventilation, preservation of the trachea, but causes increased end-expiratory pressure. Although monitorization shows vital parameters within normal limits in geriatric patients, patient complaints should not be ignored. Chest pain and dyspnea in geriatric patients should not only suggest coronary events; increased fragility in the elderly should be remembered and pneumothorax should be kept in mind.



Learning points: Fragility, geriatric anaesthesia and pneumothorax under general anaesthesia

6106

Continuous spinal anaesthesia – A suitable technique for the frail and uncooperative patient

Sales F. I.[1], Maldonado A. F.[1], Cruz A. R.[1], Cunha M.[1]
[1]Unidade Local de Saúde de Matosinhos - Hospital Pedro Hispano - Matosinhos (Portugal)

Background: Elderly frail patients are a growing population often presenting for surgery and constituting a challenge for the anaesthesiologist. We report a case in which continuous spinal was safely used in an uncooperative patient due to dementia.
Case Report: An 84-year-old woman, ASA IV, was admitted for urgent reduction of a femoral diaphysis fracture. The patient was bedridden, dependent and unable to communicate due to late stage dementia. Conservative treatment was discussed but the femur fragment was at the point of perforating the skin. Because of her frailty, we considered general anaesthesia to be a less than ideal option and were worried about the hemodynamic effects of a full-dose single-shot spinal anaesthesia. Thus, a continuous spinal was performed and small doses of bupivacaine (up to 4mg bolus) were administered throughout the procedure (total 9mg). The challenge was assessing the onset and efficacy of the block. We used facial expression, vocalizations and upper limb movement as indicators of pain, along with vital signs. Additional boluses were administered when small behavioural changes were noted. Nonetheless, she did not become agitated or visibly uncomfortable at any point and did not require sedation. The patient was discharged home 4 days later with no complications and apparently adequate pain control.
Discussion: Continuous spinal anaesthesia is a safe technique in elderly patients with multiple comorbidities, such as dementia.1 However there are no recommendations on how to monitor block onset and quality. Several scores for pain assessment in non-communicative patients have been described, the behavioural pain scale in non-intubated patients (BPS-NI) is easily applied and has been used in patients with delirium.2 The evaluation of facial expression, upper limb movement and vocalizations allows pain assessment in these patients.2 In conclusion, this scale could be useful to monitor pain in frail patients with dementia under spinal anaesthesia.
References:
1. Indian J Anaesth. 2018 Oct; 62(10): 765–772.
2. Nurs Clin North Am. 2016 Sept; 51(3): 397–431.
Learning points:
Continuous spinal anaesthesia is a safe and effective technique for lower limb surgery in frail uncooperative patients. BPS-NI could be useful to assess pain in patients with dementia under spinal anaesthesia.

5943

How to reduce geriatric patients colon surgery mortality in 4 times

Khrykov G.[1], Khalikov A.[2], Pasechnik I.[3]
[1]Regional clinical oncology dispensary - Saint-Petersburg (Russia), [2]SPb SBHCI «City clinical oncology dispensary» - Saint-Petersburg (Russia), [3]Central State Medical Academy of Department of Presidential Affairs - Moscow (Russia)

Background and Goal of Study: Indications and contraindication to laparoscopic approach in geriatric patients with high comorbidity are controversial. Low abdominal pressure (7-8 mm Hg) during laparoscopic colon resection could reduce hemodynamic and ventilation changes and reduce number of complication. Goal. To compare an immediate and distant outcomes of surgical treatment in conditions of low intraabdominal pressure by colon cancer geriatric high risk group patients.
Materials and Methods: 400 colon cancer geriatric patients were include and divided on control (n=184) and investigation(n = 216) groups. Median age 75 [69; 80] years. 219 patients (54,8 %) older than 75 years. All cases were high risk group: ASA III – 284(71,0 %), ASA IV – 116(29,0%) and operated laparoscopically. Cardiovascular complications risk were high in 301(75,25 %) and very high in 99(24,75 %) cases. Median Charlson comorbidity index was 8[7; 9]. Median CR-POSSUM was 17[15; 21]. Operations in investigation group have been made in low intraabdominal pressure (less than 8 mm Hg), in condition of deep neuro-muscular block (NMB) by rocuronium (PTC 1-2). In the end of operation before NMB-reversion perfomed by Sugammadex (4 mg/kg) in this group. In control group intraabdominal pressure was not less than 12 mm Hg, in condition of moderate neuro-muscular block (TOF 1-2) and reversion by Neostigmine. Patients in perioperative period exposed to ERAS protocol.
Results and Discussion: In investigation group were less complications by Clavien-Dindo classification (n=42 – 19,4%), than in control group (n=79 – 42,9%) (p<0,001), HR 0,32(95 % CI 0,21– 0,50). The Clavien–Dindo severity class of complications was significantly lower in investigation group too (p = 0,019). Clavien-Dindo V (death) in investigation group was in 5 (2,3%), in control – 15

(8,1 %) patients (p < 0,001). Chemotherapy realized in 44 (20,4%) (95% CI (15,5-26,2 %) investigation group patients, that are significantly more than in control – 8 (4,3%) (p<0,001). Distant outcomes show that 5-year OS and DFS were higher in investigation group (p< 0,001).
Conclusion: Implementation new method of laparoscopic operation realization allow to reduce number and severity of complications, mortality rate, expand indications to miniinvasive treatment, chemotherapy and improve distant outcomes in high risk geriatric patients.

4748

Emergency Abdominal Surgery and Older Patients. How Can We Improve Care for this Cohort of Patients?

Aggarwal G.[1]
[1]Royal Surrey County Hospital NHS Foundat - Guildford (United Kingdom)

Background and Goal of Study: Emergency laparotomy (non traumatic) has a mortality rate of 11% in the UK and higher in the US and the rest of Europe. Patients over the age of 70 have a mortality rate of 20% but in some centres is as high as 50%. How do we improve this? Lessons from orthogeriatric care, looking at preoperative frailty scores, nutritional status and planning discharges early can all help with improving care. Improving care form emergency laparotomy and implementing a very successful and proven care bundle approach is also discussed. The first cost effectiveness study examining the benefits of a gerontologist sharing care with the surgeon for emergency abdominal surgery patients is also discussed.
Materials and Methods: Baseline data was collected all patients undergoing emergency abdominal surgery (non-traumatic) over the age of 70 in four general hospitals in the UK, identifying patient demographics, cognitive function, frailty index and nutritional score and level of pre and post operative social needs. A gerontologist was then introduced into the care of the next cohort of patients, where they introduced a comprehensive geriatric assessment plan in these four hospitals. Ongoing interventions (drug review, multi-disciplinary team reviews and social needs assessment) were recorded together with post-operative outcomes. In addition an assessment on the quality of life in the post-operative period has been recorded using EQ-5D-5L up to six months following discharge from hospital. This is mapped to healthcare costs and can be related to Quality of Adjusted Life Years and cost-effectiveness of the intervention.
Results and Discussion: The results showed that the introduction of a gerontologist reduced length of stay statistically significantly. In addition, post operative complications were reduced. The health status study showed that patients reported a better health state with the intervention than without. Quality of Adjusted Life years (QALY) was improved so the intervention was shown to be cost-effective.
Conclusion: In an ageing world, it is vital we ensure older patients return to their baseline functional state as quickly as possible after surgery. Patients undergoing emergency abdominal surgery over the age of 70 should have shared care with both gerontologists and surgeons to decrease length of stay and improve quality of life post discharge from hospital.

6113

Pre-operative metabolic state in hip fracture patients

Refaeli - awin E.[1], Herut M.[2], Aronov M.[3], Rabkin V.[3], Lior Y.[4], Matot I.[3]
[1]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel), [2]Tel Aviv university - Tel Aviv (Israel), [3]Tel aviv medical center - Tel Aviv (Israel), [4]Soroka University Medical and Clinical research Center - Beer Sheva (Israel)

Background: Hip fracture is a common injury in the elderly with high peri-operative morbidity and mortality. The common practice to operate within 24-48 hours after the injury reduces mortality. These elderly patients might present to surgery with some degree of metabolic acidosis due to various causes such as hypovolemia, existing co-morbidities or medications, and acute illness. Previous studies in trauma and elective abdominal surgery patients suggested that acidosis and lactate levels predict outcome. The present study aimed to: 1.Evaluate preoperative acid-base status and arterial lactate level; 2.Assess whether there is an association between the time from hospital admission to surgery and the metabolic status.
Methods: In this retrospective cohort study, medical records of patients undergoing surgical repair of hip fractures in the Tel-Aviv Medical Center between 04/2018-03/2019 were reviewed. Arterial blood sample was routinely collected per institutional standards during anesthesia induction. Data are presented as mean (SD) unless specified otherwise. The association between the time from hospital admission to surgery and patients' metabolic status, was assessed using Pearson correlations. P<0.05 was considered significant.
Results: A total of 597 eligible patients (49.5% American Society of Anesthesiologists Physical Status [ASA-PS] 3, 68% females, mean [SD] age 81 [10] years) were included in the analysis. Median [IQR] time from hospital admission to surgery was 28 [20, 44] hours. Specifically, 39%, 46% and 15% of patients were operated within 24, 48, and more than 48 hours from admission, respectively. Significantly more ASA-PS 1-2 patients were operated within 48 hours and those that were operated >48 hours tended to be ASA 3-4. In-hospital mortality was 4.9% (n=29). Average (±SD) baseline pH, base excess and lactate levels were 7.38±0.06, -1.8±3.2 meq/L and 1.3±0.6 mmol/L, respectively. About 4% of patients had baseline pH<7.35, more than half the patients had baseline base excess<-2 or lactate>1.2 (52% and 53%, respectively). The time from hospital admission to surgery was linearly correlated with pH (Pearson: 0.1, p= 0.031) and base excess (Pearson: 0.13, p=0.007).
Conclusion: Overall, most hip fracture patients arrive to surgery without acidosis. However, we found a significant association between the waiting time for surgery and preoperative acidosis. The clinical implications of this association is still to be evaluated.

6147

Peri operative troponin levels in hip fracture patients

Refaeli - awin E.[1], Herut M.[2], Aronov M.[3], Rabkin V.[3], Lior Y.[3], Matot I.[3]
[1]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel), [2]Tel Aviv university - Tel Aviv (Israel), [3]Tel Aviv medical center - Tel Aviv (Israel)

Background: Hip fracture is a common injury in the elderly with high peri-operative morbidity and mortality. The common practice to operate within 24-48 hours after the injury reduces mortality. Increased peri-operative troponin levels are associated with mortality regardless of the presence of ischemic signs or symptoms. We aimed to test for possible association between increased pre-operative troponin levels and postoperative complications in adults undergoing hip fracture repair.
Methods: Medical records of patients undergoing surgical repair of hip fractures in the Tel-Aviv Medical Center between 04/2018-03/2019 were reviewed. High-sensitivity troponin T concentrations were routinely measured during anesthesia induction. The associations between patients' troponin level and mortality and intensive care unit (ICU) admission were assessed using Pearson correlations. Association between time from hospital admission to surgery and troponin levels was also assessed. P<0.05 was considered statistically significant.
Results: The medical charts of 360 eligible patients were reviewed (52.1% American Society of Anesthesiologists Physical Status [ASA-PS] 3, 71% female, mean [SD] age 82 [9] years). Median [IQR] time from hospital admission to surgery was 28 [21, 45] hours. Overall in-hospital mortality was 4.4% (n=16) and 30-day mortality was 3.6% (n=13). Mean (SD) troponin level was 63.2±410.8 ng/L, with 52 patients (14.4%) having abnormally high troponin levels (>50 ng/L). No association between the time from hospital admission to surgery and troponin level was found. Increase in troponin levels was associated with 30-day mortality (pearson 0.12, p= 0.014), but not with the risk for ICU admission.
Conclusion: most of the hip fracture patients have normal troponin levels when arriving the operating room, regardless of the time from hospital admission to surgery. Nevertheless, preoperative increased troponin levels are associated with 30-day mortality. The correlation we found was not very strong and of questionable clinical significance, but our study was presumably not well-powered to correctly estimate the magnitude of the association, and should be followed by larger studies.

5210

Mortality rate one year after hip fracture surgery

Hernandez Rodriguez J.[1], Jiménez Marrero P.[1], Becerra Bolaños A.[1], Prados Martínez M.[1], Padrón Ruiz O. M.[1], Rodríguez Pérez A. E.[1]
[1]Hospital Universitario de Gran Canaria Doctor Negrin - Las Palmas de Gran Canaria (Spain)

Background and Goal of Study: Hip fracture is the most common fracture in the elderly, being an important cause of morbidity and mortality in this population with multiple comorbidities. Estimated mortality 30 days after surgery is 4–14%. Most of these fractures need urgent surgical treatment, requiring an accurate anesthetic management. The aim of this study is to evaluate survival and postoperative evolution of patients who had undergone surgery for hip fracture and its association to the perioperative management.
Materials and Methods: After obtaining the approval from the Ethics Committee of our hospital, we conducted a retrospective study including all patients undergone surgery for hip fracture from January 1st 2018 to October 30th 2018.

Following data were collected: age, gender, duration of surgery, anesthetic management, perioperative variables, postoperative evolution and mortality. Statistical analysis was performed using SPSS 25.0.
Results and Discussion: During this period, 181 patients (74% women) were collected, with an average age 79 ± 11 years. Average waiting time from arrival at the emergency room to surgery was 45 ± 37 hours. The average duration of surgery was 75 ± 27 min, being performed 50.3% under spinal anesthesia and the rest with general anesthesia. Intraoperatively, 40% had a TAS <100 mmHg during an average time of 29 ± 22 min. Intraoperative bleeding was 132 ± 101 ml, requiring blood transfusion during the perioperative period 54.7% of the patients. The mean Red Blood Cell package transfusion was 1.2 ± 0.1. The length of stay in PACU was 445 ± 60 min and in-hospital stay 7.7 ± 1.2 days. Mortality rate at 30 days and one year after surgery was 4.4% and 16.6% respectively. We found a significant association between hospital and PACU stay and mortality at one year (p <0,005). However, we did not find a statistically significant association between mortality at one year and other studied variables, such as preoperative haemoglobin, ASA physical status, waiting time prior to the intervention or length of surgery.
Conclusion: Hip fracture is increasing in last years, associated with a high preoperative waiting time and a high mortality rate. Early optimization of these patients could reduce the lenght of hospital stay and postoperative mortality.

4436

Ultrasound-guided dynamic needle tip positioning technique versus palpation technique for radial artery cannulation in elderly patients

Kim S. Y.[1], Kim K. N.[2]
[1]Hanyang University Seoul Hospital - Seongdong-gu (South Korea), [2]Hanyang University Seoul Hospital - Seondong-gu (South Korea)

Background and Goal of Study: The radial artery cannulation is often challenging in elderly patients who have age-related arterial wall changes and tortuous arteries with various underlying diseases. In addition to palpation method, the use of ultrasound-guided method has been studied as the first-choice method for radial artery cannulation. Recently, the dynamic needle tip positioning (DNTP) technique was introduced to facilitate ultrasound-guided vascular catheterization. We aimed to compare ultrasound-guided DNTP technique with conventional palpation method for the radial artery cannulation in elderly patients.
Materials and Methods: In this prospective, randomized controlled trial, we enrolled patients aged 65 years or older who required arterial cannulation for intraoperative monitoring. Patients were allocated to ultrasound-guided DNTP technique group (DNTP group) or palpation method group (palpation group) with 1:1 ratio. The radial artery cannulation was achieved with either method by second-year anesthesiology residents. The primary outcome was the first-attempt success rate. The secondary outcomes were the overall success rate, the number of attempts and redirections, cannulation time and the incidence of complications (hematoma, thrombosis, spasm and ischemia).
Results and Discussion: We enrolled 256 patients in this study and each group had 128 patients. The first-attempt success rate was 85.9% in DNTP group and 72.3% in palpation group (relative risk [RR], 1.47; 95% confidence interval [CI] 1.25-1.72; P < 0.001). The overall success rate was 99.2% in DNTP group and 93.0% in palpation group (RR, 1.07; 95% CI 1.02-1.12; P = 0.010). The number of attempts was 1.2 ± 0.6 in DNTP group and 1.9 ± 1.3 in palpation group (P < 0.001) and the number of redirections for successful attempts was 0.6 ± 0.8 and 2.4 ± 2.0, respectively (P < 0.001). The cannulation time at successful attempts in each group was 49.0 ± 25.0 seconds and 67.2 ± 42.6 seconds (P < 0.001). The incidence of hematoma was 7% in DNTP group and 24.2% in palpation group (RR, 0.29; 95% CI, 0.14-0.59; P < 0.001). Thrombosis occurred in one patient in palpation group and there was no spasm or ischemia.
Conclusion: Ultrasound-guided radial artery cannulation with DNTP technique improved the first-attempt and overall success rates and reduced the number of attempts and redirections, cannulation time and complications, compared to conventional palpation method in elderly patients.

5987

Ultrasound-guided neuraxial anesthesia in elderly: A systematic review

Caballero-Lozada A. F.[1], Gómez J.[1], Ramirez J.[1], Correa C.[1], Grupo de Investigación Anestesiología y Reanimación (INVANEST)
[1]Universidad del Valle - Cali (Colombia)

Background and Goal of Study: Neuraxial ultrasonography is a recent development in the field of regional anesthesia, which allows the successful insertion of a spinal or epidural needle; this technique is called neuraxial blockage guided by ultrasound. Subarachnoid anesthesia is the technique of choice in elderly patients, 60% of the severe and long-lasting neurological complications after central neuraxial blockage, involve patients over 50 years old, among which are anatomical anomalies, including stenosis of the lumbar canal and spinal arachnoid cysts. The purpose of this study was to describe whether the neuraxial approach guided by ultrasound allows to perform successful nerve blocks in elderly patients.
Materials and Methods: A systematic and comprehensive search will be performed using MEDLINE, OVID, EMBASE, LILACS and the Cochrane central registers of controlled trial databases through November 2019, without restriction of time or language. The protocol for this review has been registered in the PROSPERO's registration number: CRD42019112382. The primary outcome was successful lumbar puncture in the first attempt of needle insertion and the accuracy of the lumbar puncture site.
Results and Discussion: Six articles were included, for a total of 530 patients, age ranges between 61 and 85 years. The subarachnoid anesthesia was the most common type and only one study included epidural anesthesia. A The randomized controlled trial, in the US group compared to the control group the difference was statistically significant for successful lumbar puncture in the first attempt of needle insertion for subarachnoid anesthesia. The most frequent lumbar puncture site was the L3-4 space in neuraxial approach guided by ultrasound. In the studies where an ultrasound approach is performed, it was important to measure the depth to determine the size of the needle in the puncture, this is important to perform fewer punctures in the patients. The depth of ultrasound measurement of the intrathecal space was related to the depth of the needle insertion. Failure to measure the depth may lead to needle changes and a higher number of punctures.
Conclusion: The ultrasound guide for the lumbar puncture it improves the identification of the puncture site and the success rate at the first attempt, however the time required is longer compared to the anatomical approach.

6075

Intra-Operative Hypothermia in non-elderly, elderly and super-elderly populations; Where can we still improve?

Refaeli - awin E.[1], Cohen B.[2], Lior Y.[3], Egoz E.[2], Kagan G.[2], Matot I.[2]
[1]Tel Aviv Sourasky Medical Center - Tel Aviv (Israel), [2]Tel aviv medical center - Tel Aviv (Israel), [3]Soroka University Medical and Clinical research Center - Beer Sheva (Israel)

Background: Hypothermia is a common peri-operative condition known to be associated with numerous complications. Although several risk factors for peri-operative hypothermia were identified, the association between age and hypothermia is not well-described in the peri-operative period. We therefore aimed to assess the impact of aging on the risk of peri-operative hypothermia by comparing the incidence of hypothermia in non-elderly (40-65), elderly (65-80) and super-elderly (>80) patients.
Methods: In this single-center retrospective cohort study, demographic, clinical, and surgical data were collected for surgical patients >40 years old who underwent surgery in 2017 and spent>2 hours in the operating room (OR). Several key temperatures were assessed: 1.Baseline (before arriving the OR); 2. First temperature recorded after anesthesia induction; 3. Lowest temperature measured in the OR; 4. First temperature in the post-anesthesia care unit (PACU); 5. Calculated area under the curve (AUC) for temperature<36°C during surgery.
Results: Data of 3647 eligible patients were analyzed, of whom 1891 (52%) were 40-64 years old [mean(SD) age 54(7) years], 355 (10%) were 65-80 [mean(SD) age 72(4) years] and 401 (11%) were >80 years old [mean(SD) age 86(4) years]. The super-elderly and elderly groups had significantly more co-morbidities than the non-elderly group [median (IQR) sum of active co-morbidities; 1 (0-2), 2 (1-3) and 0 (0-1), respectively, p<0.001]. Hypothermia (<36°C for ≥5 minutes) rates were not different between the groups (78%, 80%, and 75% for non-elderly, elderly and super elderly, respectively, p=0.12). Similarly, the incidence of severe hypothermia (<35.5°C, ≥5 minutes) was also comparable (48%, 50%, and 50%, respectively, p=0.62). The AUC of temperature <36°C was significantly higher in the elderly group than that of non-elderly and super-elderly groups [3.1(5.7), 2.7(4.9), and 2.4(4.1), p=0.036].
Conclusion: While intra-operative hypothermia remains a common surgical complication in all age groups, our data suggest that the scope of hypothermia

is more profound in the elderly group compared with the non-elderly and super-elderly groups. The direct implications of this are still to be investigated. A possible explanation for our findings could be that while we rely on natural stamina of the non-elderly and meticulously care for the super-elderly, our care of the elderly group can still improve.

5692

The hemodynamic effects of low-dose dexmedetomidine on anti-hypertensive medication at endotracheal intubation in elderly patients

Kim M. W.[1], Yang H. S.[2]
[1]Dongguk University Medical College - Gyeungju,Gyeongbuk (South Korea), [2]Dongguk KyungJu Hospital - Kyungju- city (South Korea)

Background and Goal of Study: Dexmedetomidine is highly selective alpha 2 adrenergic agonist and preoperative administration of dexmedetomidine reduce sympathetic tone and maintain hemodynamic stability. Especially hemodynamic instability is more risky in elderly patients and then in elderly, preanesthetic 0.5 µg/kg single dose of dexmedetomidine effectively suppressed hemodynamic responses to endotracheal intubation. This study was investigated for the effect of a single low-dose preoperative dexmedetomidine(0.5ug/kg) on antihypertensive drug(b-blocker, ca-channel blocker) at endotracheal intubation(retrospective data collection).
Materials and Methods: Total 42 patients aged from 65 to 85, American Society of Anesthesiologists physical status II, either sex, undergoing elective noncardiac surgery were enrolled in the study. H-group had been treated with anti-hypertensive medications and N-group was normotensive patient with no medication. Patients who attempted endotracheal intubation more than 2 times were excluded. Morbidly obese patients who had BMI over 35 kg/m2 also excluded. All patients were not premedicated. Anti-hypertensive medications were maintained until the day of surgery. After arrival of the patients at the operating room, patients were attached to a ECG, pulse oxymeter, and NIBP monitor. All patients were received 0.5 µg/kg of dexmedetomidine (Precedex; 200 µg/two ml; Hospira Inc., Lake Forest, IL, USA) for 10 min. After completion of precedex injection, pofol 1.5mg/kg, rocuronium 0.6 mg/kg was administered. After two minutes endotracheal intubation was performed with a laryngoscope, and all intubation was performed within 30 seconds by one anesthesiologist. Anesthesia was maintained with sevoflurane in nitrous oxide/ oxygen 50:50 mixture. vital signs (MBP, Pulse) were recorded at ward (baseline value), immediately after drug administration (after drug), 1, 3 and 5 minutes after endotracheal intubation.
Results and Discussion: The demographic data of the two groups showed in Fig. 1. There were no significant differences in demographic characteristics between groups. The MBP and Pulse changes of 2 groups were recorded in Fig.2. There were no significant differences in cardiovascular changes between two groups.
Conclusion: The low-dose Dexmedetomidine was not showed the synergistic effects on cardiovascular depressive changes of anti-hypertensive drug at intubation.

5366

Airway Management in Geriatric Patient with Airway Obstruction

Sergin D.[1], Özbebek Ş.[1], Derbent A.[1], Geriatric Patient
[1]Ege University School Of Medicine - Izmir (Turkey)

Background: Tumors located in the facial region, especially around the mouth and nose, and previous radiotherapy and surgical procedures in this region make mask ventilation and airway management difficult. We report a case of tracheostomy in a geriatric patient who needed airway patency and proved difficult to be ventilated through mask due to lower alveolar arch cancer involving the mandible.
Case Report: An 85-year-old, 153 cm, 45 kg, ASA 4E geriatric female patient underwent surgery for tracheostomy under emergency conditions because of airway obstruction. She had chemotherapy 7 months ago and radiotherapy 1 year ago and underwent total hip replacement surgery with epidural anesthesia 20 days ago. Mallampati score being 4, pronounced macroglossia was present and there was no area to place the mask on the face due to spreading cancer. Difficulty with mask ventilation was foreseen in the preoperative examination where intubation would prove difficult. For this reason, C-MAC videolaryngoscope, tracheostomy set, intubation tubes and stylets of different sizes were prepared beforehand. After standard anesthesia monitoring (HR: 110 / min TA: 170 / 120mmHg SpO2: 92), preoxygenization was performed. During induction, 1 mg.kg-1 2% lidocaine hydrochloride, 2 mg.kg-1 propofol and 1 mcg.kg-1 remifentanil were administered, and the patient was quickly and serially intubated with C-MAC videolaryngoscope with endotracheal tube no 5. Anesthesia was maintained with 6% MAC desflurane, 50% oxygen and 50% air mixture. The operation lasted for 30 minutes. 5 minutes after the surgery, the patient's spontaneous respiration returned and sufficient tidal volume was reached in 10 minutes.
Discussion: Neoplastic tumors are often fragile and tend to bleed. Mask ventilation and tracheal intubation may cause marked edema and hemorrhage, leading to increased airway obstruction. In this case report, we emphasize the importance of rapid serial intubation with videolaryngoscopy without the use of nondepolarizing muscle relaxant in the provision of airway patency in a geriatric patient whose mask ventilation is quite difficult.
Learning points: Geriatric patient , airway management, videolaryngoscopy

6086

Anaesthesia for pilonidal sinus surgery in a patient with Dilated cardiomyopathy. A case report

Trposka Poposka A.[1], Toleska Doneska M.[1], Naumovski F.[1], Stojkovska A.[1], Durnev V.[1], Dimitrovski A.[1]
[1]University Clinic of Anesthesiology, Reanimation and Intensive care Medicine (KARIL) - Skopje (Republic of North Macedonia)

Background: Dilated cardiomyopathy (DCMP), is a myocardial disease of varied causes characterized by dilatation of one or both the ventricles, impaired myocardial contractility, decreased cardiac output and increased ventricular filling pressures [1].These patients are often at a risk of dysrhythmias or sudden cardiac death.
Case Report: We report the anesthetic management of a 70 year-old patient with DCMP undergoing for pilonidal sinus surgery under spinal anesthesia. Previous medical records revealed that patient was a diagnosed case of DCM since 9 years and his symptoms were well controlled with Tbl Cardiopirin, spironolactone 25 mg, Carvedilol ,tbl Lisinopril 2 mg,Lasix 40 mg.Preoperative 12 lead ECG revealed Left bundle branch block.Echocardiography showed global hypokinesia of left ventricle and ejection fraction of 40 %.Patient was monitored with ECG,intermittent blood pressure measurement and pulse oximetry. The heart rate was 80 min and regular. The blood pressures were 120-70 mmHg.Spinal anaesthesia was administered ,the patient recived 2.5 ml of Bupivacaine 0.5%.Dural puncture was done in an aseptic technicque at the L3-L4 level. The 22G spinal needle was used.Intravenous ephedrine 3 mg was administered after five minutes of spinal anaesthesia to correct hypotension 90/58 mmHg. The patient was haemodynamically stable throughout the surgery.During the surgery the patient was turned and put in prone position. Patient received a total of 1500 ml of crystalloid and urine output was 100 ml intraoperatively.
Discussion: Anesthetic management of patients with cardiomyopathy can be challenging and may be associated with high morbidity and mortality.Both general and regional anaesthesia have been used.The goals of anaesthetic management are avoidance of myocardial depression, maintaining normovolemia, avoiding overdose of drugs during induction as the circulation time is slow and to avoid sudden hypotension when regional anaesthesia is the choice [2].
References:
1. Stoelting RK,Dierdorf SF(1993)Cardiomyopathy.In: Stoelting RK,Anaesthesia and Coexisting Disease. (3rd edn)USA, pp. 97-102.
2. Stoelting RK, Dierdorf SF (1993) Cardiomyopathy. In: Stoelting RK (Ed.) Churchill,Livingstone,New York,USA, pp. 97-102.
Learning points: In summary, the factors which ultimately favored the good outcome of this high-risk patient, were a thorough preoperative assessment, optimized cardiac status, anesthetic plans, postoperative monitoring and management of the complications.

5350

A case of an elderly developed pulseless electrical activity intraoperatively after a short course of low-dose steroid

Kuo T. J.[1], Shih K. C.[2], Chang C. S.[2]
[1]China Medical University Hospital - Taichung (Taiwan), [2]Anesthesiology Department of China Medical University Hospital, China Medical University, Taiwan, R.O.C. - Taichung (Taiwan)

Background: Anesthesiologists encounter the complexity of multiple comorbidities in geriatric anesthesia. We present a case with no prior diabetes mellitus history developed catastrophic hyperglycemic hyperosmolar nonketotic coma after 3 weeks of low-dose steroid supplement.
Case Report: An 82-year-old male, weighing 74kg was diagnosed with hypertension, paroxysmal AF, congestive heart failure NYHA III and prostate cancer status post CCRT. He had ever undergone T9-T10 Laminectomy due to Tuberculous spondylitis with cord edema 3 weeks ago, and then received further anti-TB therapy and low-dose steroid supplement. However, low-grade fever and pus formation developed so he was scheduled for debridement surgery. Initial vital sign in OR were as followed, BP:139/65mmHg, HR:120bpm, SpO2:97%. After induction agents with fentanyl 50mcg, lidocaine 60mg, etomidate 10mg and rocuronium 30mg were administrated intravenously, the patient had refractory bradycardia along with PEA. Resuscitation was performed for 1 minute and then ROSC. ABG revealed hyperosmolar hyperglycemic state (HHS) with blood sugar: 970mg/dL. The surgery was hold and we transferred the patient to ICU after stabilizing vital signs.
Discussion: The patient had no prior history of diabetes and blood sugar was within normal range about 3 weeks ago. However, he received low-dose steroid without blood sugar surveillance since then. He got steroid induced hyperglycemia and it emerged into HHNKC insidiously 1. According to his past medical history, initial diagnosis for circulation failure included septic shock, spinal shock, adrenal insufficiency and cardiogenic shock. However, the patient responded to steroid, inotropes and vasopressor poorly but restored hemodynamic stability after fluid resuscitation. Further treatment for HHNKC was given accordingly.
References:
1. World journal of diabetes, 2015.6(8).
2. The Medical clinics of North America,2017.101(3).
3. Journal of Korean medical science,2011.26(3) 4.Anesthesiology, 1971,35(6).
Learning points: The outcome of hyperglycemic crisis relies on early diagnosis and management. However, high mortality rate was still reported.2 Very few cases were ever reported that HHS was induced after receiving steroid supplement without previous DM history.3-4 Anesthesiologist should remain high index of suspicious of hyperglycemic hyperosmolar nonketotic coma occurrence on short term usage of low-dose steroid supplement in the elderly.

Education

4604

Continuing professional development in airway management: Identifying anaesthesiologists´ knowledge gaps

Bessmann E. L.[1], Rasmussen L. S.[2], Konge L.[3], Kristensen M. S.[2], Rewers M.[1], Østergaard D.[1]
[1]Copenhagen Academy for Medical Education and Simulation - Herlev (Denmark), [2]Department of Anaesthesia, Centre of Head and Orthopaedics, Rigshospitalet - Copenhagen (Denmark), [3]Copenhagen Academy for Medical Education and Simulation - Copenhagen (Denmark)

Background and Goal of Study: Anaesthesiologists must maintain their expert level airway management skills throughout their career. Currently, continuing professional development is mostly determined by the individual. However, self-assessment is unreliable in identifying personal learning needs (1). Therefore, the goal of this study was to combine objective and subjective assessment to identify the knowledge gaps in airway management.
Materials and Methods: We included anaesthesiologists from the departments of anaesthesiology in the Capital Region of Denmark. An adaptive E-learning programme was developed to test the core curriculum in airway management. It consisted of 103 questions covering preoperative airway assessment, basic airway techniques, and advanced airway techniques (objective assessment). Confidence in each given answer was assessed (subjective assessment), and answers that were not correct and had a confidence rating of “I know it” were classified ”incorrect and unaware”.
Results and Discussion: Twelve departments participated and the response rate was 67% (N=191/285). The percentages of anaesthesiologists being ”incorrect and unaware” were highest for advanced procedures (9/15 questions) followed by preoperative airway assessment (5/15 questions) (table 1). The procedures with the highest proportion of ”incorrect and unaware” were emergency cricothyrotomy, video laryngoscopy, and use of airway exchange catheter and bougie. The identified areas with high proportions of ”incorrect and unaware” represent knowledge gaps in areas that anaesthesiologists are not aware of. These areas are of particular interest for a continuous educational focus.
Conclusion: Anaesthesiologists were ”incorrect and unaware” most commonly in relation to advanced airway management procedures followed by preoperative airway assessment.
References:
1. Eva KW, Regehr G. Self-Assessment in the Health Professions: A Reformulation and Research Agenda. Acad Med 2005 ; 80: S46–54.
Acknowledgements: The authors would like to thank the twelve advisory board members from the involved departments for their great support in conducting the study.

Top 15	Topic of question	Incorrect and unaware (%)
1	Obstructive sleep apnoea: Associations with airway management	33.5%
2	Cannot-intubate cannot-oxygenate situation: Decision making and strategies	26.7%
3	Emergency cricothyrotomy: Preparation, patient positioning, and techniques	23.7%
4	Limited movement of head and neck: Associations with airway management	23.6%
5	Predictors for difficult direct intubation	23.0%
6	Full beard: Associations with airway management	22.0%
7	Video laryngoscopy: Insertion, positioning of the blade, and use of a stylet	21.6%
8	Video laryngoscopy: Insertion, intubation, and use with blood and secretions	21.4%
9	Adjuncts to facilitate re-intubation with tube exchange catheter	20.4%
10	Emergency cricothyrotomy: Anatomy, techniques, and training	18.9%
11	Emergency cricothyrotomy: Patient positioning, intubation, and verification	18.8%
12	Airway exchange catheter: Procedural sequence	18.8%
13	Upper lip bite test: Associations for airway management	18.3%
14	Performance of 2-person 2-hands face mask ventilation	17.8%
15	Bougie to facilitate direct intubation: Procedural sequence	17.8%

4550

Introducing crisis resource management in trauma team: the Human Factors Attitude Survey results

Alegret N.[1], Martinez F.[1], Valle A.[1], Subirana L.[1], Carol F.[1]
[1]Corporació Sanitària Parc Tauli - Sabadell (Spain)

Background and Goal of Study: The current management of trauma patients in a level 1 hospital requires the TraumaTeam (TT) coordinated work. Although specific courses like ATLS or ETC to teach physicians how to resuscitate these patients are necessary, Crisis Resource Management (CRM) training programs are highly necessary to train all the team in non-technical skills for an optimal management of these patients. Despite this, the perception of non-technical skills importance among professionals is unknown.
Materials and Methods: During three CRM in trauma care editions performed in our institution Simulation Center and conducted by Anestheshiology Department between January and November 2018, an education survey before and after the training of all TT members was conducted. We developed a modified Human Factors Attitude Survey (HFAS), a 23 question survey regarding trauma resuscitation teamwork and communication. HFAS has been used to evaluate CRM in medical setting and is based on similar work by the NASA and the aviation industry. The surveys were formulated in a standard 5-point Likert scale ranging from strongly agree to strongly desagree. Statistical analyses by Chi-square and Fishers exact test was conducted.
Results and Discussion: 80 students answered the surveys between January and December 2018. Significant improvement was noted in 18 of 23 questions in the post-CRM survey, improvement was noted in five main areas: exchange of information from pre-hospital providers to TT, role of the team leader, the role of briefing, comfort of staff with communication in the trauma bay and importance of situation awarness during atenttion to severe trauma.
Conclusion: The CRM training has been utilized in high risk hospital environments, enhancing team dynamics, communication and ostensibly impacts patient safety. Philosophy and culture of CRM should be compulsory components in organization of trauma programs and in resuscitation of injured patients. Non-technical skills should be trained through clinical simulation to increase team cohesion and patient safety. Trauma team members improve the perception of this training after experiencing it. Institutional involvement in supporting the development of this type of training is necessary.
References:
1. KM Hughes et al. A Crew Resource Management Program tailored to trauma resuscitation Improves team behavior and communication. Journal of the American College of Surgeons (2014).

4814

Ukrainian Trauma Life Support Course - what can we change in systems that are not set to act?

Kuchynska I.[1], Linchevsky O.[2], Suprun U.[3], Deineka I.[4], Kramareva O.[1]
[1]Shupyk National Medical Academy of Postgraduate Education - Kyiv (Ukraine), [2]Oberig - Kyiv (Ukraine), [3]Ex-Ministry of Health - Kyiv (Ukraine), [4]Rivne Emergency hospital - Rivne (Ukraine)

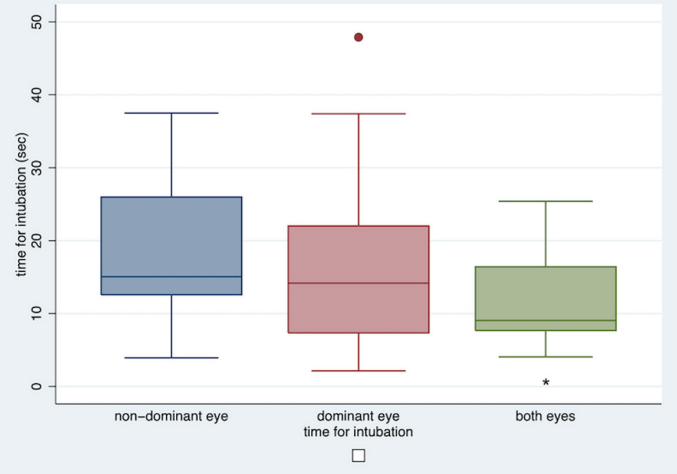
Background and Goal of Study: Traumatic injury in Ukraine accounts for more than 40 thousand deaths annually and remains the leading cause of mortality. In spite of War, in Ukraine, the fatality rate in motor vehicle collisions is 2 times higher than the combat mortality (WHO, 2018). NGO Patriot Defence changes the Ukrainian medical system one hospital at a time, by delivering the Ukrainian Trauma Life Support (UTLS) course to emergency response teams in hospitals throughout Ukraine. Each individual trained becomes an advocate for change, having a cumulative effect on the standard of care in their hospital and beyond.
Materials and Methods: UTLS is an intensive 6-day course designed to augment the critical thinking capacity of medical professionals in trauma management. UTLS introduces relevant and recognized concepts to support high-frequency practical skills required for a minimum acceptable standard of care. A deliberate focus on crew resource management and capacity building throughout the course prepares every candidate to support their hospital in the management of individual trauma victims or mass casualty events. Course duration - 44 hours, training group - 24 students, instructor to students ratio - 1:4. Starting from 2015 we provided 25 courses, 576 students (doctors): civilian doctors - 70,5%, military - 29,5%; between them - anesthesiologist - 28,5%, surgeons - 32,1%, traumatologists - 17,4%, emergency medicine - 5,3%, 16,5% - other specialists. All students took 2 multi-choice tests (n=50), basic on the main topis: primary trauma survey, DCR in trauma, blood product management, airway management, etc. The results show progress after 6 days course above 46% overage.
Results and Discussion: Primary test (before course): anesthesiologists - 44,5%, surgeons - 41,7%, traumatologists - 22,3%, emergency medicine - 28,6%; secondary test after course: anesthesiologists - 82,6%, surgeons - 71,9%, traumatologists - 62,3%, emergency medicine - 69,3%.
Conclusion: The UTLS course has been developed and standardized for the Ukrainian emergency medical system. This has been achieved by a faculty of medical specialists from the Ukrainian and international community. The results of End exams show progress in theoretical and practical skills above 40% average. Also at the end of the course doctors had practical exam - final simulation with mass casualty incidences, which also were.

5245

Eye dominance and tracheal intubation - a manikin study

Balbino M.1
[1]Centro Universitário São Camilo - Sao Paulo (Brazil)

Background and Goal of Study: To verify if there is a difference in the time for intubation, using the non-dominant eye, the dominant eye, and both eyes.
Materials and Methods: We included twenty-four eight-semester-graduation medical students in the study. All the students agreed to participate, with written consent. They first determined what was the dominant eye, using a hole-in-card method and spotting a mark eight meters away. Then, all the students were asked to intubate a normal-airway manikin, first with the non-dominant eye (dominant eye closed), then with the dominant eye (non-dominant eye shut), and lastly, with both the eyes opened. Examiners recorded the time for the perfect intubation (until the cannula passed what they supposed to be the vocal cords), as well as if they accomplished correct intubation. We relied on the t-test for the continuous variables, as well as on the chi-squared test for categorical variables. The Wilk-Shapiro test checked the data, and non-parametric criteria were applied if the test failed to achieve Gaussian distribution.
Results and Discussion: Time for intubation was 17.9 ± 9.1 seconds, 17 ± 11.7 seconds, and 12.1 ± 6.6 seconds using the non-dominant eye, the dominant eye, and both eyes, respectively. Time was shorter when the students used both the eyes, compared to the non-dominant eye (p=0.0061), and compared to the dominant eye (p=0.025), fig. 1. There was no difference in the time when the students used the non-dominant eye versus the dominant eye (p=0.38). The success rate did not differ between the groups.



Conclusion: There was no difference in the success rate when the students intubated the manikin using the non-dominant eye, the dominant eye, or both the eyes. However, the students spent the shortest time for intubation when they relied on both the eyes. It is a crucial finding since some people may believe the dominant eye is superior in performing visual tasks such as tracheal intubation.

5399

Interactive algorithms AKUTNĚ.CZ: Open access database of more than 100 virtual patients focused on acute medicine

Skrisovska T.[1], Chlupova J.[1], Harazim H.[1], Kosinova M.[2], Klincova M.[2], Stourac P.[2]
[1]Fakultni nemocnice Brno - Brno (Czech Republic), [2]Fakultni nemocnice Brno KDAR - Brno (Czech Republic)

Background and Goal of Study: The educational platform AKUTNE.CZ (meaning Emergent), is a unique project in Czechia implementing virtual patient (VP) based learning in the 4th to 6th-year medical students curriculum. This world's biggest free access Czech-English database of VP cases focused on emergency, intensive care medicine and anesthesiology, was created by students under clinician supervision. The aim was to 1) engage students in creating VP cases themselves to enhance their learning 2) implement new teaching methodology.
Materials and Methods: Author teams of students, supervised by a senior clinician, are responsible for literature overview, case description, VP creation and production of original audio-visual multimedia. VP cases are reviewed by a content expert and published on https://www.akutne.cz/index-en.php?pg=education--interactive-algorithms in the form of interactive multimedia algorithms. They are used for self-study and the problem-based learning/ team-based learning (PBL/TBL) sessions in clinical subjects First Aid and Intensive Care Medicine.
Results and Discussion: Since 2010,109 VPs were created by 218 people (177 students and 41 mentors; 11 current mentors were recruited from formal students working at the creation of VPs). Out of all students 163 (90.5%) had already graduated and from those 55 (33.7%) work in the Anaesthesia and Intensive Care Medicine. The interactive algorithms are covering topics in Anaesthesia, Intensive care, Emergency Medicine, First Aid, Gynaecology and Obstetrics, Internal Medicine, Traumatology, Paediatrics, Surgery, Algesiology and Stomatology.
Conclusion: Both creating and using the bilingual VP algorithms as teaching material was successfully implemented in the curriculum. It represents not only study material for medical students, but also highly motivational experience developing students´ interpersonal skills. The project also enables them to explore acute medicine and other specialties as their possible career choices.
Acknowledgement: Supported by a Specific University Research provided by MŠMT (MUNI/A/0966/2019).

5984

An innovative course that increased participants self-perceived confidence in difficult airway management

Pereira A. I.[1], Melo A.[2], Salgado H.[3], Garcia M.[4], Santos P.[5], Gomes S.[2], ATAM - Advanced Techniques in Airway Management
[1]Centro Hospitalar de Vila Nova de Gaia - Porto (Portugal), [2]Escola de Medicina, Universidade de Braga - Porto (Portugal), [3]Hospital de Braga - Braga (Portugal), [4]Centro hospitalar e universitario de S. João - Porto (Portugal), [5]Hospital de S.João - Porto (Portugal)

Background and Goal of Study: Difficult airway (DA) is a clinical situation where an experienced anesthesiology faces difficulties in face mask and/or supraglottic airway device ventilation, tracheal intubation or front of neck access (FONA). Residents and consultants need experience and training to become confident. For that reason, we decide to develop an innovative course with advanced techniques for airway management.
Materials and Methods: A 3 days course designed for medical professionals was conducted. It was completely hands-on and participants were able to get expertise in managing airway devices, including training in simulators and animal models as well as development of non-technical skills in high fidelity simulation scenarios. Translation for the clinics occurred at the operating theatre. Participants were surveyed before (T1) and after the course (T2), for collecting data regarding self-perceived levels of confidence in their airway skills. Results and
Discussion: The course had 30 participants (37% residents and 63% consultants), the majority were from anesthesiology (83%). Participants were asked to score from 1 (low) to 5 (high), their self-perceived confidence to use airway devices at T1 and T2. At the end, participants were asked to evaluate the course from extremely useful to not useful, considering relevance and value of each practical session. The response rate was 100% and the survey was anonymous. Considering the self-perceived confidence evaluation, the results showed a significant increase in participant´s confidence in T2, even with the techniques that they were more unconfident in the beginning. The techniques that had the most significant increase in self-perceived confidence were fibroscopy and cricothyroidotomy (p<0,0001). 94% of the participants considered these practical sessions extremely useful. The practice in the animal and in clinics was classified as very useful in 90% and 77% of the enquired. To the question if the event affects clinical practice, 84% answered "very much". The participant with better self-perception confidence can be more competent with skills when compared to a low self-rated.
Conclusion: The traditional medical education model has flaws and other options must be available to complement clinical experience. This experience may be more important for building participant´s confidence than other encounter variables.

6229

Novel 24/7 HybridLab® learning system for airway management

Mankute A.[1], Juozapaviciene L.[2], Dobozinskas P.[3], Vaitkaitis D.[3], Macas A.[2], Usas E.[1]
[1]Kaunas Clinical Hospital - Kaunas (Lithuania), [2]Hospital of Lithuanian University of Health Sciences - Kaunas (Lithuania), [3]Lithuanian University of Health Sciences - Kaunas (Lithuania)

Background and Goal of Study: Higher public and patient expectations have both encouraged the development and use of innovative educational methods. HybridLab is a distance learning and algorithm driven self-directed peer to peer medical simulation that allows learners to train 24/7 without direct presence of the instructor, while the training sessions are reviewed online by the experienced instructors. The first courses built on HybridLab platform is focused on the specific technical skills like advanced airways management. Conventional learning is a teaching and learning process that focuses on live lectures with faculty guided pre-clinical demonstration and practice. The goal of the study is to test the efficiency of a hybrid learning technique versus conventional learning technique in teaching endotracheal intubation among medical students.
Materials and Methods: Medical students were randomly assigned into two study groups to be teached endotracheal intubation (EI) using conventional learning technique (Group C) and hybrid learning technique (Group H). During first week after teaching process both groups performed endotracheal intubation on real patients under supervision by trained instructors - doctors. 5 stages of EI (preparation, preoxygenation, laryngoscopy, endotracheal tube (ET) insertion, verification) were evaluated in both groups using statistical analysis. The stage was described as completed when student performed all actions correctly. Data was assessed for normality and found to have a non-parametric/parametric distribution. The level of significance was defined as p>0.05.
Results and Discussion: 77 students were enrolled into study: 34 in Group C and 43 in Group H (p>0,05). There were no statistically significant differences between the patients in both groups with respect to demographic characteristics, ASA physical status and Mallampati score. Preparation was completed by 55,9% in Group C and 86% in Group H (p=0,003). Preoxygenation - 26,5% in Group C and 69,8% in Group H (p<0,001). Laryngoscopy - 73,5% in Group C and 97,7% in Group H (p=0,56). ET insertion - 64,7% in Group C and 81,4% in Group H (p=0,97). Verification - 8,8% in Group C and 58,1% Group H (p<0,001).
Conclusion: The study showed more efficient effect of HybridLab learning approach on endotracheal intubation skills than conventional learning technique. This training method can be useful model for teaching healthcare providers with limited faculty availability.

5474

Knowledge of Resuscitation among Greek medical students

Ntalouka M.[1], Dimitriadou H.[1], Ntertsos N.[1], Papadopoulou E.[1], Tavoularis D.[1], Arnaoutoglou E.[1]
[1]University of Thessaly, Faculty of Medicine, Univeristy Hospital of Larissa - Larissa (Greece)

Background and Goal of Study: Several studies report the importance of the knowledge of the life support algorithm and the optimal treatment of the intra-hospital and out-of-hospital cardiac arrest. In this study, we sought to investigate the knowledge regarding the Resuscitation among Greek medical students and the comparison of all Medical Schools of our country.
Materials and Methods: Questionnaires, including demographics, consisting of 7 questions regarding Resuscitation were distributed to the medical students who attend the 23rd Annual Congress of the Greek Medical Students.
Results and Discussion: Two hundreds and ninety-seven students completed the questionnaire. Most of the students (80%) reported that they have adequate knowledge of Basic Life Support (BLS) algorithm and the use of Automatic External Defibrillator (AED), with the University of Crete and the University of Ioannina in the first place. Regarding the ABCDE approach the results are quite different based on

the Medical School, with the University of Crete in the first place, followed by the University of Patras, while the University of Ioannina is in the last place. Moreover, a big heterogeneity was observed as far as the knowledge of the Advanced Life Support algorithm is concerned. More specifically, the University of Crete was at the first placed (70%), followed by the University of Thessaly (58%), while the University of Patras was at the last place (15%). Last but not least, it should be noted that 64% of our students reported that their knowledge for the BLS algorithm and the use of AED were obtained from a European Resuscitation Council course, 18% from some optional course of their Medical School and only 16% from a mandatory course/ rotation of their school.
Conclusion: It seems that a large heterogeneity exists regarding the knowledge and the training of Resuscitation among the 7 Medical Schools of our country.

5060

Three-drug simulation of bispectral index (BIS) and modified observer's assessment of alertness and sedation (MOAA/S) scale model during gastrointestinal endoscopy

Liou J. Y.[1], Teng W. H.[1], Kuo I. T.[1], Ting C. K.[1], Tsou M. Y.[1]
[1]Taipei Veterans General Hospital - Taipei City (Taiwan)

Background and Goal of Study: Simulation is used to familiarize physicians and trainees with new practice protocols. Commercialized simulation is available for 2 drugs, but often three drugs are used clinically. The need for multidrug simulation prompted the development of complex three-drug models. In this study, we applied a published three-drug model and a new bispectral index (BIS) model to stimulation.
Materials and Methods: We obtained a sample three-drug protocol for combined gastroscopy and colonoscopy using midazolam, alfentanil and propofol from literature search.1 The protocol is shown in Figure 1. Pharmacokinetic profiles were calculated with TIVAtrainer. Two models were used to simulate the protocol: The Modified observer's assessment of alertness and sedation (MOAA/S) scale2 and bispectral index (BIS) model. The models were built with the NLMAZ model (Non-linear mixed amount with zero amount) using engineering software Matlab. For the MOAA/S model, we define loss of response (LOR) if the probability is greater than 50%.
Results and Discussion: MOAA/S model was excerpted from a published research.1 A new BIS model was built from 1176 data sets of the three drugs. Strongest interaction was at the propofol-alfentanil arm in the BIS model. The simulation protocol drug concentrations ranged from 0-50 mcg/mL, 0-31 ng/mL, and 0-2.63 mcg/mL for midazolam, alfentanil and propofol respectively, which were within the modeling conditions. At the end of colonoscopy the simulation had 91% chance of LOR, 45% at return of consciousness, and 8% at time of discharge (Figure 2). The results matched the clinical observation reported by the original protocol. The MOAA/S < 2 model predicted the time course of a sedation regimen reported by another group.1 BIS remained between 50 and 80 throughout the examination and rose above 80 during recovery. There were no BIS data in the selected report.
Conclusion: This is a demonstration of a simulated protocol for gastrointestinal endoscopy. Commercialized simulation software commonly contains two-drug regimens. Three-drug model adds flexibility and offers variety to simulation for users. We believe it is beneficial to training sessions.
References:
1. BMC gastroenterology 2012, 12, 164.
2. British journal of anaesthesia 2018, 120 (6), 1209-1218.

5562

Inspiring the next generation of anaesthetists in Zambia through a novel, structured clinical skills programme for medical undergraduates

Murali M.[1], Harrington J.[2], Wang T. Y.[2], Boyd M.[2], Davies R.[2], Hall D.[2]
[1]University Teaching Hospital - Lusaka (Zimbabwe),
[2]University Teaching Hospital - Lusaka (Zambia)

Background and Goal of Study: Anaesthetists are well-placed to develop medical student knowledge and skills1. The Zambia Anaesthesia Development Programme is an international healthcare partnership which aims to improve safe anaesthesia provision in Zambia. Final year students undertake a 2-week placement in anaesthetics at University Teaching Hospital, Lusaka. Local education leads identified a gap in practical experience obtained by students during their placement. We sought to understand whether a structured programme for the assessment of the critically unwell patient improved confidence, skills and satisfaction, and increased awareness of anaesthesia as a career.
Materials and Methods: A novel programme introducing students to the A-E assessment, Basic Life Support including cardiopulmonary resuscitation, and airway management from simple manoeuvres to placement of a laryngeal mask airway, was introduced. Teaching was delivered with a combination of group discussion, workshops with hands-on experience, and simulation. High and low-fidelity simulation mannikins, resuscitation equipment and bespoke simulation scenarios were used. Feedback, using Likert scales (out of 5) and free text, was collected and analysed using quantitative and qualitative methods.
Results and Discussion: Students received the programme with enthusiasm, finding it enjoyable (median score 5, [interquartile range 5-5]) and relevant to their learning (5 [5-5]). The programme improved their confidence in managing the critically ill patient (4 [3-5]), providing a structured approach to patient assessment (4 [4-5]), and improved practical skills (5 [4-5]). The programme was considered interactive and trainers approachable. Following the programme, students were inspired to pursue a career in anaesthetics. Challenges included cultural barriers to participation, lack of familiarity with simulation, and perceived low status of anaesthesia in Zambia.
Conclusion: A structured programme for the management of the critically unwell patient, run by anaesthetists for medical students, is well-received, improves confidence and practical skills. Such a course can inspire the next generation of physician anaesthetists while providing skills relevant to newly qualified doctors. Involvement of local education leads to improve the next iteration of the course is suggested.
References:
1. Rohan D et al. 2009. Defining an anaesthetic curriculum for medical students. A Delphi study. Med Teach 31: e1-5.

6220

An Evaluation of operating room staff's awareness of environmental sustainability and medical waste knowledge

Bektas Y.[1], Buyuk S.[2], Meco B. C.[2]
[1]Ankara University Faculty of Medicine, İbni Sina Hospital - Ankara (Turkey), [2]Ankara University Faculty of Medicine Ibn-i Sina Hospital - Ankara (Turkey)

Background and Goal of Study: The healthcare sector contributes a big amount to carbon emissions. According to a study, the healthcare industry is accountable for 8% of the US' total greenhouse emissions1. Hospitals annually accumulate 5,9 million tons of waste and 21% of this waste is created by operating rooms (OR)2. The aim of this study was to assess the knowledge of our OR staff on medical waste as well as their attitudes about the management of it.
Materials and Methods: We created a 20 questions survey to assess the knowledge. This survey was given to all OR staff (surgeons, anesthesiologists, nurses, cleaning staff). Pearson Chi-square/Fisher exact test with p values <0,05 are accepted as significant.
Results and Discussion: Data of 112 participants were analyzed. The median age was 28 [20-54]. From all the participants, 56.2% expressed that the OR have an important effect on global warming and 73.6% stated that they were trying to separate the wastes according to the regulations. When evaluating the anesthesia practice in a subgroup of anesthesia team, most of the anesthesia nurses (%52) falsely stated that the safest practice was low flow desflurane while 85% of the anesthetists stated that low flow sevoflurane was the safest. Also, 40.9% of doctors and 76.9% of nurses didn't attend any educational course about the effects of ORs on the environment and the management of ORs related to this issue. Most of the participants reported that obstacles for a good management of OR wastes were inadequate knowledge (82%) and inept organization (44%). Overall 96,4% of all participants stated that education about waste management was necessary.
Conclusion: Nearly half of participants had no idea about environmental effects of ORs and stated that this was due to a lack of education. While most participants stated that they were separating wastes accurately, it might not always be the case. We think that a well organized education, adequate organization and follow up of the OR waste management is required for a better future.
References:
1. Chung J, Metzer D. Estimate of the Carbon footprint of the US Health Care Sector. JAMA 2009.
2. Lee B, et al. Analyses of the recycling potential of medical plastic wastes. Waste Manag 2002.

4610

First On-Line Assessment (OLA) Experience European Society of Anaesthesiology in Russian Federation in 2019

Gritsan A.[1], Taptygina E.[2], Vasilieva E.[2], Varvinskiy A.[3]
[1]Krasnoyarsk Regional Clinical Hospital, Krasnoyarsk State Medical University - Krasnoyarsk (Russia), [2]Krasnoyarsk State Medical University - Krasnoyarsk (Russia), [3]Department of Anaesthesia, Torbay Hospital - Torquay, Devon (United Kingdom)

Background: On-Line Assessment (OLA) is an online computer-based test similar to the first part of the European Diploma in Anaesthesiology and Intensive Care Exam (EDAIC Part I) created by the Examinations Committee of the European Society of Anaesthesiology (ESA). Russian Federation (RF) offers the EDAIC Part I in two centres (Moscow and St. Petersburg). However, to date OLA has never been conducted in RF. We describe our experience and the results of the first OLA in RF in 2019. Purpose: To present the analysis of the results of the first OLA in RF in 2019.
Materials and Methods: In 2019 OLA was held on April 12 in 127 centers, 113 cities, 33 countries around the world, counting 1,481 candidates who sat it in 11 languages. In the same year in Russia OLA was held for the first time at the Krasnoyarsk State Medical University named after Prof. V.F. Voino-Yasenetsky. 37 second year residents in the specialty "Anesthesiology and Intensive Care" took OLA between the hours of 16.00 and 19.00 local time simultaneously with all European countries. All examination conditions were created in accordance with the regulations set by Examinations Committee of the European Society of Anaesthesiology for OLA.
Results and Discussion: OLA results are presented in table.

Table. Percentage of correct answers (%) passing OLA 2019 (Mean ± SD)

Centers	RF (n=37)	All (n=1481)	European (n=1237)	non-European (n=244)
Paper A	57.85±4.21	65.15±7.51	65.21±7.44	65.63±7.85
Paper B	55.73±5.13	67.75±7.13	67.89±7.08	67.00±7.31

The results are comparable with the results of OLA for European and non-European centers. OLA is held annually in April and, therefore, is an excellent test for all candidates who want to assess their knowledge at the end of each year of study, and those who plan to take the EDAIC Part I exam in autumn.
Conclusion: The first experience of conducting an online test showed that OLA allows beginners to evaluate their knowledge gained during the residency period. It also allows individual departments, based on an analysis of the test results to identify problematic areas of knowledge gaps and make the relevant corrections to the specialist training programmes. Our future plans include organising OLA in Russia Federation again on April 17, 2020 and register Krasnoyarsk as EDAIC Part I centre to start from 2020.

4810

The key Anaesthesia Non-Technical Skills (ANTS) necessary for anaesthesia senior residents to practise with distant supervision - a mixed methods analysis

Ong S. G.[1], Leong A.[1], Muay S.[1], Tan L. H.[2], Lim E.[3], Dong C. Y.[4]
[1]Singapore General Hospital - Singapore (Singapore), [2]Changi General Hospital - Singapore (Singapore), [3]Kandang Kerbau Women's and Children's Hospital - Singapore (Singapore), [4]Sengkang General Hospital - Singapore (Singapore)

Background and Goal of Study: ANTS describe cognitive, social and personal resource skills that complement technical skills, contributing to safe and efficient patient care. Deficiencies increase the risk of an adverse event. ANTS system is a taxonomy and behavioural rating comprising 4 categories and 15 elements which encompass the domains of Situation Awareness, Task Management, Decision Making and Teamwork. Training with the ANTS system is part of the anaesthesia curriculum of some countries. However, little data exists relating the categories and elements in the ANTS system to the level of supervision and entrustment. In Singapore's public healthcare institutions, anaesthesia senior residents must achieve a level of entrustment equivalent to distant supervision to be on call. A cross sectional study of Singapore's largest anaesthesia training programme was performed utilising both a survey and focus group discussions with key-stakeholders. The goal of the study was to identify key ANTS and other skills (beyond the ANTS system) that are perceived as important for anaesthesia residents in Singapore to practise with distant supervision.
Materials and Methods: A survey was sent to key stakeholders (faculty, nurses and residents) of Singapore's largest anaesthesia residency training programme, asking them to select the three most important elements in the ANTs system needed for distant supervision. Respondents were subsequently invited to focus group discussions. The interviews were transcribed and analysed utilising an interpretive approach and phenomenological perspective.
Results and Discussion: The survey response rate was 55.6%. The key elements identified from the ANTS system for entrusting distant supervision from both the survey and focus groups were sub-stratified into Situation Awareness (recognising, understanding, anticipating), Task Management (planning, prioritising), Decision Making (balancing risks and options) and Teamwork (coordinating activities). In addition, other skills identified were assertive leadership and stress/conflict management. Stakeholders reported that role modelling is important to imbibe these skills, the practice of which can be influenced by hierarchy and culture. Certain key elements in the ANTS system were deemed more crucial than others for the entrustment of distant supervision by key stakeholders. Further work is required for the teaching and assessment of ANTS.

5082

Self-reported and perceived professionalism in anaesthesia residents: an observational study

Ramis Bou T.[1], Benet Bertran P.[2], Carrero Cardenal E. J.[2]
[1]Hospital Clinic De Barcelona - Barcelona (Spain), [2]Hospital Clínic De Barcelona - Barcelona (Spain)

Background and Goal of Study: Professionalism is recognized as a core competence for anaesthetic training1. The aim of this study is to determine our anaesthesia residents' perception of their own professionalism and compare it with the perception they have of the staff's.
Materials and Methods: 20 anaesthesia residents of a high complexity hospital were sent a survey with 10 professionalism attributes adapted from Chestnut1: Humility, Servant leadership, Emotional intelligence and self-awareness, Kindness, Altruism, Physician's well-being, Responsibility, Lifelong learning, Self-regulation, and Honesty. Participation was voluntary, not incentivized nor subject to evaluation. They were instructed to rate themselves and the staff on each attribute from 0 to 10. Ratings were compared individually, as a dichotomy (<7:improvable, ≥7:appropiate) and globally.
Results and Discussion: 13 answered the survey. Table 1 shows demographic data and Table 2 shows the significant results. Residents considered themselves better than the staff on humility, self-awareness, and honesty. They rated themselves lowest on service leadership and highest on self-awareness and honesty. They rated the staff lowest on altruism and highest on responsibility and lifelong learning.

n	13
Age [avg (d)]	27.92 (4.3)
Males [n(%)]	5(38.5%)
Experience [mdn(IQR)]	2(2)

n=13	Self	Staff	p*
Humility [mdn(IQR)]	7(2)	6(1)	0.007
Awareness [mdn(IQR)]	8(1)	6(1)	0.005
Honesty [mdn(IQR)]	8(2)	6(2)	0.015
Σ[%≥7]	76.92	53.85	0.0002

*p value was calculated with related-samples Wilcoxon's test or McNemar's test with the continuity correction (when taken as a dichotomy).
Conclusions: Residents' perception of their professionalism is better than the staff's. Analysis of these attributes helps us focus our teaching efforts. It seems worth noting that residents appear to think they have already attained most professionalism attributes, which are often thought to be at the summit of medical practice.
Reference:
1. Chestnut DH. On the Road to Professionalism. Anesthesiology. 2017;126(5):780-786.

5405

Knowledge and perceptions of Anaesthesiology among fourth-year Greek medical students after completion of the anaesthesia core rotation

Ntalouka M.[1], Chalkias A.[1], Bareka M.[1], Stamoulis K.[1], Papaspyrou D.[1], Arnaoutoglou E.[1]
[1]University of Thessaly, Faculty of Medicine, Univeristy Hospital of Larissa - Larissa (Greece)

Background and Goal of Study: Several studies reported that medical students lack sufficient knowledge regarding the anaesthesiology practice. In this study, we sought to investigate the knowledge and perceptions regarding the Specialty of Anaesthesiology in fourth-year medical students of Medical School University of Thessaly.
Materials and Methods: A theoretical knowledge questionnaire was used, that surveyed the students' knowledge and perceptions regarding the Specialty of Anaesthesiology, before and after the completion of the 14-week anaesthesia core rotation. The questionnaire was distributed to the 104 students, 65 (62.4%) male and 39 (42.2%) female during their first and their last in-class session of the mandatory 14-week anaesthesia core rotation.
Results and Discussion: Before the rotation, the students' primary sources of information regarding Anaesthesiology were university experience (N=35, 33.6%) and television/film/media (N=27, 25.9%). Moreover, although the majority of students (90.2%) knew that the anaesthetists work in the operating room, 50 (48.9%) and 43 (41.2%) students respectively reported that they have no place in the recovery room or in the pain clinic, while 71 (68%) that they are some kind of psychiatrists. After the completion of the rotation almost all students reported that their primary sources of information is university experience. Additionally, only 10 students (9.6%) stated that anaesthetists have no place in the recovery room or in the pain clinic, while none of them that they are some kind of psychiatrists. Last but not least, after their training 100 (96.1%) students stated that their preferred method of studying Anaesthesiology is the hands-on skills session, compared to 45 (43.2%) students before the rotation.
Conclusion: It seems that the 14-week anaesthesia core rotation of our Medical School have a positive impact on the knowledge, perception and attitudes of the undergraduate medical students, regarding our specialty.

5448

Learning and training together: Combined DATC/ DSTC course in Spain

Varela Cabo J. A.[1], Duque P.[2], Terradillos E.[2], Piñeiro P.[2], Perez D.[3], Turegano F.[3]
[1]Gregorio Marañon General Hospital - Madrid (Spain), [2]Anesthesia And Intensive Care, Gregorio Marañon General Hospital - Madrid (Spain), [3]General Surgery, Gregorio Marañon General Hospital - Madrid (Spain)

Background and Goal of Study: DATC (Definitive Anesthetic Trauma Care) course is already established in some european countries and wordlwide. It is offered along with the surgical version, the Definitive Surgical Trauma Care (DSTC) course, in a combined program on trauma care adapted for surgeons and anaesthesiologists. This course is a good option and broadest trauma course ever, following initial management principles based on European Society of Anesthesiology ETC course (European Trauma Course) and Advanced Trauma Life Support (ATLS) course. The aim of the study was to assess the opinion among spanish anesthesiologists and surgeons after attending this combined two and a half day course.
Materials and Methods: A follow-up questionnaire was sent by email. 15 questions of 3 groups of issues: 1) Self-efficacy in trauma care after attending the course, 2) Contents of the DATC course, 3) Relationship between anesthesiologists and surgeons. We obtain 18 responders from the last three years.
Results and Discussion: 1) Self-efficacy in trauma care: 90% of them still considered the course quite or very beneficial for their clinical practice. Average confidence rating in managing trauma patients improved from 6 out of 10 pre-course to 8 out of 10 post-course.80% of participants reported an improvement on their ability to deal with major trauma in a high or very high degree after the course. 2) Contents of the DATC course: 90% considered technical contents of the DATC course as the best part of it, but only 50 % pointed out non-technical skills (decision making, team working, etc). 100% of the responders would recommend the course to another surgeon (50% the combined version and 50% the surgical version alone). 3) Relationship between anesthesiologists and surgeons: 70 % of the surgeons think DATC/DSTC course could very benefitial for improving relationships with the anesthesiologist in areas of daily clinical practice (establishing protocols, medical education, day-case surgery, etc).
Conclusion: DATC course has been well received among anaesthesiologists and Surgeons involved, with subjective evidence of empowerment and improved ways of judgment. Follow-up questionnaires should be planned in next editions in order to measure changes in the clinical practice, level of confidence and organizational situation of trauma care in the participant´s departments.

5965

First year residents are satisfied with an innovative training programme to deal with a new challenge: Starting anesthesia residency

Cardozo Panoff M.[1], Estepa Calvo V.[1], Roges Robledo X.[1], Blasco Mariño R.[1], Manrique Muñoz S.[1], Munar-Bauzá F.[1], Anaesthesia, Resuscitation and Pain Management Department
[1]Hospital Universitari Vall d'Hebron - Barcelona (Spain)

Background and Goal of Study: Initiating Anesthesiology residency, normally, is perceived with hope and enthusiasm; but, on the other hand, it can generate anxiety, fear and uncertainty. For this study, we develop an initiation training programme for First Year Residents (R1) and we evaluate its impact on them.
Materials and Methods: The twelve R1 at Vall d'Hebron University Hospital accomplished, during the first month of residency, 8 training modules dictated by Anesthesiology's senior residents (SR); and were assigned to other SR as tutors for operating rooms (OR) activities. The theoretical and practical modules were: Preparation of OR, Types of Anaesthetic Procedures, Preoperative Evaluation, Basic Anesthesia Monitorization, Pharmacodynamic and Pharmacokinetic of Anesthetics, Mechanical Ventilation, Airway Management and Computer Programs. At the end of the training course, all R1 answered a structured paper questionnaire (containing 17 multiple-choice and open questions).
Results and Discussion: 58.3% and 41.7% have responded as very satisfied or satisfied, respectively, concerning feeling integrated in the Anaesthesia, Resuscitation and Pain Management Department (AD). 91.6% perceived themselves as part of the working team during OR activities. When asked if they felt that the AD had offered a commencement of their anesthesiology specialization with support and academic formation, 100% answered that they were very satisfied or satisfied and 100% think that this training programme should be repeated on the next R1. As positive aspects of modules dictated by SR, most of R1 (83.3%) believe that SR has a good idea of what a R1 needs at this point; and 91.6% felt less nervous dispelling doubts during theoretical classes and practical activities. Non negative aspects were reported.
Conclusion: This study indicated that R1 were highly satisfied with the initiation training programme and with the support and educational background provided by the Anaesthesia, Resuscitation and Pain Management Department.

5661

Variability in exposure to trasplant procedures during anesthesiology residency: a review of argentine residency programs per lustrum for 2010 decade

Aponte-Gatica J. F.[1], Sommer Alias D`abate M. J.[2], Cicconi E.[2], Waldhorn M.[2], Dominguez M. X.[2], Teijido C. A.[2]
[1]Hospital Italiano de Buenos Aires - Ciudad Autónoma de Buenos Aires (Argentina), [2]Hospital Italiano de Buenos Aires - CABA (Argentina)

Background and Goal of Study: Transplantation is a complex procedure performed on critically ill patients with multiple comorbidities. Currently transplant training is not required for accreditation or certification in anesthesiology, and not all anesthesia residency programs are associated with transplant centers. The purpose of this paper was to analyzed transplant exposure in domestic residencies in Argentina in the last decade.
Materials and Methods: We analyzed all organ transplantation performed in Argentina Transplant Centers in lustrum for 2010s decade. Each period was separated in three groups: A) Kidney/Pancreas, B)Liver and C)Intrathoracic (Heart/ Lung). We calculated the average and median in each group per period. We defined which institutions made more than 250 transplants per group. Finally, which Centers with high volume of Transplant had Residency Programs.
Results and Discussion: A total of 17919 transplants were performed in 55 Centers in this period, 8568 between 2010-2014 (6140 Kidney/Pancreas, 1768 Liver and 660 Intrathoracic) and 9351 (6554 Kidney/Pancreas, 2032 Liver and 765 Intrathoracic) between 2015-2019. Only 18 Centers performed all type of transplants. Five (2 with residence program) out of 51 Centers performed more than 250 kidney/pancreas transplants in the first period (average=120/ median=74) while, 8 (4 with residence program) out of 51 Centers in the second period (average=128/

median=83). Two (both with residence program) out of 19 Centers performed more than 250 liver transplants in the first period (average=93/ median=67) while, 3 (all with residence program) out of 24 Centers in the second period (average=84/ median=40). One (without residence program) out of 23 Centers performed more than 250 intrathoracic transplants in the first period (average=29/ median=9) while, 1 (with residence program) out of 21 Centers in the second period (average=36/ median=11).
Conclusion: There are 6 centers with anesthesiology residency programs that performed adequate number of transplants (one Center performed more than 250 in all organs, 2 only in liver and 3 only in Kidney/Pancreas) that allows for the training of anesthesiologist in all aspects of transplant perioperative care. Therefore we think there is need to contemplate the possibility of creating residency/fellowship programs transplant oriented.

5823

Attitude and knowledge of the students of the University Department for Health Studies in Split about organ donation

Agnic I.[1], Vucemilovic H.[1]
[1]University Clinical Hospital Split - Split (Croatia)

Background and Goal of Study: Although brain death signifies the end of life, at the same time, it brings up the possibility to save lives with organ donation. An important step in organ donation is family consent, which is largely dependent on the family's knowledge and attitudes towards brain death and organ donation. The goal of the study was to investigate the opinions among students of the University Department for Health Studies in Split, Croatia and their knowledge about the organ donation process.
Materials and Methods: 210 students from nursing, radiology, physiotherapy, laboratory and midwifery studies filled out a newly constructed Questionnaire with 11 questions about student knowledge, and 13 questions exploring student opinions on organ donation. Examinees scored their attitude or knowledge on a Likert scale from 1 (completely disagree) to 5 (completely agree).
Results and Discussion: No difference in knowledge or attitudes were noted between genders or different study groups. Older examinees showed more knowledge about brain death and organ donation (≥30 y, p=0.042). Almost all students (96.2 %) have a positive attitude towards organ donation, 77.6% are willing to donate their organs. However, 35.7% have doubts or disagree with brain death as the death of a person. In addition, 37.6% are inconclusive or agree with the fact that brain death is very difficult to detect. Moreover, 48.1% of all students are concerned about possible manipulation in brain death confirmation. The very high percentage of students (82.8%) disagree with the fact that donation contributes to the recipient's life quality. More than half of all students (54.7%) are inconclusive or agree that organ donation is against religious beliefs. Fortunately, 70.5% of all students agree with the need for additional education.
Conclusion: Although Croatia is a very successful member of Eurotransplant, further improvements need to be made regarding the knowledge about organ donation from both, civilian and religious authorities. Although student attitudes towards organ donation are positive, additional education about this subject is required to clear the doubts about brain death confirmation, organ donation allocation and life quality of the recipients.

5736

If you want peace, prepare for war. Theoretical, practical and technical requirements in military anesthesiology to be displaced in combat. The spanish model

Navarro-Suay R.[1], Díaz-Viudes A.[1], Castillejo-Pérez S.[1], Tamburri-Bariain R.[1], García-Cañas R.[1], López-Soberón E.[1]
[1]Hospital Central de la Defensa - Madrid (Spain)

Background and Goal of Study: One of the main medical lessons identified after the conflict in Afghanistan is the need for military surgical teams to be trained, cohesive and led during periods between wars, in order to complete the mission in the future. The objective is to describe theoretical, practical and technical requirements that a Spanish military anesthesiologist must learn in order to be deployed in an international mission.
Materials and Methods: An analysis 2/2017 technical instruction of Health of the Defense General Inspection of the Kingdom of Spain which it specifies the requirements that a Spanish military anesthesiologist must overcome in 4 years in order to be deployed abroad. As a secondary objective, these requirements are compared to those employed in other allied medical military corps.
Results and Discussion: Over a period of four years, the Spanish military anesthesiologist must meet military, practical and theoretical requirements. Within the military level we highlight the military exercises in national territory, rotations in some military unit and international mission days. Regarding the practical requirements, 24-hour (5 / year) guards, anesthesia in general and digestive surgery (20 / year), in orthopedic surgery and traumatology (20 / year), in neurosurgery (2 / year) should be performed, in thoracic surgery (2 / year), in vascular surgery (1 / year), in obstetric surgery (5 / year) and locoregional techniques (5 / year). Finally, it is necessary a theoretical training in a unit of polytraumatized (2 months), burned (1 month), critics (2 months), pediatric intensive (1 month), ATLS course, Ecofast course, DATC course, mechanical ventilation course , ultrasound course in locoregional anesthesia, difficult airway control management course, congresses of interest, English language course and approved physical tests. Other military allies have a program similar to that carried out by the anesthesiologists of the Spanish Military Health Corps.
Conclusion: From the point of view of the authors, the requirements at the military, practical and theoretical level demanded in the Spanish Military Health Corps are necessary although partially scarce in the practical requirements. This preparation resembles that made in other allied countries.
Acknowledgements: Spanish Medical Corps.

5694

Comparison of and factors affecting publication rates of abstracts presented at ASA 2016 and ESA 2016

Gouda D.[1], Goud M.[2], Singh A.[3], Gouda P.[4]
[1]University of Pennsylvania - Philadelphia (United States),
[2]Vassar College - Poughkeepsie (United States),
[3]Sidney Kimmel Medical College - Philadelphia (United States),
[4]Saint Louis University - Saint Louis (United States)

Background: An understanding of publication rate should be informative to academic conference attendees, since the findings of abstracts are based on preliminary data and have not gone through the rigorous peer-review process of published studies. Determining factors that influence publication rate can also help illuminate bias in the review process. This study seeks to ascertain the publication rate of abstracts presented at Anesthesiology 2016, the annual meeting of the American Society of Anesthesiologists (ASA), and Euroanaesthesia 2016, the annual meeting of the European Society of Anaesthesiology (ESA). The objectives of this study are to examine differences in publication rate across clinical track and country of origin within and between both academic conferences. These factors are analyzed in correlation to destination journals and their impact factor.
Methods: A total of 1128 presented abstracts from ASA 2016 and 1368 presented abstracts from ESA 2016 were examined. Their authors, qualifications (M.D., D.O., Ph.D ect.) and country of origin were extracted. Google search, ResearchGate and PubMed were then used to learn if the research presented in the abstracts was published in medical journals in the next 2 years (until November 2018). If they were, the medical journal, its impact factor and the date of publication were recorded.
Results: Of the 1128 abstracts presented at ASA 2016 and 1362 abstracts presented at ESA 2016, 369 (32.7%) and 335 (24.6%) were published respectively within the studied timeframe. By clinical track, Anesthetic Action and Biochemistry had the highest publication rate of 56.7% at ASA 2016, while Cardiac, Thoracic and Vascular Anaesthesiology had the highest publication rate of 33.3% at ESA 2016. By country (with 10 or more presented abstracts), Taiwan had the highest publication rate of 72.7% at ASA 2016, while Turkey had the highest publication rate of 69.2% at ESA 2016. The most popular journal of publication was Anesthesia & Analgesia for both meetings, with 42 publications coming out of ASA 2016 and 20 publications coming out of ESA 2016. 183 abstracts (49.6% of total) were published within a year of ASA 2016, and 128 abstracts (38.2% of total) were published within a year of ESA 2016.
Conclusions: Publication rates of abstracts presented at ASA 2016 and ESA 2016 vary across clinical track and country of origin. Further research is needed into the underlying drivers of these biases.

4414

Impact of simulation based CPR training for multidisciplinary OR teams

Nagy E.[1], Meurling L.[2], Kjellqvist N.[2], Norberg Å.[2], Escher C.[2]
[1]Karolinska University Hospital Stockholm - Stockholm (Sweden), [2]Karolinska University Hospital - Stockholm (Sweden)

Background and Goal of Study: Emergency situations such as a cardiac arrest present a challenge for the operating room (OR) team [1]. Team training using high-fidelity simulation is the gold standard in health care education but there are few studies of full professional OR teams. [2,3] This study was performed at the Center of Advanced Medical Simulation and Training (CAMST) and included 17 full days of training focusing on collaboration and communication during OR emergencies. Each team consisted of the 5 professions commonly working in an OR. The aim was to evaluate the impact of training on team members' self-reported level of non-technical skills and knowledge regarding European CPR guidelines.
Materials and Methods: All participants (n=138) gave written informed consent. Data on self-reported performance was collected using questionnaires consisting of seven-level Likert-type scales and knowledge of CPR guidelines using single correct answer questions. Scores before and after training were analyzed using the Wilcoxon matched-pairs signed rank test (significantly different P value < 0.001).
Results and Discussion: Scores improved significantly after training regarding the questions: I am sure that: a. I know how to act in my role in an emergency situation; b. I will communicate "clearly" in an emergency situation; c. I will call for help when I need support while working in the OR; d. I will act correctly in case of a CPR situation in the OR. Regarding CPR guidelines scores improved significantly, nurses and doctors scoring 91% respectively 93% after training. Interestingly, 7.7 % of licensed personal did not answer correctly regarding when to administer epinephrine.
Conclusion: Self-assessment concerning non-technical skills improved significantly after training. Interestingly, theoretical knowledge regarding CPR guidelines was equally among nurses and doctors but still not 100% correct after training. The results will guide further improvements of the ongoing training intervention.
References:
1. Katz D et al, BMJ Qual Saf 2019; 0:1-8.
2. Fouilloux V et al, Perfusion. 2019 Jan; 34(1):29-34.
3. Greif R et al, European Resuscitation Council Guidelines for Resuscitation 2015. Section 10. Education and implementation of resuscitation. Resuscitation 95. 2015; 288-301.

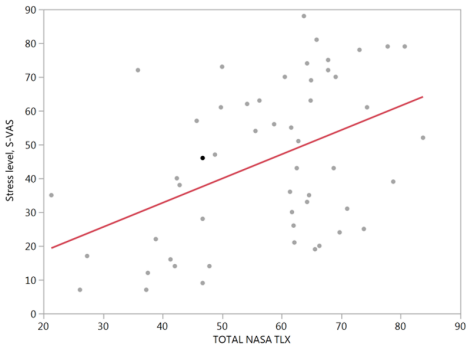
4617

High-fidelity simulation to assess task load index and performance: a prospective observational study

Favre-Felix J.[1], Dziadzko M.[2], Bauer C.[2], Rimmele T.[3], Lehot J. J.[4], Lilot M.[5]
[1]Hôpital Cardiologique Louis Pradel - Lyon (France), [2]Hôpital de la Croix Rousse - Lyon (France), [3]Hopital Edouard Herriot - Lyon (France), [4]Hopital neurologique - Bron (France), [5]Hopital Femme Mere Enfants - Bron (France)

Background and Goal of Study: Measuring task load by NASA Task Load IndeX (NASA-TLX) in high-fidelity simulation is a tool widely used in aviation to assess pilots. This index might be an interesting asset for optimising the quality of a scenario (mobilization of optimal amount of mental and physical resources). The main purpose of this study was to explore whether the score of NASA-TLX of residents in anaesthesia and critical care medicine during critical simulation scenarios, was consistent with the values reported in the literature. The second purpose was to describe relationships between NASA-TLX, performance during simulation and generated stress.
Materials and Methods: All residents in anaesthesia and intensive care medicine undergoing HFS sessions between June and December 2017 were involved. No exclusion criterion was applied. The primary endpoint was the task load generated by each scenario assessed by NASA-TLX questionnaire. Based on literature, the NASA-TLX score between 39 and 61 was considered as a consistent task load level. Stress level (Visual Analogue Scale for stress), specific technical and non technical skills performances (Team Emergency Assessment Measure (TEAM)) were also assessed.
Results and Discussion: Fifty-three residents actively participated in one of ten different scenarios. Median NASA-TLX score of scenarios was 61 [48-65]. No association between NASA-TLX score and technical or TEAM performance scores, but an association between NASA-TLX and the stress level (rho=4.7, p=0.001) was observed.
Conclusion: Simulation scenarios generate different task loads in residents; the task load was deemed acceptable for half of the scenarios. The NASA-TLX could be considered as a tool to assess the pedagogic adequacy of scenarios. Scenario and generated stress level, but not task load, can modify residents' performance during simulation. This should be considered when planning normative simulation.
References:
1. Grier RA. How High is High? A Meta-Analysis of NASA-TLX Global Workload Scores. Proceedings of the Human Factors and Ergonomics Society Annual Meeting. 2015;59(1):1727-1731.

Figure 1 : Bivariate fit of stress level and NASA Task Load IndeX score.



Predicted Total NASA TLX = 44.685 + 0.279*S-VAS, *p*=0.001. S-VAS: Visual Analogue Scale for Stress, TLX: Task Load IndeX

4789

A national survey of simulation utilization in anesthesiology residency programs in the Russian Federation

Andreenko A.[1], Kuzovlev A.[2], Musaeva T.[3], Bratischev I.[4]
[1]S.M.Kirov Military Medical Academy - Saint Petersburg (Russia), [2]Research Institute of General Reanimatology named after V.A. Negovsky - Moscow (Russia), [3]Kuban State Medical University - Krasnodar (Russia), [4]City Clinical Hospital named after S.P. Botkin - Moscow (Russia)

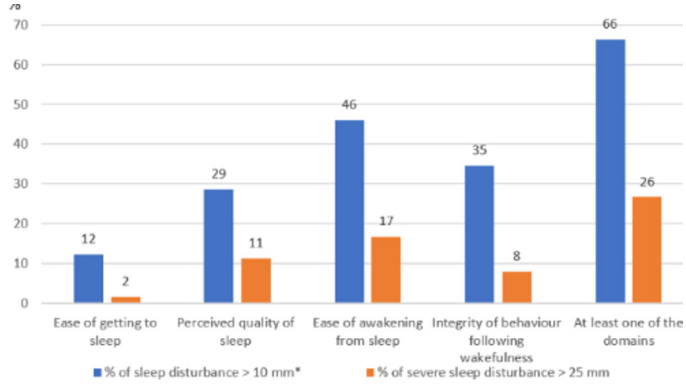
Background and Goal of Study: Currently, there are little data available regarding the current status of simulation-based curricula across residency programs in Russia. In this study, we aimed to characterize the type, frequency, and content of the simulation courses offered for resident training in anesthesiology in the Russian Federation.
Materials and Methods: An 44-question survey was distributed to anesthesiology residency program directors in the 88 universities, academies, research centers.
Results and Discussion: 65 of 88 (73,9%) residency program directors responded to the survey. All of respondents utilized any type of simulation for anesthesiology education. 52 (80%) included official simulation course in curriculum. Most of respondents (60; 92,3%) reported using part-task trainers for training airway management skills. Using phantoms for training central venous access reported by 50 (77%) respondent and 25 (38,4%) use special phantoms for US-guided central venous access. Simple manikins for training BLS used in 62 (95,4%) centers and computerized manikins for training ALS – in 57 (87,7%). 42 centers utilized manikins for training neuraxial anesthesia. 27 (41,5%) directors reported using manikins and check-lists for assessment of resident's manual skills during exam. 62 (95,4%) centers equipped with high-fidelity patients simulators. Regular simulation session (at least 1 full day in month with each group) provided in 42 (64,6%) centers, in 51 (78,4%) centers debriefing is essential part of training. The most often used scenarios include basic of anesthesia (46%), airway management (80%), intraoperative anesthesia crises (44,6%), cardiac emergencies (70,7%). 43 (66,1%) centers use high-fidelity patients simulators for resident's performance assessment during OSCE with check-lists. Inter-professional command training provided in 43% centers. The respondents called the lack of qualified teachers (66%), simulator availability (32,3%), lack of motivation among teachers (66%) as most common limitations for introducing simulation into the educational process. 63 (97,9%) respondents agree with the need to develop a national simulation program in anesthesia residency.
Conclusion: The results from this survey highlight that there are currently large variations in simulation-based training and assessment among training programs. Most directors consider it necessary to develop a standard curriculum.

4987

Prevalence of sleep disturbance of residents the night before high-fidelity simulation: results from a prospective one-year national survey

Calmettes M.[1], Denoyel L.[2], Duclos A.[3], Rimmelé T.[4], Lehot J. J.[5], Lilot M.[6], SoFraSimS: Société Francophone de Simulation en Santé
[1]Hospices Civils de Lyon, Départements d'anesthésie-réanimation - Bron (France), [2]Université Claude Bernard Lyon 1, Centre Lyonnais d'Enseignement par Simulation en Santé, SAMSEI - Bron (France), [3]Hospices Civils de Lyon, Health Data Department, Lyon, France. Université Claude Bernard Lyon 1, Health Services and Performance Research Lab (EA 7425 HESPER) - Bron (France), [4]Hospices Civils de Lyon, Départements d'anesthésie-réanimation, Lyon, France. Université Claude Bernard Lyon 1, Centre Lyonnais d'Enseignement par Simulation en Santé, SAMSEI. EA 7426 "Pathophysiology of Injury Induced Immunosuppression" (Pi3), Université Claude Bernard Lyon 1-Biomérieux-Hospices Civils de Lyon - Bron (France), [5]Hospices Civils de Lyon, Départements d'anesthésie-réanimation, Lyon, France. Université Claude Bernard Lyon 1, Centre Lyonnais d'Enseignement par Simulation en Santé, SAMSEI. Université Claude Bernard Lyon 1, Health Services and Performance Research Lab (EA 7425 HESPER) - Bron (France), [6]Centre Hospitalier Louis Pradel, Hospice - Bron (France)

Background: The stress level of participants of high-fidelity simulation (HFS) stems from various factors but may result in anticipatory anxiety causing sleep disturbances during the night prior to HFS. The objective of this survey was to determine the prevalence of sleep disturbances of residents during the night prior to HFS.
Methods: The survey was sent to all residents at the beginning of the HFS during one year, in ten simulation centres. The questionnaire combined demographics and the Leeds Sleep Evaluation Questionnaire using visual analogue scales divided into four sleep qualitative domains 1. The primary outcome was the prevalence of sleep disturbance (more than 10 mm on one of the four domains). Secondary outcomes were the prevalence of severe sleep disturbance (more than 25 mm) as well as qualitative and quantitative reported explanatory sleep parameters.
Results: Among respondents, 66% [95%CI, 63 to 69] of residents had more than 10 mm and 27% [¬-95%CI, 24 to 30] had more than 25 mm of sleep disturbance (Figure 1). Residents with a sleep disturbance of more than 10 mm had fewer hours of sleep (6.4 (SD 1.8) vs. 7.3 (SD 1.3), difference: -0.9 [95%CI, -1.1 to -0.7]; P<0.0001), with a higher number of night-time awakenings (1.3 (SD 1.5) vs. 0.7 (SD 0.9), difference: 0.6 [95%CI, 0.4 to 0.8]; P<0.0001).
Conclusion: Among residents participating in HFS, a high prevalence of sleep disturbance during the night before HFS, was noted. Strategies to help residents achieve better sleep prior to HFS should be explored.
Reference:
1. Psychol Med 1978; 8: 325–9.



**of note: the % of severe sleep disturbance (orange diagrams) are included in the % of sleep disturbance (blue diagrams)*

5143

The role of high-fidelity simulation in supporting the effective performance of board-certified anesthesiologists during anesthesia crises

Andreenko A.[1]
[1]S.M.Kirov Military Medical Academy - Saint Petersburg (Russia)

Background and Goal of Study: Application of high-fidelity simulation can help identify the performance gaps of practicing clinicians and improve their performance during anesthesia crisis. Goal of study - to assess the performance of board-certified anesthesiologists during anesthesia crisis, those who were attending simulation courses of anesthesia crisis resource management (ACRM) compared to those who have not passed.
Materials and Methods: Twenty board-certified anesthesiologists from anesthesia department of academy (study group) with no prior experience with simulation-based training were attended for a 2 days' ACRM workshop with real anesthesia equipment and HPS™ (CAE) simulator. The scenarios simulated were anaphylaxis, difficult airways (3 scenarios), total spinal block, bronchospasm, pneumothorax, malignant hyperthermia, intraoperative cardiac emergencies (3 scenarios) with debriefing after each scenario. Each anesthesiologist participated in two 20-min simulated scenarios as primary anesthesiologist, watched the actions of other participants during the scenario using video broadcast and took part in debriefing after other scenarios during course. The control group consisted of 20 anesthesiologists from another hospital who had never undergone simulation ACRM courses. After 3, 6 and 12 months, all anesthesiologists in both groups underwent a performance assessment during one randomly assigned simulated scenario with using checklists (max. score 100 p.) without debriefing. A comparison between the groups was made based on the results of the performance assessment.
Results and Discussion: Anesthesiologist in both groups showed low performance score before course (70.3, 66.4-74.1 in study group; 68.4, 64.2-73.5 in control group; p=0.74). It was significant improvement of anesthesiologist's performance in study group 3 month after ACRM course (84.8, 79.9-89.1; p=0.036 vs initial score before course) and high level of performance remain 12 month after training (82.5, 76.4-85.1; p=0.074 vs 3 month). In control group anesthesiologist's performance score show no any improvement and remain significantly lower in comparison with the study group after 3, 6 and 12 months (p<0.05).
Conclusion: Anesthesiologist showed higher performance during simulated anesthesia crisis up to 12 months after ACRM high-fidelity simulation course in comparison with colleagues who have not completed these courses.

5541

ZamSim: embedding a structured critical incident simulation training programme for physician anaesthetists in Zambia

Murali M.[1], Harrington J.[1], Wang T. Y.[1], Hall D.[1], Mumphansha H.[1], Zyambo M.[1]
[1]University Teaching Hospital - Lusaka (Zambia)

Background and Goal of Study: Anaesthesia in low and middle-income countries is hindered by limited training opportunities1. Simulation improves the acquisition of technical and non-technical skills, and knowledge of best practice1. The Zambia Anaesthesia Development Programme is an international healthcare partnership which aims to train physician anaesthetists in Zambia. Local partners identified a shortfall in critical incident training and requested the development of a simulation programme to address this at University Teaching Hospital, Lusaka. We sought to understand whether delivering simulation in this context was practical, useful and improved skills.
Materials and Methods: In conjunction with local education leads, simulation scenarios, adapted to local practice, were developed, incorporating critical incidents in general and obstetric anaesthesia. "Simulation passports" were distributed to trainees. A high-fidelity simulation mannikin was combined with low fidelity mannikins, a tablet used as a standalone monitor, and resuscitation equipment. Simulation was run in theatre to improve attendance and increase realism. Trainees were provided with a clinical vignette and undertook a structured debrief. Feedback, using Likert scales (out of 5) and free text, was collected and analysed using quantitative and qualitative methods.
Results and Discussion: Trainees unanimously felt the training was relevant to their practice (median rating 5 [interquartile range 5-5]) and that it would improve patient safety (5 [5-5]). Simulation enhanced their confidence in dealing with critical incidents (5 [4-5]) and provided a structured approach to clinical management (5 [4-5]). Participants felt the scenarios were realistic, feedback was constructive, and they had greater awareness of non-technical skills. Trainees thought more emphasis on guidelines in the debrief would have been helpful. Challenges included a lack of protected time for teaching.

Conclusion: Simulation in a Zambian context is feasible, well-received and beneficial. Further work is needed to understand whether learning translates into clinical practice and to address whether non-technical skills teaching should be adapted for cultural norms. Moving forwards, classifying the programme as a mandatory training requirement and involving local faculty will improve sustainability.
References:
1. Turkot O et al. 2019. A Review of Anaethesia Simulation in Low-Income Countries. Cur Anaes Rep 9: 1-9.

5637

Adapting a low-cost high-fidelity phantom for teaching emergent cricothyrotomy in a virtual multidisciplinary scenario

Ibanez C.[1], Calvo A.[1], Belda I.[1], Carramiñana A.[1], Valero R.[1], Gomar C.[1], SIMCLINIC
[1]Hospital Clínic de Barcelona - Barcelona (Spain)

Background and Goal of Study: Despite significant advances in airway management, difficult airway is still a challenge in anaesthesiology due to its potential serious complications. Cricothyrotomy (CT) is the technique of choice in the scenario "can´t intubate can´t ventilate" (CICV), but CT is rarely performed in clinical practice and skill acquisition is difficult. Our goal was to adapt a low-cost high-fidelity phantom, the Real Cric Trainnerl1, and apply and evaluate it in a multidisciplinary simulation scenario.
Materials and Methods: We applied some modifications to the mentioned model to increase its fidelity and to adapt it into a simulation scenario. The main modifications were related to simulation of bleeding and air. We designed a CICV case and performed a multidisciplinary workshop. We evaluated: the fidelity and usefulness of the phantom, the possibility of applying ultrasound (US) to the phantom and the satisfaction of the participants.
Results and Discussion: The workshop involved 11 participants (6 doctors and 5 nurses) from an Intensive Care Unit. The initial cost for building the phantom was 220E. The price for each student at the workshop was 4E. The students scored out of 10 the following characteristics of the phantom: visual appearance 8.1±1.2; tactile sensation 8.2±1.4; fidelity when performing the technique 7.9±1.8; usefulness to teach the technique and usefulness of integration the phantom in a clinical scenario 9,6±0,7. Regarding the use of US, the images were evaluated as high-fidelity by two experts. Regarding satisfaction, students scored out of 10: usefulness of the workshop for their clinical practice, approach and the development of the scenario 9.8±0.7. The debriefing 9.9±0.3. Definition of learning objectives, expectations, acquisition of new skills and usefulness of the training 9.9±0.3. All participants would recommend the workshop to a colleague and would repeat it.
Conclusion: The adaptations made to the Real Cric Trainer model allowed the integration of this phantom in multidisciplinary simulation scenario. The model was evaluated as high-fidelity by the participants and the satisfaction and usefulness of the workshop was very high. The cost of the model was low compared with commercial ones. The phantom allows identification of anatomical structures by US and therefore might be useful for teaching this skill.
References:
1. Kei J et al. The REAL CRIC Trainer. J Emerg Med. 2019;56(4):426-430.

6187

Patient death in high-fidelity simulation – measuring volunteer self-confidence and emotions

Berzins A.[1], Jagodzinska J.[2], Sabelnikovs O.[2]
[1]Riga East University Hospital - Riga (Latvia), [2]Riga Stradins University - Medical Education Technology Centre - Riga (Latvia)

Materials and Methods: This observational study included 30 volunteer participants - third to sixth year medical students with varying experience in high-fidelity CPR training. The volunteers were randomized in two groups with predefined simulation outcomes – either patient death (PD) or return of spontaneous circulation (ROSC). After simulation and debriefing the volunteers completed a self-assessment survey stating their initial emotional response and self-confidence.
Results and Discussion: No significant self-confidence evaluation difference was found among the compared volunteer groups. A wide range of emotional response was recognized among the volunteers. From the 30 volunteers that completed the self-assessment survey 11 students stated that their confidence has increased (5 PD vs 6 ROSC) and 11 students stated that there was no change in their confidence (6 PD vs 5 ROSC) and in 8 cases the volunteers noted a decrease in their confidence (4 PD vs 4 ROSC). Overall impression based on volunteer self-assessment ranking tended to show more signs of reflective thinking in the negative outcome group.
Conclusion: Patient death as a teaching tool has no negative effect on medical student self-confidence. Patient death in high-fidelity simulation tends to promote beneficial reflective thinking to a greater degree compared to positive outcome scenarios.

5774

High-fidelity simulated scenarios for two obstetric critical situations

Berge Ramos R.[1], Tena Blanco B.[1], Magaldi Mendaña M.[1], Cuñat López T.[1], Jacas Coma A.[1], Gomar Sancho C.[1], SIMCLINIC
[1]Hospital Clinic De Barcelona - Barcelona (Spain)

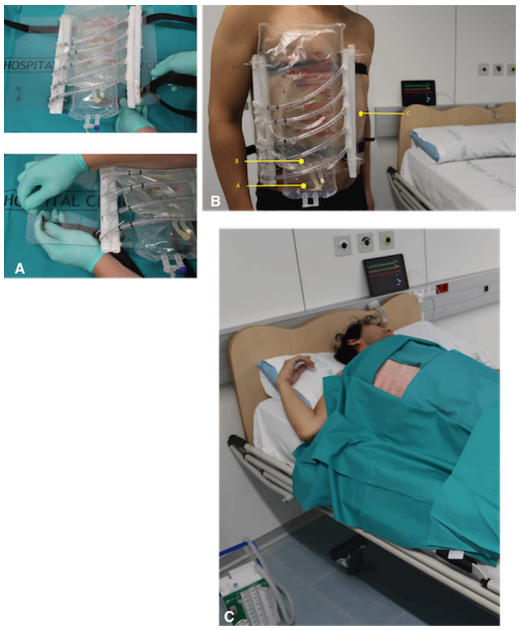
Background and Goal of Study: Obstetric haemorrhage (OH) and high spinal block (HSB) are two of the most critical situations in obstetrics. High fidelity Clinical Simulation (CS) is considered the most potent teaching tool, helping to improve individual skills and team performance, clinical reasoning and decision-making necessary to preserve patient safe. Furthermore, to follow guidelines and local protocols in crisis effectively requires shifting from knowledge to action. We describe the design of CS scenarios for the two emergent situations. The teaching objective was to follow the institutional protocol of OH and recognize and manage mother, foetus and emergent surgery in HSB.
Materials and Methods: A simulation workshop on obstetric crisis is part of the curriculum of the third-year anaesthesia trainees in our department. It consists in the clinical management of two obstetric scenarios and a structured final debriefing. Scenario 1 (OH): simulated delivery room with a hybrid simulator: a simulated pregnant woman (one made up instructor) with a pelvic delivery dummy including placenta and birth canal attached (Laerdal PROMPT®), a newborn dummy and an actor playing the father's role. Monitoring simulated with the program SimMon® in an Ipad. Artificial blood was coating delivery, surgical table, instruments and floor. Scenario 2 (HSB): simulated operating room with robotized manikin SimMan® in which a simulated pregnant abdomen was attached, two real obstetricians prepared for a caesarean section and a surgical nurse.
Results and Discussion: Sixteen residents have already participated in the workshop with a high level of satisfaction. They considered as strengths of the session the decision making in critical situation, to observe in the video record their performance with their own strengths and weaknesses, self-assessment and the free and frank discussion during the debriefing in the frame of the participating team. Trainees manifested that the simulation had been useful for improving their competence managing them. Debriefing was crucial to achieving changes in professional performance and detection areas of self-improvement.
Conclusion: The two scenarios design was feasible with the usual structure of a Simulation lab, allowing to integrate simulation into a training program of obstetric anaesthesia. Clinical simulation was the best available tool we had used for teaching the competences that requires team work.

5553

A chest-tube insertion simulation model: assembling an educational need to all budgets

López-Baamonde M.[1], Perdomo Linares J. M.[1], Ibáñez Esteve C.[1], Angeles Fite G.[1], Guirao Montes Á.[1], Gomar Sancho C.[1], SIMCLÍNIC
[1]Hospital Clinic De Barcelona - Barcelona (Spain)

Background and Goal of Study: Chest-tube insertion technique is urgently required in some critical situations even when training is limited. It is paramount for doctors working in emergency departments and ICUs to be competent to perform this technique effectively and safely. Clinical simulation could potentially address this educational need. Available commercial simulators are expensive and their realism is limited. Authors aim at developing and testing a new low-cost simulation model for chest-tube insertion.
Materials and Methods: The design of a high fidelity and low cost simulation manikin for chest-tube insertion was made mainly of recycling medical waste materials (expired and/or used) and pork skin: 6 orotracheal tubes, 2-4 chest-tube packing cylinders, 2 empty serum bags (one of 0.9% NaCl 1000 mL and one of irrigation water for endoscopic procedures of 3000 mL), a piece of pork skin 25x25cm and 2cm thick. A plastic plate DIN A3 size 3mm thick, a hot glue gun, 2 m of Velcro® strip were used to affix the model. Two manual air pumps were used to fill the bags with air.



Results and Discussion: The total cost was 47€, remarkably cheaper than commercial ones, whose cost ranges between 2000€ and above 40000€ what are beyond most educational budgets. When it comes to usefulness and fidelity, the low-cost manikin was used in a simulation workshop for ICU staff. A high-fidelity simulated scenario was achieved by placing the model on an actor's thorax with vital signs response monitoring. The model was then assessed by an expert thoracic surgeon and the 12 workshop participants with high scoring in fidelity (Table).

ASSESED CHARACTERISTIC	Participant scoring X±SD	Thoracic surgeon scoring
THORAX VISUAL APPEARANCE	9,33±0.82	8
TACTILE FIDELITY		
Skin feeling	9,83±0,41	7
Skin movement and shifting	9,33±1,03	6
Rib cage and intercostal spaces palpation	9±0,63	9
TECHNIQUE-PERFORMING FIDELITY		
Local anaesthetic infiltration feeling	9,67±0,52	9
Skin incision	9,67±0,52	8
Dissection by planes	9,67±0,52	7
Resistance feeling ("*click*") puncturing the pleura	9±2	9
Air release when the pleura is punctured	9,83±0,41	6
Resistance to chest-tube/catheter insertion	7,83±2,31	5
Thorax re-expansion when pneumothorax is drained	8,83±1,94	-
Drain-tube fastening to skin (stitches)	9,6±0,55	9
Aspiration device connection	10±0	10
OTHER CHARACTERISTICS		
Has been the fact of integrating the manikin in a monitored simulation scenario useful for learning the technique?	10±0	10
Has the fact of integrating the manikin to an actor has been useful?	10±0	10
Did the lung-expansion manipulation by the actor distract you?	8.67±2	-
Do you think this manikin is appropriate for this technique learning?	9.83±0.41	10

Conclusions: Authors conclude that this model is feasible, reproducible, transportable and extremely cheaper than their commercial counterparts. These characteristics make this realistic chest-tube insertion model accessible to most educational budgets.

4992

Effects of standardized breathing and biofeedback on performance of anaesthesiologist residents during high fidelity simulation

Schlatter S.[1], Therond C.[2], Guillot A.[1], Rimmelé T.[3], Debarnot U.[1], Lilot M.[4]

[1]Claude Bernard Lyon 1 University. Inter-University Laboratory of Human Movement Biology (EA 7424) - Villeurbanne (France), [2]Hospices Civils de Lyon, Departments of Anaesthesia and Intensive Care - Lyon (France), [3]Hospices Civils de Lyon, Departments of Anaesthesia and Intensive Care. Claude Bernard Lyon 1 University. Centre Lyonnais d'Enseignement par Simulation en Santé (CLESS, high fidelity medical simulation centre), SAMSEI, Lyon, France. Claude Bernard Lyon 1 University-Biomérieux-Hospices Civils de Lyon. Pathophysiology of Injury-Induced Immunosuppression (EA 7426 Pi3) - Lyon (France), [4]Centre Hospitalier Louis Pradel, Hospice - Bron (France)

Background: High fidelity simulation (HFS) remains stressful for residents. This stress level negatively impacts performance not only in HFS but most likely also in clinical practice. Thus, stress management with standardized breathing and biofeedback exercise might help participants to improve performance. This study explored whether these methods can contribute to improve performance during HFS.

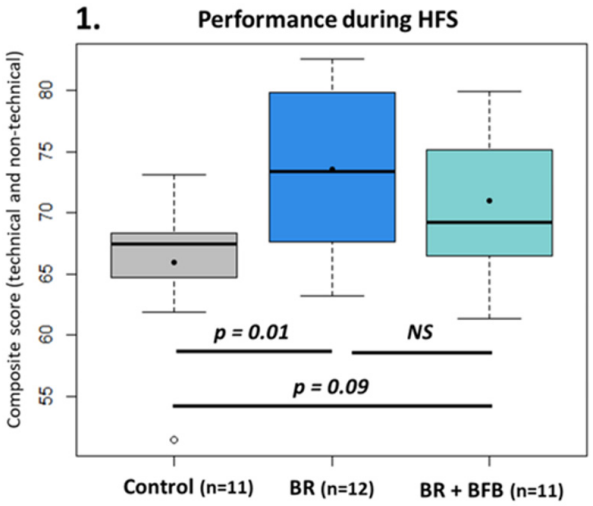
Methods: Residents who convened to HFS were randomized in 3 parallel-arms: standardized breathing exercise (BR), BR paired with heart rate variability biofeedback (BR+BFB), review of normal biological results (CONTROL). The 5-min intervention was performed after the scenario briefing (1 of 4 scenarios). Primary endpoint was a composite score made of technical (scenario specific grid) and non-technical (Ottawa1) performance scored by 2 blinded investigators. Secondary endpoints included physiological (heart rate, breathing rate) and psychological stress markers (visual scale, Thayer2) that were analysed at different time-points. Performance was analysed by a ANOVA-2 with GROUP and SCENARIO factors. Stress markers were analysed by repeated-measures ANOVAs with between subject variable GROUP and with within-subject factor TIME.

Results and Discussion: 34 residents were included in the analysis. Residents in the BR group had higher performance score compared to control while a similar trend was observed in the BR+BFB group (fig 1). Residents with BR+BFB had an increase in internal relaxation from the Thayer questionnaire after intervention (fig 2).

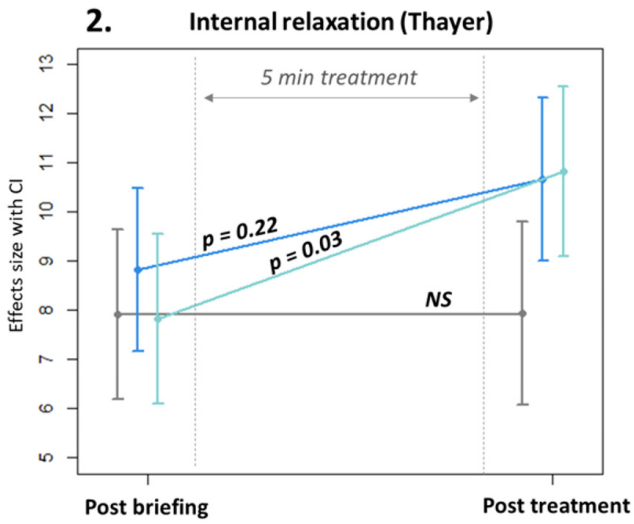
Conclusion: A 5-min session of standardized breathing before scenario provides higher performance, hence offering promising application for stress management during HFS. Biofeedback association shall be further explored for its potential additional interests.

References:

1. CCM 2006; 34: 2167-74.
2. Psychol Rep 1978; 42: 747-56.



*Mean number of composite score of performance during scenario of high fidelity simulation. Points represent means, thick lines indicate medians, boxes indicate interquartile ranges, and whiskers indicate minima and maxima. Each scenario was evaluated independently by 2 blinded investigators. Composite score: (score Ottawa*100/42 + score ratting grill) / 2.*



Evolution of internal relaxation during treatment. Grey, blue and green thick lines represent CONTROL, BR, BR + BFB groups respectively. Points represent effects of the models with confidences intervals.

Name
Code abstract

Aaberge L.
5168

Abad Gurumeta A.
4365
5622

Abad Motos A.
4365
4761

Abadal Viyallandre J. M.
4764

Abad-Gurumeta A.
5533
6237

Abad-Motos A.
6237

Abdallah F.
4858

Abdellatif M.
4320

Abdou A. M.
5259

Abdul Ghafoor R.
4793

Abdulahad W.
4636

Abdullah H.
5104

Abdullah H. R.
4622
4675
4959
5080
5252
5298
5336

Abdullah H. R. B.
4686
4694

Abdyli A.
5077
6270

Abe K.
4470

Abe N.
4462

Abedinov F.
4906

Abejaro Mut B.
6125

Abela G. P.
4443

Abram J.
4918

Abrao J.
6310

Abreu F.
6324

Abreu Paradell S.
5047

Abrunhosa R.
5963

Absalom A. R.
4545
5381
5382
5478

Acevedo Bambaren Ismael
5800

Acevedo I.
5800
6149
6175
6200

Adachi H.
5246

Adachi Y.
4722
5246

Adalid Hernandez I.
4614

Adalid I.
5808
6141

Adam E.
6291

Adamchuk N.
5598

Adi N.
5414

Adjami B.
5584

Adrover A.
5185

Aduse-Poku V.
6222

Afonso A.
6160

Afonso J. P.
6295

Afonso Queijo J. C. D.
4352

Agawane N.
5120

Agejas R.
5011

Aggarwal G.
4638
4748

Aghakaryan V.
4335

Aghasaryan N.
4335

AGIM
5322

Aglan A.
6274

Agnic I.
5823

Agnoletti V.
5594

Aguado La Iglesia I.
4795
6157

Aguado Laiglesia I.
5195

Aguado Sanchez S.
5956

Aguilera Aguilera G. A.
5781

Aguilera L.
5524

Ahern H.
4919

Ahijado Agudo J. M.
4446

Ahmad A.
4721

Ahmed M.
4405

Ahmed S. M.
5778

Ahmetasevic D.
5317

Ahn J.
5136

Aiims, New Delhi
4876

Ail D.
5970

Airway management
5477
5737
5958

Aísa Gasca I.
6008

Aisa T.
4455

Aizawa K.
4930

Akbas S.
4567

Akca B.
5404

Akcaboy Z. N.
5265

Akdaş Tekin E.
4792

Akiizumi H.
4596

Akinci S. B.
5014
5310

Akselrod B.
5328

Al Hamzeh Y.
4752

Al Nahdi S.
6163

Al-Ani T.
4916
4922

Alanoglu Z.
5771

Albajar A.
4595

Albajar Bobes A.
6025

Albaladéjo P.
5779

Albrecht E.
4813
4833

Albrecht M.
5063
5406

Aldakauskaitė P.
5580

Alday Muñoz E.
6094
6139

Aldhoun J.
5920

Alegret N.
4550

Alekberli T.
4877

Aleksi A.
4579

Alessandra Rocha E.
6140

Alexander L.
4931

Algarra N.
5236

Algera M. H.
5375

Ali A.
4584

Aliaga J. L.
5812

Aliaño M.
4327
4328

Alkış N.
4767
5861

Al-Lach A.
6148

Alliet W.
5144

Almagro Vidal I.
6047

Almeida C.
6036
6038
6049
6068

Almeida J.
4669

Almeida Pinto D.
6191

Almeida V.
4662
6191

Almog O.
5559

Alonso E.
5349

Alonso Gómez A.
5047

Alonso Mateo M.
6020

Alonso Tuñón O.
6101
6114

Alonso Yanci E.
4486

Alonso-Babarro J. M.
5669

Alonso-Chico A.
4453

Alsina E.
4719

Alström U.
5529

Altindas F.
4924

Altıparmak B.
5878

Alvar E.
4523
5205

Álvarez Baena L.
5338

Alvarez Escudero J.
4580
5960

Álvarez Escudero J.
5875

Álvarez Herreros C.
6277

Alvarez J.
6333

Álvarez J.
5808
5929

Alvarez Rementeria R.
6265

Alvarez Torres E.
5949

Alvarez-Escudero J.
4491

Alvaro-Gracia Heredero L.
5615

Alves Â.
5628
6087

Alves R.
4352

Amadeu E.
5631
6340

Amagai C.
4905

Amaral C.
6006

Amaro P.
6265

Amaro S.
5683

Ameen A.
4455

Amin A.
4455

Amorim A.
4620
4945
6365

Amorim F.
5520

Amorim P.
5879
6177
6341

Amoros Ruiz D.
5956

Amozadeh L.
6280

Ampatzidou F.
4438

Amri K.
6386

Amza A. C.
5585

An J.
5301

Anaesthesia Cardiac Arrest and Mortality Study Commission
4799

Anaesthesia, Resuscitation and Pain Management Department. Hospital Universitari Vall d'Hebron. Barcelona (Spain)
5629

Analitis A.
5753
5759
5765
5783

Analyti A.
4884

Anand A.
6335

Anand R. K.
4876

Anastácio M.
6203
6262

Anaya R.
6292

Anderson W.
5602

Ando K.
4325

Ando S.
5068

Ando T.
4653
5073

Andonova R.
5114
6153

Andrade M.
5489

Andreenko A.
4782
4789
5143

Andreeva A.
5207

Andreia Puga
4511

Andriyavska N.
4958

Andriyevska N.
4952

Anesthesia and Cognitive Function Study Group
5608
5617

Anesthesia and Intensive Care Department
4491

Angeles Fite G.
5553

Angeles G. S.
5466

Angjushev D.
6044

Ankay Yılbaş A.
5595

Antonelli P.
5989

Antonini R.
5544

Antunes H.
5543

Antunes M.
6303
6334

Antunes R.
4863

Ao H.
6056

Aoki Y.
4905

Aoragh A.
4744

Apeinane E.
6219

Apine M.
5985

Aponte-Gatica J. F.
5661
5767

Aptekman B.
4474

Aquino E.
6286

Aracil Escoda N.
5622

Aracil N.
5533

Aragonés L.
6265

Aragones Quintanero L.
6157

Aragonés Quintanero L.
4795
5195

Arai C.
5109

Arana E.
6149
6175

Arasu A. D.
4622

Araujo Lopes Junior L.
6058
6091

Araújo Lopes Júnior L.
6099

Araújo R.
6064

Araz C.
6039

Arboleda Salazar R.
5571

Arbones Aran E.
4614

Arcanjo F. S.
5665
5686

Ardant E.
4485

Arellano Pulido M.
6015

Arellano Pulido R.
6015

Arenas E.
5565

Arespacochaga G.
4551
4595
4857

Arespacochaga Ramos G.
6025

Argente M. P.
5821

Argente Navarro P.
5829
6224

Argente P.
5760

Arleth T.
6011

Armelles E.
4701
4913
6033

Arnal Velasco D.
5871

Arnalich A.
5455
6032

Arnalich Montiel A.
6034

Arnalich-Montiel A.
5926

Arnaoutoglou E.
5401
5405
5474
6231
5469

Aronov M.
6113
6147

Arroyo R.
5929

Arroyo Rubio J. J.
6161
6395

Arsentiev L.
4782

Arslantas M. K.
5723

Arteaga F.
4621

Arteaga Galich F.
4816

Arteche Lopez A.
5111

Artemenko V.
4558

Artigas Soler A.
5913

Asani E.
6082

Asbert R.
5506

Asbert Sagasti R.
6085

Aschkenasy G.
5528

Ashikari E.
4431

Ashmawi H.
5352

Assaker R.
4979

Asseiro M.
4484

Assunção J. P.
4458

Assunção P.
5601

Asteri T.
4438

Aston D.
5659

ATAM - Advanced Techniques in Airway Management
5984

Atanasova A.
6153

Athanasiou P.
4398

Atıcı S.
6235

Atmosoerodjo S. D.
5381
6198

Attard Cortis P.
5928

Au Yong P. S. A.
5298
5336

Aubin H.
4461

Audibert G.
5129
5727

Auinger D.
6251

Aun A.
4769

Aurilio C.
5214
5422
5464

Auyong A.
5104

Avetisian V.
6159

Avni N.
4910

Ayanoglu H. O.
5723

Aydas A. D.
5477

Aydin G.
5265

Aykaç Z.
5343

Aykaç Z. Z.
5291

Aykut A.
5757

Ayyaz H.
4967

Aze C.
5267

Azevedo A.
5651

Azevedo J.
4577

Azizoglu M.
6235

Aznar de Legarra M.
5592

Aznar P. T.
5440
6002
6020

Baba H.
4544
4899

Babasiz T.
5397

Baca Pose B.
6172
6196

Bachero A.
5204

Bachmann K.
5053
5086

Badenes R.
5072

Bader A.
5016

Badr E.
5798

Badrinath M.
5662

Bae G. H.
4574

Bae H. B.
5042
5233

Baek J.
5839

Baekgaard J. S.
5858

Baeza L.
5483
5565

Bafort V.
4978

Baggott M.
4463

Bagntasarian S.
5446

Bahcecitapar M.
4746

Bai S.
5748

Bai S. J.
5720

Baidya D. K.
6405

Bairaktari A.
5639
5840

Bajaj M.
4741

Bakan S.
4924

Baladrón González V.
5134
5147
5169
6161

Balandina E.
5390

Balaško A.
6178

Balbino M.
4245
5243

Balcan A.
4934
5213
5672

Balcı E.
4746
5757
5841

Baldó Gosálvez J.
6277

Bali M.
4744

Balintova Z.
4641

Baltruskeviciute L.
5052

Baluja González M. A.
6202

Balust J.
4718

Bandic Pavlovic D.
5780

Bangash M.
4705

Banicevic-Ceric A.
6319

Banney A.
5417

Baptista C. R.
6035

Baptista D.
6390

Bar S.
4849

Barber K.
5251

Barbosa C.
4660
5843

Barbosa H.
6021
6181

Barbosa R.
4875

Barbosa T.
5221
5544

Bareka M.
5405

Barends C.
5384

Barley M.
5300

Barnett S.
6298

Barquero M.
5157
5620

Barrachina B.
5669

Barragán L.
4822

Barranco Benito M.
5993

Barrio I. M.
6032

Barrio Perez I. M.
5456
5910

Barrio-Perez M.
5926

Barros F.
6064

Barros I.
6191

Barros M.
6135

Basaran B.
5404
5813

Bash L.
5741

Basora M.
5325

Bassas E.
4731
4736
5511

Bastos C.
6326

Batalla A.
6292

Bataller A.
6003

Bauer C.
4617

Baulig W.
4567

Bausili Ribera M.
5649

Bayar Muluk N.
5265

Bayir T.
5404

Bayramov T.
5014

Baytaş V.
4767

Bayülgen A.
6235

Bazarov D.
4656

Becerra Bolaños A.
5210

Becerra Bolaños Á.
4796
5128
5170

Beck-Schimmer B.
5847
6043

Bedenic B.
5780

Beharic S.
6355

Bekkenes M.
5168

Bekker H.
6103

Bektas Y.
6220

Belba A.
4579

Belba G.
4579

Belba M.
4579
4982

Belda I.
5359
5466
5637

Belda J.
4559

Belitova M.
4890

Belkaid M.
5499

Bello Dias M. B.
6197
6213

Belmonte-Bayo L.
5454

Belo J.
4479

Beloeil H.
4684

Beltrán De Heredia S.
5145
5204
5349
5616

Beltran J.
4562

Beltrán S.
5808

Ben Jazia K.
6272

Benet Bertran P.
5082

Benet i Bertran P.
5785

Benette G.
4861

Benhassen K.
5083

Benitez Cano A.
5956

Benitez Gil L.
6281

Benítez-Cano A.
5524
6148

Benito A.
5506

Benito Anguita E.
5521

Benito Gómez A.
6085

Benlamkadem S.
5979

Benmeridja L.
4704

Bento C.
5576

Berbec M.
5772

Berdai M. A.
5979

Berdat P.
4567

Berends N.
4646

Berge R.
6010

Berge Ramos R.
5774

Berger M. M.
5133

Berger-Estilita J.
5148

Bermejo Albares L.
5919
5982

Bermejo L.
5312
6019

Bernardes De Oliveira R.
6193
6310

Bernardino A.
6263
6300

Bernardo J.
4875

Bernardo R.
6234

Bernat M. J.
5511

Berndt R.
5063

Berrevoet F.
4950
5107
5433

Berrill A.
4506

Berritta C.
4711

Berruga Corredor J. J.
6008

Berta T.
4478

Berzins A.
6187

Bespalov E.
5270

Bessmann E. L.
4604

Bettencourt A. R.
6329
6371

Bettencourt M.
6054

Bevilaqua C.
4396

Bezen O.
5496

Bezerra A.
5665

Bezerril Cipião Fernandes M.
6091

Bhardwaj M.
4721

Bhoi D.
6405

Bialka S.
5538
6074

Bialowolska K. A.
4973

Bianco A.
5225

Bianco J. C.
5540

Bicchi E.
5199

Bielka K.
4558

Bigalke S.
4996

Bijral S.
5662

Bilaj-Miraka M.
6270

Bilali P.
4374
4697
4831
5218
6173

Bilgili B.
5332

Bilgin H.
4714

Bilous A.
4952
4958

Bilskiene D.
4321

Binyamin Y.
4988

Biosca Perez E.
5155

Birbiçer H.
5711

Bisciaio A.
4943

Bisgaard Stæhr J.
4738

Bispo C.
6376

Bjelic D.
4372

Bjelić D.
6004

Blacker C.
4443

Blackwell J.
4390

Blandina Gomes
4511

Blasco Mariño R.
5965

Blasco R.
5629

Blasi A.
4718

Blasi Marques M. C.
5621

Blazquez E.
4512

Blazquez Martin J.
4805

Blobner M.
5078
6028

Bodson A.
5089

Boekestein K.
5582

Boichat C.
5083

Bojaxhi E.
5681

Bokkers R. P. H.
4545

Bolaños I.
6337

Bolaños Noguera I. D.
4867

Boliart De San Félix Y.
5206

Bolliger D.
5874

Bologa C.
5772

Bolón Villaverde A.
5045
6202
6230

Boncanoska Panovska S.
5624

Bonev M.
6003

Bongiovanni F.
5117

Bonilla López I.
6008

Bonnet J. F.
4639

Bonnier G.
4316

Bonofiglio F. C.
5851

Bonvini J. M.
6043

Boran E.
5931

Boran M.
5931

Borders J.
4418

Borges J.
5576

Borgmann S.
6222

Bornemann-Cimenti H.
6407

Borrás R.
5018

Borrat Frigola X.
4616

Borys M.
4375
5837

Bos A.
4572

Bos E.
4608
5864

Bosch D.
4636

Bosch L.
5145
5349

Boström L.
4348

Botos N.
5796

Boudjema K.
4485

Bougouin W.
6195
6225

Bourezg A.
4456

Boutros M.
5307

Bouzia A.
6231

Boveri H.
5185

Boyarkin A.
5390

Boyd M.
5562

Boyd-Carson H.
4391

Boyko M.
4378
4490

Boyraz G.
5014

Braga A.
5234

Braga E.
4402

Braghiroli K.
4799

Brahim A.
6272

Brain Oxygenation during Prehospital Anesthesia (BOPRA)
5275

Brandão J.
5963
5988

Brandão M. J.
5234

Branquinho P.
6234
6264

Brás A.
6021
6181

Brase A.
5416

Bratischev I.
4789

Braz L. G.
4769
4799

Braz M.
4769
4799

Brazzi L.
4943
4963
4976

Breitfeld P.
5322

Bresadola E.
5787

Brichant J. F.
4706
4974
5089

Brienza N.
5989

Brinkmann C.
6308

Brogly N.
4486
4523
4530
4719

Brotfain E.
4358
4379

Brouwer F.
4975

Broux V.
5305

Brown J.
5978

Brukhnou A.
5807

Brull R.
4858

Bruvere M.
5194

Brzezinski Sinai Y.
5559

Bu T.
4451

Bubb C.
5078

Bubulis D.
5052

Bueno Rey L.
5513

Buggy D.
4639

Buggy DJ.
4405

Buggy E.
4639

Buhre W. F.
6241

Buketov A.
4619

Bulat C.
4322

Bunte S.
4461

Bunyatyan A.
4656
4808
5921

Burgic A.
5836

Burgos Santamaría A.
5993
6009
6020

Burgos V.
5851

Buriticá Aguirre A. M.
5781

Buriticà Aguirre A. M.
6145

Burmuzoska M.
4586
6044
6082

Burton M.
5556

Buyuk S.
6124
6220

Büyük S.
5861

Buyukkocak U.
5265

Byun S.
4516

Caballero A.
5626

Caballero Garzon M. E.
5456

Caballero-Lozada A. F.
5826
5987

Cabral F.
6071

Cabral T.
5489

Cabrera M.
6265

Caccioppola A.
5526

Cadilha S.
6038
6049

Cadore Stefani L.
5789
6249
6372

Cagnazzi E.
5117

Cai L.
4520

Cakar K.
5163
5747

Cakar Turhan K. S.
5771

Çakir Çetin A.
5488

Calabrese G.
6192

Calarasu G.
4756

Calatzis A.
5501

Calderon Barajas Z. A.
4399

Calderón Barajas Z. A.
5571

Çalım M.
6336

Callebaut I.
4645
4646
5124

Callicó F.
5018

Callicó Ros F.
5866

Calmettes M.
4987

Calvache J. A.
5680

Calvano C.
4772

Calvo A.
4822
5312
5331
5359
5637
5995
6019

Calvo-Rey A.
4491

Camderman T.
5749

Camio E.
5315

Camoes P.
6156
6381

Camorcia M.
4711

Campana A.
5422

Campanholo A. B. S.
5735

Campbell R.
5593

Campello J.
5167

Campos C.
6014

Campos M.
6328

Campos-Pires R.
5920

Camps A.
4758

Canal Alonso M. I.
6032

Canal M. I.
5910

Canales Lara P. M.
5829

Canbay Ö.
5595
5816

Cancer and Anaesthesia (CAN) study group
5119

Candela A.
6333

Cang J.
4773
5523

Canquerini C.
5735

Cao Y.
6013

Capeto P.
6302

Capogna G.
4711

Caporusso R. R.
5955

Cappellini I.
6040

Cara Gilabert C.
6242

Caramelo S.
5963
5988

Carazo J.
5524

Carbonell J. A.
4559

Cardoso A.
4861

Cardoso G.
4954
6014

Cardoso H.
6295

Cardoso P. F. N.
5735

Cardozo Panoff M.
4758
4805
5965

Carette R.
5144

Carev M.
4322
4372
5897
5930
6004

Carles M.
5413

Carlidi G.
5139

Carlos R. V.
5024
5735

Carmello R.
6140

Carmo Pinheiro A.
5645
5650
5652

Carmona A.
4731

Carmona Blesa A.
4736

Carmona M.
4551
4595
5608
5617

Carmona P.
5760

Carmona Prieto M.
4565
5574
6025

Carneiro A.
4514
6183

Carneiro E.
5954
6369
6377

Carneiro S.
4954
5591

Carol F.
4550

Carp M.
5543
5628

Carpio López D.
4966

Carramiñana A.
5637

Carre X.
6400

Carreira C.
5009

Carrero Cardenal E.
5785

Carrero Cardenal E. J.
5082

Carrero E.
4874

Carretero Rollon E.
5456

Carrick L.
4391

Carrillo-Alfonso N.
4871
5439

Caruezo Rodríguez V.
5045

Carvajal Nuñez M. V.
6138

Carvalhas J.
4664

Carvalheiro Fagulha L.
6212

Carvalho A. F.
6259

Carvalho F.
6295

Carvalho J.
4660
5843

Carvalho V.
5234

Casal M.
4830
5879
6177
6327

Casazzo M.
5989

Case report of thoracopagus conjoined twins
4772

Castaldello M.
5904

Castedo J.
4954

Castel Gonzalez B.
4720

Castellar Cuesta T.
6395

Castellarnau S.
5599

Castellarnau Uriz S.
5442

Castelo Branco Chaves V.
6099

Castillejo-Pérez S.
5729
5736

Castro A.
6369
6377

Castro D.
6326

Castro J.
6061

Castro Lalin A.
4775

Castro M.
4592
4762

Catalán M.
5821

Catalca S.
5795
5857

Catanho Da Silva M. B.
4402

Catarina S Nunes
4511

Cattin L.
5787

Cavaco H.
4388

Cavalcante Passos S.
6249
6372

Cavalcante T.
5831

Cavaleiro C.
5452
6134

Ceballos Burbano M.
4749

Cebeci Z.
5813

Cebrián A.
5506

Cebrian Moreno A.
6085

Cedillo S.
5741

Celebioglu B.
5404

Celi S.
5633

Cenicante T.
4514
6376

Ceran A. C.
5861

Ceraolo E.
4943
4976

Cerniauskiene V.
4823

CET FMABC
6140

CET Hospital Felicio Rocho
6398

Chacon Sal R.
6261

Chae M.
4428

Chaichana K.
5681

CHAKMA A.
5778

Chalkias A.
5405
6231
5469

Chan C.
5392

Chang C. S.
5350

Chang E.
5658

Chang H. W.
4518

Chang J. H.
4561

Chang K. Y.
4412
4654
4677
4680
4790
4809
4929

Chang M. Y.
4790

Chang R.
4538

Chang S. S
5094

Chang W. K.
4790

Chang Y. W.
4725

Chao A.
5364

Charchyan E.
5968

Chardonnal L.
5779

Chatzakis C.
5373

Chau K. C.
5922

Chavan D.
5340
5346

Chaves J.
4863
6016

Che L.
5776

Chee M.
5886

Chee Y. R.
5365

Chelnick D.
6313

Chen C.
5033
5333

Chen D.
4457
5320

Chen E.
5333

Chen H. L.
5892

Chen J. S.
5673
5964

Chen J. Y.
4409
4515
4561
5699

Chen K.
4788

Chen L.
4730

Chen M. C.
5704

Chen S.
5090
5098
5263
5776

Chen W. H.
4784

Chen X.
5320
5420

Chen Y. C.
4561
4821

Chen Y. H.
4409
4678
4725

Chenard L.
5137

Cheng K. I.
5704
5881
5892
5944

Cheng Y.
4538

Cheng Y. J.
5673
5964

Cheng Z.
5743

Cherestes R. X.
5585
5884
6314

Chernova T. V.
5515

Chernyshuk S.
5742

Chervyakov I.
4609

Chew E. S.
4675
5252

Chi R. C.
4903
5237

Chiavari R.
5923

Chico García M.
4761

Chien W. C.
4535

Chiou C. S.
4929

Chiu H. C.
4678
4732

Chiumello D.
5526

Chiveli M. Á.
5760

Chloropoulou P.
5451

Chloropoulou P. P.
4448
6084

Chlorou D.
4872

Chlupova J.
5399

Cho A.
6031

Cho J. E.
5296

Cho S.
5718

Chocrón I.
5315

Choi J. H.
5039

Choi J. I.
5042
5233
5256

Choi S. H.
4688
5903

Choi Y.
5067

Choke E.
5922

Cholley B.
5779

Chong B.
5080

Chou T. L.
4732

Chou W. H.
4678

Choza De Juan C.
5513

Christensen R.
4659

Christodoulou K.
6417

Chu C. C.
4821

Chu Y. H.
4415

Chung A.
4570

Chung C. H.
4535

Chung J. Y.
5034

Chunwoo Y.
5040

Cicconi E.
5661

Cindea I.
4934
5213
5672

Cinnella G.
5339
5955

Cirer Cirer A. M.
5649

Cirkovic A.
4931

Claes M.
4645

Clausen N. G.
5762

Clave J. L.
5506

Clínica da Dor HUPE/ UERJ
5601

Clusella A.
5793

Cobilinschi C.
5772

Cocciolo F.
5594

Cody C.
5602

Coeckelenbergh S.
4990

Coelho M.
5628
6035
6054
6184
6327
6341

Coelho Ramos L. V.
4402

Cohen B.
5999
6075
6313

Cohen J.
5529

Cohn Reinoso C. M.
6172

Coimbra L.
6181

Coinus L.
5129

Colacio D.
6000
6099

Colella U.
5214

Coles I.
6223
6267
6352

Colet L.
6400

Collete S. L.
4545

Colnat-Coulbois S.
5727

Colomina Morales J.
5586

Colson P.
5779

Comino Trinidad O.
5812

Conde P.
5628
6087

Conde R.
6234
6264

Congo Silva C.
4749

Consales G.
6040

Consonni D.
5526

Cools E.
5607

Copik M.
5538
6074

Coppack S.
5178

Coppens M.
4869

Coppola S.
5526

Corcoy M.
6141

Cordeiro L.
5532

Corella Montoya F.
4365

Corman Dincer P.
5723

Coroa M.
6021
6181
6245

Correa Barrera J. J.
6009

Correa C.
5987

Correa V.
4772

Correia C.
5963

Correia De Barros F.
4511

Correia F.
6376

Correia L.
5879

Correia M.
6191

Cortés Guerrero M.
4399
4701
5571
5615
5949

Cortesão J.
4484

Cortez C.
5202

Cortez M.
6038
6049

Corubolo L.
5787

Costa A. I.
6369
6377

Costa Araújo B. K.
5189

Costa C.
6299

Costa D.
4577
6109
6132
6150
6162

Costa F.
5628

Costa G.
4592
4920

Costa J.
4660
5992
6016

Costa M.
6064

Costa V.
6259

Costea D.
4934
5213
5672

Coto C.
5483
5565

Cotoia A.
5339

Couto C.
6046

Cravero J.
5371

Crescenzi O.
5199

Crescioli E.
4738

Crespo E.
5626

Criado Camargo A.
4761

Crisóstomo J. N.
6376

Cruz A. R.
5591
6016
6073
6092
6106

Cruz A. R.
5976

Cruz P.
5331

Cruz Pardos P.
4759

Cuenca Tello S.
6277

Cuesta Cabezas T. C.
6161

Cueva L.
6292

Cuevas R.
5415
5514

Cuff G.
5415
5514

Cui D.
5677

Cui P.
5706

Čulo B.
4953

Cuñat López T.
5774

Cunha A.
6183

Cunha I.
4875

Cunha M.
6073
6092
6106

Cunha Ribeiro R.
6193

Cunha S.
4875

Cusack B.
4639

Cynthia Kassab M.D.
4517

Czobor N. R.
6037

Czuczwar M.
4375
5837

Czyzewska J.
4766
4925

D.Martinez De Castro Gil Mayo
5458

Da Costa Leite A. I.
6381

Da Silva Costa A.
6058
6091

Da Silva D. M.
4468
4469
4755

Da Silva Quesado J. L.
5313

Da Silva Ramos S.
4662
4664

Da Silva Rodrigues J.
5789

Dabrowski W.
5538

Dagtekin M. I.
4986

Dahan A.
5375

Dahlem C.
6035
6054
6107
6184

Dahmani S.
4979

Daiki M.
6386

Dalakakis J.
4872

Dalfino L.
5883

Damas A.
5603

Damasceno J.
5520

Damasceno M.
5601

Daminelli F.
5633

Danassi D.
4884
5880
5969

Danchyna T.
5019

Danilovich A.
5295

Dare O.
5159

Davidovitch R.
5415

Davies C.
5178

Davies R.
5562

D'Avolio A.
5904

De Andres Ibañez J.
5155

De Andrés Ibáñez J.
6008

De Andres J.
5151

De Armendi A.
4418

De Baerdemaeker L.
4869
4950
5107
5433

De Boer H. D.
4691
4825
4942
5024

De Brito Poveda V.
4380

De Broca B.
4849

De Carvalho C.
4468
4469
4755

De Frene B.
4704

De Groof P.
5569

De Hert S.
4950
4968
4978
5107
5421
5433
5752

De Jonge E.
4549

De Keizer N.
4549

De Korte J. D.
6241

De La Gala F.
6065

De La Quintana Jimenez B.
5111

de la Rosa Estadella M.
5913

De Miguel J. P.
5440
6065

De Nadal M.
4758
5756
5763

De Nardis L.
5464

De Oliveira Filho A.
5686

De Orange F. A.
4468
4469
4755

De Paula Tofani G.
6310

De Robertis E.
5199

de Roux Q.
6195
6225

De Vicente Martin M.
5111

De Wachter G.
5124

De Witt Hamer P.
4794

De Wolf A. A. M.
5144

Debarnot U.
4992

Debbag S.
5595

Decousser J. W.
6195
6225

Dedic Simendic L.
5317

Degott J.
4316

Degryse F.
5124

Deguchi H.
4899

Deineka I.
4814

Deiros C.
4731
4736

Deiros Garcia C.
6261

Deiros Garcia M. C.
5611

Del Cañizo J. F.
5993

Del Castillo Fernández T.
4759

Del Pozo D.
5589

Del Río M. E.
5460

Delgado Alonso M. C.
5128

Delgado-Baeza E.
5550

Della Selva A.
5139

Dell-Kuster S.
4841

Delta-Natrium
4549

Deluca D.
5185

Demir A.
5575

Demir G.
5198

Demir Z. A.
4746
5757
5820
5841

Demirdag C.
4924

Deng C.
4441

Deng Y.
5822

Denoyel L.
4987

Department of Anaesthesiology
4874

Department of Anaesthesiology and perioperative medicine and clinical surgery Mater Misericordiae university hospital, Dublin Ireland
4405

Department of Anaesthesiology, Hospital Clinic, Barcelona. Spain
6010

Department of Anesthesia and Intensive Care, Hospital del Mar, Barcelona
5524

Department of Anesthesiology and Intensive Care
4646

Department of Anesthesiology and Intensive Care, Jessa hospital, Hasselt, Belgium
4645

Department of Anesthesiology and Intensive Care, Jessa hospital, Hasselt, Belgium - Hasselt University, Hasselt, Belgium
5305

Department of Anesthesiology and Intensive Care, Jessa Hospital, Hasselt, Belgium; Hasselt University, Diepenbeek, Belgium
5124

Department of Anesthesiology, Faculty of Medicine, Prince of Songkla University, Thailand
4850

Department of Anesthesiology, Saitama Medical Center, Saitama Medical University
4897

Department of Neurosurgery Hospital Clinic, Barcelona, Spain
4874

Derbent A.
4642
4765
5366

Derwael R.
5124

Desai N.
4833

Desai P.
5120

Desmet M.
5899
5908

Desmond F.
5225
5251

Despotovski D.
6044

Devadze G.
4735
5207
6243

Devolder L.
4869

Di G.
5751

Di Serio F.
5883

Diagoupi I.
5639

Diakomi M.
5639
5840

Dias C.
5160
5603
6185

Dias J.
5788

Dias L.
5212

Dias R.
5537
6097
6134

Dias S.
4640

Diasamidze K.
5972

Díaz Balbas E.
6172

Díaz Gómez T. V.
5956

Díaz Jover R.
6125

Díaz Parada P.
4966

Díaz R.
6292

Diaz Viudes A.
6278

Díaz-Vieito Piélagos M.
5045

Díaz-Viudes A.
5729
5736

Dibin D.
5708
5770

Dickinson R.
5920

Díez Munar R.
5308

Dikmen Y.
4924

Dilik B.
6124

Dilip Thakar M.D.
4517

Diltoer M.
5588

Dimakopoulou A.
4735
5207
6243

Dimitriadou H.
5474

Dimitrova B.
5522

Dimitrovski A.
6086
6409

Diosdado A.
5524

Divjak L. P.
6346

Djurdjevic Svraka A.
4576

Dobbins R.
5375

Dobozinskas P.
6229

Docquier M. A.
4589

Dolbneva E.
4808
5166
5921

Doldán Pérez P. N.
5875

Doldán Pèrez P. N.
4491

Doleman B.
4390
4391

Dolmatov D.
4729

Dolmer H.
4768
5435

Domenech de la Lastra J.
5466

Domi R.
5077
6270

Dominguez A.
5793

Domínguez M.
4658

Dominguez M. X.
5661

Domínguez Varela M.
5875

Dominik P.
4641

Domino K.
5209
5864

Domokos D.
5948

Donev L.
5624
5918

Dong C. Y.
4810

Dongois E.
5607

Dor Y.
4877

Dostál P.
5164

Dostalova V.
5164

Doughmi D.
5979

Douma A.
4735

Dourado C.
6211

Dovysh N.
5295

Draisci G.
4740

Drame M.
5413

Drayton D. J.
6103

Driesens M.
5384

Dropulic N.
4372

Drost G.
5382

Drudis Morell R.
5586

Drudis R.
5589

Drummond R.
5234

Druzhina O.
5019

Druzhyna O.
5548

Dryn D.
5890

Du G.
4520

Duarte D.
6312

Duarte D. F.
4712
6107

Duarte Deprez L.
4974

Dubrov S.
4836

Duclos A.
4987

Duggan E.
4426

Dulfer S. E.
5382

Dumitrescu C.
4756

Dupuis A.
4349

Duque P.
5448
6194

Durán Aparicio M.
5993

Durán Luis Y.
5632

Durán-Aparicio M.
5521

Duranteau O.
4443

Durnev V.
5667
6086

Dutch Perioperative Allergy Center
4608

Dykes N.
5212

Dziadzko M.
4617

Dziuba D.
5655
5890

Ebrahimoff M.
5519

Echevarria C.
5051
5202

Echizen M.
4722

Efstathiou G.
4912

Eftekhar N.
6280

Egea Guerrero J. J.
6101
6114

Egi M.
4839
5056

Egol K.
5915

Egoz E.
6075

Eibel S.
4396

Eikermann M.
6298

Einav S.
4799

Eintrei C.
5066

Eiras Mariño M.
6230

Eizuka A.
4339

Eke C.
6315
5948
5758

Elaskri H.
6205
6288

Elbeih S.
5849

El-Boghdadly K.
4833

Elia N.
4960

Ellidokuz H.
4986

Eloy A.
4577
5532

Elsherbeeny M.
5798

Emergency Laparotomy Collaborative
4638

Enciso D.
4942

Endo S.
4778

Enev R.
4906

Engel D.
5086

Engl P.
4657

Englesakis M.
4858

Enlund M.
5119

Ennaas I.
6386

Enohumah K.
5935

Enomoto J.
4743

Epidurale Veiligheid (Epidural Safety)
5864

ERAS GYN ONCOLOGY Group - University of Texas MD Anderson Cancer Center
5978

ERAS LatAm Research and ERAS Centers of Excellence.
4942

ERAS Study Group Martini general Hospital Groningen
4691
4825

Erdem A. F.
5198

Ergil J.
5605
5795
5857

Erkin Y.
5769

Ermakova N.
4808

Ermolaev V.
4344

Erngaard L.
5762

Eroğlu A.
4618

Erol D.
5723

Errico G.
5955

Erthal L.
6063
6089

Escher C.
4414

Escher Imhof M.
4349

Escontrela B.
5800
6149
6175
6200

Escribano Subías P.
5949

Espejo S.
4731
4736

Espinosa J.
5442
5599

Espinosa-Marsiglia R.
5826

Essber H.
5999
6313

Establés Learte M.
4759

Establés M.
5910

Estebe J. P.
4990

Estèbe J. P.
4485

Estepa Calvo V.
5965

Esteves S.
4511
5879
5967
6097
6177

Estruch I.
4951
5027
5417

Etikcan K. T.
4767

Eunice M.
6300

Evans N.
4823

Ezugbaia B.
6159

Fabregas N.
4801

Fábregas N.
5833

Fàbregas N.
4737

Fabris M.
4322

Fagerland M.
5168

Falanga A.
5633

Falk W.
5066

Falvo P.
4707

Fan Y.
5658

Fang F.
4773
5523

Fang J.
6335

Fang X.
5693

Fanizza T.
5883

Fares K.
6205

Faria A.
4655
5936
6303
6334

Faria Lima L.
6071

Favre-Felix J.
4617

Fechner J.
4396

Feder O.
5415

Feigl G.
6251

Felipe Correoso M.
5649
6292

Félix F.
4954

Feng Y.
6119

Ferhi F.
6272

Ferjani M.
6205
6288

Fernandes A.
6038

Fernandes A. L.
6109
6132
6150
6162

Fernandes D.
4620
4945

Fernandes H.
5352
5651

Fernandes L.
4620
4945

Fernandes P.
4827
5645
5650
5652

Fernandez A.
5620

Fernandez Colorado A.
5157

Fernández Dorado F.
4761

Fernandez López A.
6138

Fernández Lorente J.
4759

Fernandez Riveira C.
5331

Fernandez Villarreal W.
5313

Fernández-Esmerats A.
5359

Fernandez-Lopez I.
5521
5993
6009
6022
6130

Fernández-López I.
5201

Fernandez-Riveira C.
4453
5910
6032

Fernando Abelha
4511

Fernanz J.
5511

Ferrando C.
4559
5460

Ferrara G.
5339

Ferrari C.
5989

Ferraroni A.
4949

Ferré M. S.
5011
5015
5016
5185

Ferreira A. J.
4875

Ferreira Albuquerque Costa N. T.
5308

Ferreira C.
5545
5631
5885

Ferreira Cavalcante S. L.
5189
6058

Ferreira P.
6211

Ferreira R.
6213

Ferreira T.
5352

Ferrer C.
5072

Ferrer P.
5821

Ferrero D.
4963

Ferrés A.
4737

Fervienza A.
5460
5833

Feu F.
5329

Ficarella M.
6192

Figar Gutierrez A.
4775
5011
5015
5016
5185
5851

Figar Gutiérrez A.
4816

Figueiredo D.
4769
5436

Figueiredo J.
5641
6183
6327
6341

Figueiredo K.
6063
6089

Figueiredo P.
4712
6326

Fileli A.
4697

Filetici N.
4740

Filinto Correia de Barros
4511

Filip C.
5546

Filipovic M.
4424

Filisina C.
5904

Fils J. F.
5013

Filyk O.
4487

Finetti C.
4707

Fino C.
5645
5650

Fiorot W.
4772

Firescu R.
6261

Fischer A.
4784

Fischer G.
6160

Fiszer E.
5519
5559

Flaczyk A.
5674

Flores Cajal B.
4800
5458

Fogagnolo A.
4707

Fonseca J.
5020
5702
5705
6240

Fonseca S.
6135
6328

Fontaine M.
4951

Fontanals M.
4512

Fonte A.
4712

Forkner I.
6325

Forne D.
5325

Fot E.
5873
5896

Fotopoulou G.
4884
5880
5969

Fraga G.
5867

Fraidenraij U.
4621
5015

Frank D.
4358
4378
4379
4490

Franks N.
5920

Franssen C.
4974

Franušić L.
5188

Frari H.
5352

Frassanito L.
4740

Freedman J.
4797

Freer M.
4463

Freire Aragón M. D.
6101
6114

Freitas L. S.
4861
4863

Freitas S.
6109
6132
6150
6162
6365

French M.
4834
5609

Freundlich A.
4432

Frias P.
5156
5489
5508
5576

Fritze L.
5063
5406

Frolov K.
5276

Fu C. H.
5364

Fu J.
4676

Fu P. H.
4561

Fucak Primc A.
6320

Fuenmayor M. L.
6237

Fuest K.
5078

Fujimura N.
5068
5109

Fujino Y.
4682
5250
5272
5362

Fujita Y.
4700
4845
5635

Fujiwara Y.
4700
4845
5635

Funcke S.
5719
6308

Furgiuele D.
5415

Furrer M. A.
5053
5086

Furtado I.
6329

Furue H.
4682

Furushima N.
5056

Furutani K.
4899

Fusco P.
5923

Gál J.
5948
4560
5758

Galan P.
5315

Galante D.
6059
6066
6083
6090
6100
6136

Galarioti V.
4912

Galatà M.
4976

Galeano Solís C.
5574

Galiana Ivars M.
5573

Gallart L.
5349

Galmén K.
4797

Galvão M.
5846

Galve Navarro S.
6012
6060

Galve S.
5763

Gama De Abreu M.
5282
5283
5945
6176

Gamberini E.
5594

Gampopoulou Z.
4524

Gan L.
5333

Gani H.
4982

Ganuza Martínez E.
5877

Gao H.
5776

Gao R.
5033
5333

Gao-Smith F.
4444

Garcia Alvarez J.
4614

Garcia Alvarez R.
4701
4913

García Álvarez R.
4754

Garcia Bernedo C. A.
5956

García C.
4530

Garcia C. A.
6148

García Domínguez M.
5180

García Fernández J.
4565
5574
6025
6349
6379

García Gutierrez A.
5571

Garcia I.
5682

García I. M.
4874
6010

García J.
4551
4595
4857

Garcia M.
5984

García M.
4874
5833

García Navia T.
4749

García Ortega R.
6265

García Pérez N.
5471

Garcia R.
6033

Garcia Ramos S.
6015

García Ramos S.
5201

Garcia Rojas I.
4616

García Rueda A.
4806

García S.
6022
6130

García-Cabo P.
5483

García-Cañas R.
5729
5736

García-Hernandez S.
4453

García-Hernández S.
5926

García-Martínez I.
4888

Garcia-Orellana M.
4737
4801

García-Pérez M. L.
5072

Garg A.
4823

Garrido Sánchez A.
6009

Garry E.
4405

Garutti I.
5995
6002

Garvey M.
4741

Gasulla A.
5157

Gasulla Rodríguez A.
5913

Gaszynski T.
5766

Gaur P.
4745

Gavrilov S.
4808
5921

Gavrilovska Brzanov A.
5581

Gavrilovska-Brzanov A.
4586
4753
5006
5572

Geerts L.
5560

Gelir I. K.
5310

Gelmanas A.
5486

Gencay I.
5265

Georgescu C. M.
5546

Georgiou K.
4735

Gerolouka-Kostopanagiotou G.
4912

Gestosa S.
4619

Geurtsen G. J.
4993

GEVAD
5622

Ghaddar Rivas L.
4759

Gheorghina V.
5213

Gherghina V.
4934
5672

Gholamian Ovejero S.
4764
4806

Ghotbizadeh F.
6280

Ghulam R.
5535

Giaccari L. G.
5214
5422

Giebl A.
5501

Gika A.
6417

Gil J. M.
4658

Gil L.
5511

Gil Sanchez J. M.
4949

Gil Sánchez J. M.
6125

Giladi Y.
5290

Gillott H.
5178

Gine M.
6292

Ginosar Y.
4988

Giralbo B.
5018

Giraldo A.
5687

Gisbert De La Cuadra L.
5871

Gisselbaek M.
4932

Gitti N.
6077

Giunta F.
4976

Giupponi A.
5633

Gjorcevska E.
4753

Gjorchevska E.
4586
5572
5918
6082

Gkiouliava A.
5373
5438
6201

Glazniece Kagane Z.
5049

Glen P.
5428

Glória A.
4712

Gloria Escobar S. D.
5781

Glumac S.
4322

Gn Y. M.
5104
5336

Goffin P.
4868

Gökcan M. K.
5861

Gokel E.
5859

Goldin I.
5872

Gomar C.
5329
5637

Gomar Sancho C.
5553
5774

Gomes A.
4931

Gomes B.
5976

Gomes da Costa J.
5843

Gomes Durão N. M.
4402

Gomes L.
6312

Gomes N.
5651

Gomes N. V.
4841

Gomes P.
4484

Gomes S.
5984

Gómez De Diego J. J.
5550

Gómez Felices A.
5592

Gómez J.
5987

Gomez L.
5329

Gomez Peñuela C. F.
6012

Gómez Pesquera E.
5376

Gomez Sánchez E.
5376

Gómez-López L.
6010

Gómez-Tarradas J.
5359

Gonçalves A.
5508

Gonçalves D.
5963
5988

Gonçalves Da Silva Leite A.
5189

Gonçalves J.
6223
6267
6352

Gonçalves N.
5009

Gonçalves V.
4830
5436
5452

Goncharova A.
5328

Gonen L.
4910

Gong D.
4441

González Benito E.
5919

Gonzalez Carranza J. E.
5312
5331
6019

González Cibrián C. C.
4800

González Del Pozo I.
6034
6047
6278

Gonzalez J. J.
4874

González M.
5455

González M. C.
5550
6034

Gonzalez Martinez S.
5611

González O.
4919

Gonzalez Paniagua C.
5877

González Pizarro P.
6349

Gonzàlez Tallada A.
5592

González Velasco R.
4685

Gonzalez-Cofrade M.
4701
4913
6033

Gonzalez-Suarez S.
4758
4805
5315

Gordillo I.
5683

Gordon C.
5970

Goren O.
5414

Goto S.
4431

Goto T.
4552
4585
4780
5200
5695
5739

Gottin L.
5787

Gottschling S.
5416

Goud M.
5694

Gouda D.
5694

Gouda P.
5694

Gouveia A.
5439

Gouveia B.
6006

Gouveia C.
6275

Gouveia I.
6223
6267
6352

Gouwy J.
5013

Govender P.
5659

Goyagi T.
4940

Gozal E.
4432

Gozal Y.
5872

Gozdzik W.
5138

Gracia I.
5325
5833

Gràcia J. A.
6010

Graessner M.
6028

Granados A.
5205

Grande Muñóz G. M.
6015

Granell Gil M.
5155

Grant S.
4916

Grape S.
4813

Grasa C.
5462

Grass A.
4432

Grasso S.
5883

Graverot M.
5083

Gravia E.
5207

Gredilla E.
4523

Greenman D.
5872

Gregoire H.
5129

Gregório M.
5020
5702
5705
6240

Gregory K.
5414

Greif R.
5097
5323
5737

Grenho B.
6329
6371

Griffin J.
4405

Grigoraki A.
6417

Grigoriadis S.
4727

Grigoriadou I.
6243

Grigoryev V.
4343

Grim C. C. A.
4549

Grinshpun J.
4490

Grisaro S.
5872

Grisaru-Granovsky S.
4432

Gritsan A.
4609
4610
5029
5295

Groen R. J. M.
5382

Groeneveld G. J.
5375

Groizard Botella M. J.
6212

Grousouzakou E.
4374
4697

Gruenbaum S.
5681

Grujicic D.
5581

Grupo de Investigación Anestesiología y Reanimación (INVANEST)
5987

Grupo de Investigación del Departamento de Anestesiologia del Hospital Universitario Clínica San Rafael
6337

Grützner S.
5501

Gu X.
5023
5232

Guadalupe Fernandez N.
4949

Guadrini L.
6077

Guanabara Teixeira Reis N. M.
6000

Guardabassi D.
5118

Guasch Arévalo E.
4486

Guasch E.
4523

Gubko A.
5328

Gudaityte J.
5563

Gude García C.
6202

Guenaga Vaqueiro O.
6261

Guerci P.
5137

Guereca Gala A.
5877

Guerra Lucena Matias Alencar L.
5189
6099

Guerrera F.
4943
4976

Gui C.
4686

Gui C. H.
5080

Guijarro Jorge R.
5155

Guillen R.
5462

Guilló Moreno V.
6349
6379

Guillot A.
4992

Guimarães J.
4655

Guimarães L.
5221

Guirao Montes Á.
5553

Gumus Demirbilek S.
5878

Gün I.
4792

Gunasekara D.
5577

Guntz E.
5013

Guo Y.
6013

Gupta A.
5066
5749

Gupta P.
4506
4570
5640

Gutiérrez A.
6125
6379

Gutierrez C.
6372

Gutiérrez Martínez A.
6349

Gutierrez R.
6200

Gutman R.
5167

GVAH
5622

H.Abdel-Wahab A.
4320

Habijanec B.
6165
6282

Habre W.
5607

Hadzilia S.
5773

Haegeman O.
4869

Haga A.
4470

Hahn R.
6216

Hahn R. G.
5326

Hai C.
5392

Haile S.
6043

Haiyun W.
5751

Hakim R.
4522
5487

Haldar R.
4421

Halis A.
5467

Hall D.
5288
5541
5562

Haller G.
4349

Hallet C.
4706
5089

Halpern S.
4727
4927

Ham S. Y.
4781

Hammer M.
6298

Hammond C.
6103

Han J. H.
5034

Han S. C.
5673

Han X. H.
5256

Hanai Y.
4894

Hannerz-Schmidtke E.
5149

Hanouz J. L.
5307

Hao R.
4773

Hara N.
5250

Harada S.
4937

Haraki T.
6029

Harana A.
6084

Harandou M.
5979

Harazim H.
5399

Harbut P.
4797

Haritha D.
4876

Harman F.
5343

Harrington J.
5288
5541
5562

Hartmann E.
4904

Hartmann J.
5788

Hartwich V.
5323

Hasan M.
5778

Hasanin A.
4670
5798
5849

Hascilowicz T.
5670

Hashimoto A.
4700
4845
5635

Hashiya M.
5703
5804

Hasselgren E.
5749

Hatasa C.
5544

Hatip E.
5709

Hauquiert B.
4921

Hauser B.
4560

Havaux M.
4591

Havrysh K.
5276

Hawkins M.
4829

Hearty C.
6301

Heeringa P.
4636

Heesen M.
4727
4927

Heesen P.
4927

Hei Z.
4553

Heiberg J.
4659

Heinzelmann M.
5847

Helmerhorst H.
4549

Helmy N.
5849

Helsloot D.
5908

Hendrickx J.
5238

Hendrickx J. F. A.
5144

Heng D.
5105

Henning R.
4542

Henningsson R.
5066

Henry M.
5582

Hens C.
5305

Heras Hernando V.
5871

Herireche M.
4330

Hermanides J.
4608
4993
5314

Hermans J.
4646

Hernandez Aguado C.
6172

Hernández Aguiar Y.
4796
5170

Hernández Laforet J.
6008

Hernandez Rodriguez J.
5210

Hernández-Alfaro F.
5756

Hernando D.
5442
5599

Hernando Vela B.
5632

Hernanz Rodríguez G. M.
5128
5170

Herrera Castro R.
5471

Hertling A.
5415
5514

Hertzberg D.
5749

Herut M.
6113
6147

Herzog M.
5945
6176

Hibi H.
5257

Hidaka K.
4644

Hidalgo F.
5642

Hidalgo Garcia I.
6015

Higashi M.
5722

Hight D.
5761

Higuero F.
4453
5440
5919
6002
6065

Hijazi Z.
4542

Hill M.
5582

Hino H.
4791

Hirata N.
5983

Hirose Y.
4909

Hitoshi S.
4780

Hitosugi T.
5284
5292

Ho C. N.
4561

Ho V.
5094

Hochman M.
4711

Hoff A.
6287

Hoffmann F.
6287

Hofmann G.
4316

Hohnen A.
6241

Hokka M.
4839

Hollmann M.
4608
5314
5864
5425

Homola L.
4605

Honcharenko H.
4826

Hopkins P.
4320

Horata E.
5815

Hori K.
4791

Hörmann C.
4657

Horosz B.
4973

Hortal J.
5440

Horvat A.
5356

Hostić V.
4953

Hotta N.
4893

Houle T.
6298

Houweling B. M.
4528

Howard S.
6103

Howell S. J.
6103

Howells P.
4741

Hramazdou D.
5807

Hrazdilova O.
5745

Hsieh Y. H.
5881

Hsu F. K.
4809

Hsu P. K.
5113

Hsu Y. H.
4895

Hu B.
4520

Hu X.
4489

Hu Y.
5677

Hu Z.
4422

Huang C. F.
5704

Huang C. H.
4317

Huang H. H.
4903
5237

Huang L.
4676

Huang Y.
5090
5098
5263

Huang Y. J.
4678

Hudelson P.
4932

Hudson E.
6301

Hugger S.
5097

Huh H.
5296

Huhle R.
5282
5283
5945
6176

Huhn R.
4459
4461

Humberto Machado
4511

Hummitzsch L.
5063
5406

Hung I. Y.
4821

Hung J.
5288

Hung M. H.
5962
5964

Hurren C.
4506

Hurtado P.
4737
4801

Hurtado-Palma L.
5454

Hussein A.
4455

Hussein K.
4426

Hussien R.
5259

Huti G.
5077
6270

Hwang K. Y.
5441

Hwang T.
5618

Hwang T. J.
5034

Hwang T. L.
5092

Iancu I. B.
5585
5884
6314

Ibanez C.
5637

Ibáñez C.
5460

Ibáñez Esteve C.
5553

Ibañez Lorente C.
4795
5195
6157

Ibañez P.
5462

Ibrahim M.
5887

Ibrahim N.
4320

Ida M.
4429

Ide Y.
58

Idei M.
5061

Ifraimov R.
5290

Igarashi T.
5267

Igea L.
5462

Iglesias Guitián R.
6157
6265

Ihara N.
5267

Ikeda M.
4648

Ikeda T.
4315
4778

Ikemoto N.
5075

Ilharreborde B.
4979

Ilieva Georgievska E.
4753

Imsirovic J.
6313

Inácio R.
4662
4664

İnal D. G.
5900

Inamura M.
5327

Ince I. E.
5900
4986

Infante C.
4592
4762
4920
6263

Íñiguez De Onzoño Pérez Á.
5829

Inoue M.
4902

Inoue S.
4429

INSPIRE 2 Group
4511

Interreg Italia Malta Mediwarn
5928

Ioannidis R.
4438
4448
6084

Iofin N.
5915

Iohom G.
4944

Ioscovich A.
4379
4432
4988
5290
5872

Isabel G.
4874

Isbell J.
6160

Ishibashi K.
4898

Ishida Y.
4587
5347

Ishii A.
5200

Ishikawa J.
5061

Ishutin V.
5029

Isono S.
4898
5044

Ito H.
4613

Ito T.
5670

Iturriagagoitia X.
5059

Ivanov E.
5750

Ivanova E.
5114

Ivanova V.
4345

Ivanyuk Z.
4958

Iwanaga K.
4315

Izgi M.
5404
5467

Izzi A.
5339

Jacas A.
5460

Jacas Coma A.
5774

Jack E.
5593

Jacob M.
4619

Jacquet L. M.
4573

Jäger C.
5874

Jagodzinska J.
6187

Jagtar Singh M.D.
4517

Jain S.
5215

Jakobsson J. G.
4797

Jakubow P.
4766

Jakubów P.
4925

Jalil H.
4645
5305

Janda D.
4657

Jandreska J.
5584

Jang H.
4556

Jang Y. E.
4896

Janicki P.
4564

Jankovska A.
5918

Jankuviene A.
5052

Jantarada C.
5221

Jarahyan E.
5560

Jaramillo Ochoa I.
4867

Jaremko I.
5486

Jarosz J.
5321

Jatuporn Pakpirom, MD
4850

Jauregui E. G.
4816

Jazokaite L.
5563

Jeanne G.
5013

Jee D.
5839

Jeha C.
4861
5234

Jeleva Z.
4890

Jensen H.
4659

Jeong M.
5852

Jeong S.
5042
5233
5725

Jeong S. W.
5725

Jessa hospital, Hasselt, Belgium
4646

Ji C.
4368

Ji S.
5057

Jiakai L.
4368

Jiang K.
5741

Jiang L.
4475

Jiang R.
4676
4730
4787

Jiang W.
5677

Jiang X. J.
4386

Jiménez Gil M. D. C.
4796

Jiménez Marrero P.
5210

Jimenez Y.
5499

Jiménez Y.
5793

Jimeno C.
5910
6032

Jimyeong J.
5040

Jin B.
5042
5233

Jin L.
4734
5392
5698

Jing H.
4679

João Marques A.
5789

Joensen O.
5529

Johannessen López M. V.
6224

Johannessen M. V.
5760

Joko R.
4700

Jongman R.
4636

Joo H.
5269

Joo H. J.
5644
5664

Jorgensen C.
4473

Jovanovski-Srceva M.
5572
6044

Jover Pinillos J. L.
6322

Joyce K.
4944

Ju J.
4574

Juanola A.
6003

Juanola Galceran A.
5740

Juanola Galcerán A.
5866

Juhl-Olesen P.
5435

Juhl-Olsen P.
4768

Julián González S.
5866

Julien Marsollier F.
4979

Jumić A.
6346
6282

Junca Marti S.
5620

Juncà S.
5157

Jung Docko A.
5621

Jung J.
4516

Jung K. T.
5121

Jung S.
5269
5644
5664

Jungwirth B.
5078

Jungwith B.
6028

Junxiang L.
5698

Juozapaviciene L.
6229

Justo Pavía P.
6224

Kabakov D.
4656

Kabiri Sacramento M.
5533

Kabriri Sacramento M.
5622

Kadosaki M.
4930

Kafalı H.
5496

Kagan G.
6075

Kagans A.
5049

Kahn D.
4921

Kaiser H.
5737
5761

Kaiser U.
4996

Kakemizu M.
4837

Kakinohana M.
4470

Kalagara R.
6405

Kalindidi R. V.
5887

Kalkman C.
5864

Kalogiannis E.
4884
5759
5765
5783
5880
5969

Kalopita K.
4398

Kalousek V.
4953

Kalsang T.
5778

Kaluza P.
5097
5737

Kamaraj R.
5662

Kamata M.
5426

Kamel A.
5798

Kamga Totouom H.
5307

Kamio T.
4629

Kamiya S.
5085
5646

Kamiya Y.
4899

Kamizato K.
4470

Kammura Y.
4648

Kamuf J.
4904

Kanai A.
5854

Kanamori H.
4700

Kanani S.
5300

Kanavos K.
4524

Kanbak M.
5567

Kanda H.
4355

Kaneko A.
5635

Kaneko T.
4897

Kang B.
4781

Kang D.
5725

Kang H.
5287
5853

Kang H. Y.
5618

Kao H. M.
4725

Kao M. C.
4371

Kapessidou P.
4744

Kapessidou Y.
5013

Kaplan G.
5559

Kapsokalyvas I.
5887

Karaaslan K.
6336

Karabak P.
5771

Karaca E.
5958

Karaca H.
5958

Karadağ Erkoç S.
5861

Karadeniz A.
5723

Karadeniz U.
5575

Karadeniz Ü.
5841

Karadjova D.
5750

Karadza V.
4507

Karadzova D.
5613

Karamarkovic A.
4578

Karanovic N.
4322
5897
5930
6004

Karanović N.
4372

Karaoğlan L. I.
4986

Karatas A.
6336

Karavaev A.
6330

Karbonskiene A.
5580

Kardum G.
4322

Kargerbauer S.
6028

Karlicka D.
5002
5577

Karmelic D.
6165
6346

Karmelić D.
6282

Karnjanawanichkul O.
4850

Karras G.
5451
5579

Kartalov A.
5657
5667

Kasemsiri C.
5177

Kashyap L.
4876

Katagiri M.
5327

Katancic J.
4507

Kataoka K.
4338
4837
4838

Katayama E.
5243

Katayama H.
5075

Kathy Landowsky CRNA
4517

Kato G.
5327

Kato S.
4898

Kato T.
4897

Katsakis Z.
5438

Katsanoulas K.
4374
4697
4831
5218
6173

Katsika E.
4374
4697
4831
5218
6173

Kaufmanis K.
5194

Kavochkin A.
4656

Kawagoe I.
4338

Kawaguchi M.
4315
4429
4778

Kawahito K.
4930

Kawakami H.
4780

Kawamata M.
5360

Kawasaki Y.
4897

Kaya D.
6039

Kaya E.
5827

Kaya G.
4971

Kazim Mirza D.O.
4517

Kazūne S.
5450

Ke B.
4441

Ke H. H.
5113

Ke Y.
4622
4686
4694
5080
5441

Ke Y. H.
5255

Kehlet H.
4473

Kemper T.
5314

Kendigelen P.
4971

Kendrisic M.
4423

Khader R.
4877

Khalifa C.
4546
4573

Khalikov A.
5943

Khanna P.
4876
4881

Kharenko Y.
6105
6142

Khartanovych M.
6105
6142

Kheylo A.
5973

Khizhnyak K.
6182

Kho Y. Y.
4675

Khrapak M.
4826

Khristoforov V.
4342

Khromacheva N.
5873

Khrykov G.
5943

Kiamiloglou B.
5451
5579

Kichigin V.
4341

Kida K.
4900

Kidd L.
6411

Kienbaum P.
4459

Kii N.
5946
6050

Kılıcaslan B.
5310
5014
5567

Kim B.
5644

Kim D. H.
5067

Kim E.
5253
5301

Kim H.
4518
4574
4726
5067
5301
5738

Kim H. C.
5296

Kim H. J.
5311

Kim H. K.
5253

Kim H. S.
4896

Kim H. Y.
5136

Kim J.
5269

Kim J. M.
5644
5664

Kim J. T.
4896

Kim K. H.
5269

Kim K. N.
4436

Kim K. S.
4324

Kim M.
5269

Kim M. W.
5692

Kim N.
5903

Kim S.
5852

Kim S. H.
4688
4689
5054
5121

Kim S. J.
5664

Kim S. O.
4776

Kim S. Y.
4436

Kim Y.
5057

Kim Y. H.
5396

Kim Y. J.
6383

Kim Y. K.
4324

Kim Y. O.
5256

Kim Y. S.
5738

Kimizuka M.
6050

Kimura S.
5073

Kindgen-Milles D.
4459

Kindler F.
5083
5413

Kindler U.
5083

Kinlay S.
5674

Kinoshita T.
4845

Kirkegaard E.
4768
5435

Kirov M.
4709
4967
5459
5494
5873
5896

Kirov M. Y.
5515

Kirves H.
5275

Kitamura Y.
4898

Kjaev I.
5750

Kjellqvist N.
4414

Klabusayova E.
4601
4605

Klaric V.
6178
6246

Klaschik S.
5397

Klein A. A.
5659

Klein M.
4358

Klem F.
5234

Klibus M.
6219

Klican-Jaic K.
5356

Klincova M.
5399

Klinker S. D.
5761

Kloeckner J.
5789

Klucka J.
4601
4605
4641

Klygunenko O.
5276
5355

Knapen A.
4573

Knaub S.
5981

Knežević P.
5805

Ko D. E.
4781

Ko E. J.
5116

Ko M.
4840

Ko Y. K.
5396

Kobayashi T.
4587

Kobzeva J.
5985

Kocayigit H.
5198

Koch T.
5282
5283

Kodaira A.
5347

Kodaka M.
4325

Kodra N.
4982

Koga M.
4552

Koh N.
5029

Kohl G.
4772

Koike M.
4843

Koishi W.
4339

Kokareva A.
6044

Kolaric N.
4507

Kolesnykov V.
5548

Kolesnykov V.
5019

Kolevinskaite S.
5052

Kolevska S.
5584

Kolganova K.
4952

Kolliopoulou G.
5639

Kollmann Camaiora A.
5149
5529

Kolonia K.
5401

Komatsu M. A.
5243

Komori M.
4325

Komuro T.
4629

Konda N.
4823

Kondo H.
5327

Kondo I.
4843

Kong C. Y.
5428

Kong M. H.
5057
5738

Konge L.
4604

Kongwattanakul K.
5177

Koning M. V.
4528

Konkoly-Thege B.
6037

Kontrimaviciute E.
5052

Koo Z. K.
5094

Kooij F.
4608

Kopa M.
4542

Koraki E.
5373
5438
5446
6201

Korchagin E.
5295

Korea University Guro Hospital, Department of anesthesiology and Pain Medicine
5057

Koren O.
4522
5487

Kori I.
4474

Korichi N.
5215

Korkmaz Toker M.
5878

Kornilov E.
6287

Korolkov O.
4609

Korotchcuk N.
5019

Korthoudt C.
4606

Korycińska-Krajmas O.
5957

Kosaka M.
4596

Kosaka Y.
5854

Kosciuczuk U.
4766
4925

Koshida T.
4644

Kosinova M.
4601
4605
5399

Kostic A.
4424

Kostov M.
6082

Kotak N.
4745

Kotake Y.
5400

Kotfis K.
4590

Kouda H.
4431

Kourounis G.
5428

Kouvelos G.
5401

Kovacevic P.
4576

Kovacevic T.
4576

Kovalev S.
5377

Koyama H.
4629

Koyama K.
4897

Kozera N.
5138

Koziakas I.
5969

Kramareva O.
4814

Krastiņa A.
5450

Kratochvil M.
4605

Kratocvhil M.
4641

Kravets O.
5355

Kreuzer M.
5761

Krievins D.
5194

Krishna A.
6419

Kristensen M. S.
4604

Krolo Videka H.
5356

Krstevska J.
5613

Kruzkhova I.
5981

Krycinska R.
5321

Kuandykov T.
6207

Kuchyn I.
4558
4728

Kuchynsk I.
4814

Küçük A. O.
4618

Küçükçotur Kokurcan E.
5567
5816

Kuizenga K.
6198

Kukralova L.
5164

Kulturoglu G.
5605

Kulturoglu M. O.
5605

Kumagai M.
4339

Kumano H.
4743

Kumar S.
4557

Kumaravel V.
5662

Kunikata M.
5739

Kuo I. T.
5060

Kuo P.
4538

Kuo P. H.
4783

Kuo T. C.
4389

Kuo T. J.
5350

Kuperman R.
4772

Kupiec A.
5138

Kurihara H.
4339

Kurisawa K.
4585

Kurnosov D.
5295

Kuroda M.
4596

Kuroki M.
4644

Kutnik P.
4375
5837

Kuts R.
4358
4378
4490

Kuvaki B.
5516
5859

Kuvvet Bilen M.
5709

Kuzkov V.
5494
5873

Kuzkov V. V.
5515

Kuzmanovska B.
5006
5657
5667

Kuzovlev A.
4789

Kuzucuoglu T.
5709

Kwon J. Y.
5067
5253

Kwon Y.
5514

Kyriakidis V.
4438

Kyryllova L.
5276

Labanca Delgado Perdigão R.
6058

Labbene I.
6205
6288
6386

Laboratory animal study: male Sprague Dawley rats
5920

Lacaba A.
4551
4595
4857

Lacaba Mazario A.
4565

Ladjinovic D.
4860

Laferla G.
5928

Lages N.
5631

Lagreca E.
6071

Lahlou A.
5979

Lai Y. M.
4794

Lakshminarayan S.
4463

Lal S.
5002
5493
5535
6188

Lalić L.
6346

Lalloo J.
4506

Lam D.
4944

Lam S.
4377

Lambevska N.
6082

Lambo M. S.
6059
6066
6083
6090
6100
6136

Lamote S.
5899

Lampadariou A.
4884
5880
5969

Lampiris G.
4448

Lança F.
4376
4388
4834

Landau R.
6382

Landesberg G.
4877

Langeron O.
6195
6225

Lang-Illievich K.
6407

Laou E.
6231

Lapa Teresa
4511

Lapage K.
5752

Lapin K.
5515

Lara A.
5642

Lara Jiménez A.
6042
6076
6242

Laranjinha I.
4863

Lareida M.
5323

Lares A.
4619
4871
5439

Larranaga L.
5929

Larrañaga L.
5808

Lasala J.
5978

Lassen M.
5858

Latkovskis G.
5194

Latronico N.
5117
6077

Latus S.
5322

Lau D. S.
4675

Lau Sean
4517

Laukkanen Nevala P.
5275

Laurens Acevedo L. M.
6012

Lauritzen D.
4659

Lavado J.
4352

Lavandhomme P.
6171

Lavrinenko N.
4729

Lazar O.
4756

Le Corre P.
4990

Leães Rodrigues A.
5789

Leal F.
6302

Lean L. L.
4362

Lebrun T.
5083
5413

Lecoq J. P.
4868

Lecumberri R.
5642

Lee A.
5556

Lee B. J.
4428

Lee B. W.
5037

Lee C.
4538

Lee C. W.
5364

Lee D.
5253
5301

Lee H. A.
4780

Lee H. G.
5042
5233
5256

Lee H. J.
5806
6383

Lee H. K.
5876

Lee I.
5057

Lee J.
5301

Lee J. H.
4556
4896

Lee J. W.
6383

Lee M. Y.
6096

Lee S.
4478
4574
5725

Lee S. Y.
5396

lee W.
5523

Lee W. T.
5067

Lee W. Y.
4574

Lehot J. J.
4617
4987

Leiderman M.
5282

Leiriao J.
5788

Leite A. I. D.
4662
4664

Leite A. I. D. C. L.
6156

Leite Neto G.
5665

Leite-Moreira A.
6236
6303
6334

Lema M.
4822

Lema Tome M.
5338

Lema Tomé M.
4759
5919
5982

Lemaire G.
4546
4573
4921

Lemos S C. D.
4380

Lemos Neto S.
5846

Lemos P.
5992

Lemos S.
6390

León Núñez M.
5458

Leonardi-Bee J.
4391

Leong A.
4810

Leong S.
5922

Lepot A.
4960

Leshi A.
5657
5918

Leung S.
6331

Leurcharusmee P.
4357

Levin I.
4474

Levstek M.
4399
5571

Levy N.
5559

Li C.
4858

Li M.
5033

Li Q.
4386
4457

Li T.
5822

Li V.
5377

Li W. O.
5924

Li X.
5368
5776
5824

Li Y.
4422
6013
5677

Li Y. T.
5962

Liang P.
4471

Liang X.
5091

Liang X. Q.
5924

Liang Z.
4773

Liangyuan L.
4368

Liao K. H.
4788
5658

Liao M. H.
4732

Liberal Sarnago P.
5379

Librizzi A.
6077

Lidziya M.
5807

Liedgens H.
4996

Lievens M.
4869

Liew G. H. C.
4622
5298

Liew L.
4362

Lilienthal S.
4784

Lilot M.
4617
4987
4992

Lim B. G.
5057
5738

Lim C. H.
5116

Lim E.
4810

Lim W. Y.
5080
5104

Lim Y.
4574

Lim Y. C.
5094

Lima Cavalcanti I.
4402

Lima De Morais L.
5645
5650
5652

Limón Granja Á.
4720

Lin B. C.
5658

lin C.
5420

Lin I.
4686

Lin K. J.
4677

Lin P. A.
4535

Lin P. C.
4678

Lin T. Y.
4895
5274
5398

Lin W. C.
5274

Lin W. T.
4674

Lin Y. T.
4515

Linchevsky O.
4814

Lind P.
4768

Lind P. C.
5435

Linke J.
4396

Lior Y.
6075
6113
6147

Liou J. Y.
5060
6096

Lippens N.
4588

Lirk P.
5864

Lisbona-Saez C.
4453

Lishchinskiy P.
4836

Liu C.
5091

Liu J.
4384
4422
4441
4676
4730
5033
5333
5797
6005

Liu J. H.
4725

Liu S. T.
5364

Liu X.
5706

Liu Y.
5023
5232
6119

Liu Y. C.
4680

Livingstone K.
4916

Liying Ren
5776

Llau J. V.
6277

Lleshi A.
6409

Lloret I Villas B.
5632
6196

Llukacaj A.
4982

Lochekhina E.
4967
5494

Lodaite S.
4321

Loer S.
4794

Löffel L. M.
5053
5086
5326

Loh K.
4959

Lois F.
4706
5089

Lojna K.
6165

Loke W.
5336

Lomakin M.
5708
5770

Lombardi N.
6192

Longrois D.
5779

Lopes L.
6295

Lopes M.
6109
6132
6150
6162

Lopez A.
5626

López A.
5466

Lopez E.
6033

Lopez Fernandez J.
5632
6172

López Herrero R.
5376

López J. M.
5483

Lopez Lopez E.
4701

López López E.
4754
4913

López M.
5760

López Medrano F.
4913

López Olaondo L.
6042
6076

Lopez Olid A.
5134
5147

López Olid A.
5169

López V.
5051
5202

Lopez-Baamonde M.
4616

López-Baamonde M.
5460
5553

Lopez-Muñoz B.
4917

López-Soberón E.
5729
5736

López-Torres López J.
5829

Lorne E.
4849

Lorsomradee S.
4357

Loseva A.
5708
5770

Loskutov O.
5019
5548
5890

Loskutova M.
5019

Lotfy M.
5259

Lotowska-Cwiklewska A.
4925

Lotowska-Cwiklewska A. M.
4766

Loução M. R.
6299

Louie C.
5681

Louizos A.
6417

Loupatty A.
4752

Lourenço A.
6236

Lourenço D.
6140

Lourenço S.
5885
5967
6046
6098

Lu C. C.
4415

Lu C. H.
4535

Lu C. W.
4895
5274
5398

Lu J.
4679

Lu Z.
5392

Luc A.
5129

Lucas Passos R.
6071
6193
6310

Lugarinho Monteiro T.
6156
6381

Luijendijk-De Bruin D.
4825

Luís M.
6365

Lukasevic K.
5486

Lund J.
4390
4391

Luque P.
4562

Lurati Buse G.
4461
5874

Lusardi A.
5526

Lutcenko M.
4609

Lychakov A.
5494

Ma Z.
5023
5232

Macas A.
4321
6229

Macedo I.
5702

Macedo Q.
5665

Machado A.
6061

Machado A. S.
6168

Machado H.
4669
5452
5879
6046
6177

Macheras G.
4524

Macholz F.
5133

Macía Abraham J.
4936

Madeira I.
6001

Madi A.
4912

Madrid Vázquez L.
4795
5195

Maeßen T.
4996

Magaldi M.
4562
5812

Magaldi Mendaña M.
5329
5774

Magas Vadlja J.
4507

Maggiani C.
5923

Magnuson A.
5066

Mahamid M.
4522

Maher Kamel M.
5849

Maheshwari K.
5999
6335

Mahoko G.
5577

Mahrous R.
4670

Maia N.
4886

Maitra S.
4881
6405

Maj-Bryła I.
5957

Maka E.
4560

Makarem J.
6280

Makarov A.
5534

Makarova N.
6335

Makoveev S.
4967
5494

Makrypodi M.
5207

Malbrain M.
5588

Maldera M.
6192

Maldonado A. F.
6073
6092
6106

Maldonado F.
5591
5976

Malec- Milewska M.
4973

Malengreaux C.
4706

Malenkova I.
5932
5952

Malenkova Y.
5940
5968

Malik Z.
5493

Malinovska-Nikolovska L.
4510

Maliwan Oofuvong, MD, PhD
4850

Malla M.
5904

Malm M.
6216

Malobabic D.
4423

Malviya D.
4557

Malysh I.
5548

Mamaja B.
4811
5049
5985

Mamdouh A.
5259

Mandell M.
4412

Mandras A.
5614

Mané Ruiz N.
4800

Maniatis C.
4735
6243

Mankute A.
6229

Mann C.
5832

Mannai Y.
6386

Manohara S.
5094

Manon C.
5607

Manrique Muñoz S.
5592
5965
6060

Manrique S.
4888
5629
5763

Mantilla Martinez I.
5338

Manzano A.
4551

Manzano Rodríguez A.
4565
5574

Mao G.
5999

Marc J.
4849

Marchetti M.
5633

Marco G.
5589

Marcos A.
6245

Marcu A.
4939

Marelj D.
4423

Marenchino R. G.
5540

Margalit N.
4910

Mariano F.
6398

Marin J.
5239

Marin Jimenez D.
4917

Marín Jiménez D.
5573

Marín Moya M.
6085

Marin Prado A.
5687

Marinangeli F.
5923

Marinho S.
5156
5508
5576

Marinov T.
4890

Markovska-Ristovski Z.
5584

Maroño Boedo M. J.
5877

Marqués Asín F. J.
6138

Marques C.
6049

Marques J.
6303
6334

Marques Ruivo E. F.
4619

Márquez Garrido G.
4764
4806
5867

Marquez Simoes C.
5831

Marsac L.
4979

Martí A.
5793

Martí I.
5499

Martín Jaramago J.
6277

Martín Orejas M.
5592

Martín Oropesa R.
5455
6278

Martín Pérez M. E.
6094
6139

Martín Serrano P.
6094
6139

Martín T.
4530

Martín Vizcaíno M. P.
5379

Martinez A.
5800
6175
6200

Martínez A.
5466
6149

Martinez Caridad J.
4551
4565
5574
6025

Martínez Catala D.
6224

Martínez D.
6065

Martinez F.
4550

Martinez- Galán Fernández L.
5169

Martínez García S.
4491

Martinez Gascueña D.
6002

Martinez Hurtado E.
5622

Martínez J.
4857
5157

Martinez Marivela T.
5615

Martinez Otero S.
4616

Martínez Pérez J. A.
6085

Martínez Pillado M.
4966

Martinez Plumed R. M.
5155

Martínez Rafael B.
5376

Martínez Ruiz A.
5877

Martinez Ruiz Alberto
5800

Martinez S.
4874
5929

Martínez Salgado A.
6230

Martinez V.
4684

Martínez Villar C.
5829

Martínez-Castro S.
5454

Martinez-Galan Fernandez L.
6395

Martinez-Galán Fernández L.
6161

Martínez-Galán Fernández L.
5134
5147

Martinez-García E.
4446

Martínez-Gazcueña D.
5440

Martinez-Hurtado E.
5533

Martinez-Palli G.
5325

Martinho J.
6184

Martinho L.
4514
5005

Martini J.
4918

Martinovic Z.
5780

Martins A.
4713
6021

Martins F.
6098

Martins I.
4592
4762

Martins M.
6021
6181

Maruniak S.
5548

Maruta T.
4644

Maruyama Y.
5360

Masdeu Castellvi J.
5611

Masdeu J.
4731
4736
5511
6261

Mases A.
5145
5204
5349
5616
6081

Masiá J.
5756

Masó Serra A.
5913

Masoodi A.
5655

Massart Q.
4706

Matayoshi S.
5243

Mateboer-Baving M.
4691

Mathis S.
4918

Mathivon S.
4456

Matias B.
5544

Matias F.
6156

Matic M.
4433

Matolinets N.
5561

Matos F.
4762
4886

Matot I.
5414
6075
6113
6147

Matreja P.
6188

Matsagkas M.
5401

Matsota P.
4912

Matsumoto M.
4743

Matsumoto R.
5347

Matsumoto Y.
4682

Matsushima E.
4722

Matsushita T.
5347

Matsuura F.
4778

Matsuura T.
4791

Matute Crespo M. M.
6212

Matute E.
4719

Mauermann E.
5059
5874

Maurya Y. P.
4557

Mavromattis E.
5759

Mavrommatis E.
5765
5783

Mayer D.
4479

Mazzinari G.
5821

Mc Loughlin S.
4942

Mcaleer K.
4829

Mcaleer S.
5556

Mcdonald J.
4390

Mcnulty D.
4705

Meco B. C.
6220

Medrano J.
5669

Medved K.
5188

Medvedeva L.
5932
5940
5952
5968
5973

Mega S.
4871

Meier J.
6291

Meiying Xu
5776

Mejía Kattah J. M.
4858

Melek A.
5310

Meler E.
5812

Melnyk M.
5890

Melnyk O.
5655

Melo A.
5984

Melo Teixeira Batista H.
5189

Melo W.
6071
6193
6310

Melone A.
5201
6022
6130

Memoria C.
5617

Mena G.
5978

Mendes Â.
5631

Mendes E.
4484
5009
6035
6054
6184
6263

Mendes J.
6197
6213

Méndez E.
5642

Méndez Martínez E.
6042
6076
6101
6114
6242

Mendia Conde E.
4800

Mendonça M.
4620
4945
6109
6132
6150
6162
6376

Mendoza Pintos M.
4966

Mendoza Sorrondegui J.
6042
6076
6242

Menegat M.
6063
6089

Menegatti F.
4869

Meneses F.
6398

Menezes M.
5832

Menshih N.
5328

Merino Fernández F. J.
4685

Merten A.
4949

Merten A. R.
5649

Mertes P. M.
5137

Mertsalov Sergey
4632

Mestres G.
5506

Mestres González G.
6085

Metha M.
4885

Metnitz P.
6251

Meurling L.
4414

Meybohm P.
6291

Meyer L.
5978

Mi W.
6119

Michalinos A.
5753

Michel Tactuk M.
4936

Michunovich L.
5918

Mičić S.
6320

Miclo M.
4849

Micunovic L.
5624

Midory Marques Monteiro R.
6140

Miestinger G.
4657

Miguel da Cunha A. S.
4615
6087

Mihaljevic S.
5780

Mihara T.
4552
4585
4780

Milakovic B.
5581

Milan Z.
4931

Milanez P.
5846

Milaras C.
4524

Milella L.
6192

Milene Silva
4511

Milevski A.
4510

Milheiro A.
6252

Milheiro A. S.
6276

Milicic B.
5614

Milisic Jasarevic I.
4507

Millard D.
5137

Min K. T.
5903

Min Su
5776

Miñana A.
4559

Mincer S.
5209

Ming Tian
5776

Mingon C.
5787

Miño-Bernal J.
5826

Mio Y.
5670

Miquel López A.
5471

Mirabella L.
5955

Miranda M.
5682
6329
6371

Mirón Alonso P.
4580
5960

Mirza K.
4517

Mishin G.
5972

Misiolek H.
5538
6074

Misir A.
5805

Missant C.
5899
5908

Misumi T.
5739

Mitaka C.
4338

Mitos G.
5373
6201

Mitsukov D.
5029

Mitsuma Y.
4899

Miyajima M.
4722

Miyamoto M.
4629

Miyashita T.
5200

Miyoshi H.
5085
5646
6029

Mizobuchi S.
4839
5055
5056

Mizutani T.
4909

Mladenova M.
4890

Mladenovic J.
4424

Mladic-Batinica I.
4953

Moço R.
5683
6036
6068

Moehnle P.
4536

Moerman A.
4968
4978
5752

Moestl S.
6287

Moguš M.
6165
6282

Mohamed F.
5981

Mohamed-Ali N.
5920

Moita J.
6183

Mojsova-Mijovska M.
4586
4753
5006
5572

Moleirinho C.
4352

Molero Díez Y. B.
4936

Molins G.
5756

Møller Ann M.
5432

Møller Morten H.
5432

Momeni M.
4546
4573
4589

Monedero P.
6333

Monedero Rodríguez P.
6242

Mongardon N.
6195
6225

Monge Cid E.
5919
5982

Monge E.
5312
6019

Monica P.
4817

Monleon B.
5072

Monnens J.
5406

Monsalve C.
4562

Monsalve X.
5315

Monteagudo L.
5462

Monteagudo Moreno L.
5379

Monteiro C.
4871
6054
6184

Montero López P.
6042
6076

Montero Matamala A.
5586
5775
6212

Montero Saiz O.
5195
6157

Montero Saiz Ó.
4795

Montes Perez A.
4614

Montiel Carbajo M.
4800

Montinaro F.
6040

Montoliu Torruella R.
4949
6125

Monyihan A.
4405

Moon B.
5127

Moon S.
4840

Moonen J.
4433

Moor P.
5556

Moragues I.
5018

Morais A.
4799

Morais I.
4713

Morais L.
4827

Moral Garcia M. V.
4949

Moral García M. V.
6125

Moralejo J.
4827

Morales E.
5608

Morales Herrera E.
5621

Morales Sarabria J.
5151

Moreira Feitosa Rodrigues F. H.
6099

Moreira J.
5992

Moreira S.
6286

Moreira Z.
5537
5885
5967

Moreno V.
6400

Moret E.
5499
5793

Moret Ferrón M. L.
4749

Moreti N.
5601

Morgenstern C.
5740

Morgenstern R.
5740

Morgese C.
4444

Mori A.
4653

Mori T.
4791

Morimoto Y.
5254

Morinello E.
5416

Morisaki H.
5267

Morishige A.
5739

Morishita J.
4743

Moro F.
4707

Morozumi K.
4894

Morrissey K.
4489

Mosforth V.
5582

Moss L.
5375

Mostafa M.
4584

Motkova L.
4641

Moura Alho A. R.
6140

Moura Cabral S.
4875

Moura F.
6295

Moyano P.
4621
5015

Mroczek T.
5321

Mrzljak A.
5188

MTEC
5322

Muay S.
4810

Mughal S.
4705

Muiño Palomar V.
5128

Mujkic L.
5317

Mulier H.
4704

Mulier J.
4606
5560

Mulier J. P.
4704

Müller C. S.
6241

Müller M.
5847

Muller W. D.
5381

Multani M.
4463

Mumphansha H.
5541

Munar Bauzá F.
6012

Munar F.
5629
5763

Munar-Bauzá F.
5965

Mungroop H.
5384

Muñoz Alameda L. E.
4795
5195
6157

Muñoz Burgués C.
6012

Muñoz Jimenez Á.
5521

Muñoz Rojas G.
4616

Mur Irizar M.
5775

Mur Irízar M.
5180

Mura Ondok M. J.
5883

Murali M.
5288
5541
5562

Muramatsu T.
5044

Murcia Sánchez E.
4701

Muriedas Alfonso F. D. J.
5574

Murniece S.
4811

Muro C.
5763

Muronzi G.
6188

Murphy L.
5159

Musaeva T.
4789

Mutagirov V.
6207

Muthukumaraswamy M.
5662

Muthukumaraswamy M. K.
5887

Mwansa S.
5288

Myoga Y.
5907

Na S.
5269
5664

Naas I.
6205
6288

Nachev G.
4906

Naco M.
4579
4982

Nadeem A.
5778

Nagata E.
5400

Nagore D.
6333

Nagy A.
6315
5948

Nagy Á.
5758

Nagy E.
4414

Nahtomi-Shick O.
4910

Naili A.
4330

Naito Y.
4429

Nakagawa M.
5061

Nakagomi S.
4544

Nakai Y.
5272

Nakajima T.
4587

Nakamura A.
5352

Nakamura R.
5085
5646
6029

Nakamura Y.
4629

Nakanishi T.
4497

Nakano R.
5068

Nakata S.
4930

Nakata Y.
4724

Nakatsuka H.
5400

Nakazawa K.
5347

Nana P.
5401

Nani F.
5352

Nani F. S.
5024

Napiórkowski T.
5957

Narasimha K.
4633

Narasimhan U.
5365

Narayanan N.
5002

Naseem S.
5778

Nastasovic T.
5581

Nastou M.
4438

Natanel D.
4378

National Taiwan University Hospital
4674

Naumovski F.
5657
5667
6086
6409

Navarro Casado R.
4913

Navarro Martínez J. A.
5573

Navarro Perez R.
5533

Navarro S.
5793

Navarro Suay R.
6047
6278

Navarro-Suay R.
5729
5736

Nave P.
5625

Naveira Castelo A.
5045

Ndirangu K.
5741

Neda B.
4906

Nedelkova I.
5918
6409

Neidhardt M.
5322

Nemoto A.
4940

Nepomuceno Barros L.
6091

Nesyn V.
5534

Nesyna S.
5534

Neto L.
6035

Neumann C.
5397

Neves I.
6234

Neves P.
6054

Nezha I.
4579

Ng S. Y.
5922

Nguyen L.
4418

Nicevska-Golubikj S.
4586

Nickel F.
4459

Nicolai Lohse
5432

Nicosia S.
5928

Nieuwenhuijs-Moeke G.
4542

Nieves Alonso J. M.
6094
6139

Niezen C.
4572

Niftaliyev S.
5343

Niimi N.
4838

Nikolakopoulou E.
4524

Nikopoulou A.
4872

Nikouli E.
5451
5579

Nir E. A.
5528

Nishihara T.
4462

Nishikawa K.
4791

Nishimura D.
5267

Nishiwaki K.
4653
5064
5073

Nitzschke R.
5719
6308

Nizovtsev N.
4709

Njuguna S. K.
5421

No H. J.
5067
5311

Nobre Muniz F.
6000

Nogueira S.
5936
5954
5990
6061
6135
6168

Nogueira Z.
6087

Noh C.
5396

Nomura T.
5061

Nomura Y.
5055

Norberg Å.
4414

Noronha B.
5148

Norseth J.
5168

Noske D.
4794

Novikov S.
5276

Novikova Anna
4632

Novo J.
6303
6324
6334

Novokreshchennykh V.
5029

Ntalouka M.
5401
5405
5474
6231
5469

Ntertsos N.
5474

Ntoka P.
5880

Numata K.
5360

Nunes C.
5452

Nunes C. S.
4511
5879
5992
6177

Nunes J.
4615

Nunes L.
6286

Nunes S.
4620

Nunez M.
5145

Nuñez M.
6148

Núñez M.
5616
6081

Núñez S.
4658

Nuno Fernandes
4511

Nurmi J.
5275

Obata N.
5055

Obukuni K.
5109

Ocampos Hernández M.
4365

Ochiai R.
4540
4544
4722
4894

Ochiai Y.
5075

Ocmen E.
5488
5859

Ocsovszky Z.
6037

Oğuz A. K.
5299

Oh D.
4840

Oh H. W.
6383

Oh J.
5127

Oh Y. J.
4689

Ohara R.
5703

Ohashi I.
5075

Ohnishi Y.
4893

Ohyama A.
58

Ojea Yañez R.
5308

Okada T.
5055

Okamoto H.
5854

Okuda M.
5257

Okumura S.
5068

Okur Kavak E.
5588

Olarte Luis J. T.
6118

Olea Vielba C.
4399

Olguner C.
5900

Olieman A. F.
4691

Olivas Dols M.
5151

Oliveira C.
5608
6184

Oliveira F.
6324

Oliveira I.
5489

Oliveira J.
4886

Oliveira M.
4655

Oliveira N.
6164

Oliveira S.
6302

Oliveira T.
4920

Olkinuora A.
5275

Olthof K.
6198

Omer M.
5144

Onat M.
4659

Öncü K.
4618
4980

Ong B. C.
5922

Ong S.
5886

Ong S. G.
4810

Onishi M.
4909

Ontanilla López A.
6138

Oofuvong M.
4850

Ophir M.
5414

Orarat Karnjanawanichkul, MD
4850

Orbach - Zinger S.
4988

Orbach-Zinger S.
4727
4927
5290

Orechova E.
4742

Orechova Ekaterina
4632

Oreshnikov A.
4340
4341
4342
4343
4344
4345

Oreshnikov E.
4340
4341
4342
4343
4344
4345

Oreshnikova S.
4340
4341
4342
4343
4344
4345

Orhon Ergün M.
5291
5332

Orieta D.
6281

Orlob S.
6251

Orozco A. C.
5867

Orozco Vinasco A.
4685
4764

Orozco Vinasco A. C.
4806

Ortega Abad A.
5775
6145

Ortiz Martín I.
5379

Ortscheid L.
4744

Orvalho C.
6185

Ory J. P.
5305

Oshiro A.
4355

Osinova D.
5148

Osman M.
5798

Osorio Salazar E.
5180
5781
6145

Østergaard D.
4604

Ota T.
4629

Otake H.
4724

Otani S.
4900

Otemachi Hospital--Fukuoka
4355

Otero Castro F. P.
5875
5960

Otero Gómez P.
5875
6202
6230

Ottoboni A.
5831

Ou W.
5822

Ouattara A.
5779

Ovezov A.
5069

Ozaki M.
4431

Ozay H.
4746

Ozaydın S.
5815

Özbebek Ş.
5366

Ozbilgin S.
5516

Özbilgin Ş.
4986

Ozcelik M.
5771

Özçelik M.
4767

Özdemir L.
5711
6235

Ozdemir M.
5769
5859

Ozdilek A.
4924

Ozgok A.
4746
5820

Özgök A.
5841

Özkan B. G.
5488

Ozkan S.
5815

Ozmumcu E. A.
5496

Ozoliņa A.
5049
5985

Ozturk A. C.
4792

Özturk E.
5605

Öztürk N.
5343

Pabon I.
5139

Paccaud P.
4589

Pace M. C.
5214
5422
5464

Pack J.
5659

Padrón Ruiz O. M.
5170
5210

Paevanovska Petrush A.
5006

Pagotto V.
4621

Pain and regional anaesthesia committee
4684

Paiva A.
5156
5508

Paixão Rodrigues L.
4977
6058

Pakpirom J.
4850

Palacio Abizanda F.
5919

Palacio F.
6019

Palacios M.
5796

Palaczynski P.
6074

Palamidessi Domínguez J.
4565
6025

Palamidessi J.
4595
4857

Palazzo M. A.
5594

Paleari A.
6281

Palha A.
5520
5545

Pallardó López M. Á.
6008

Pallavicini J.
4804

Palumbo M.
6212

Pamuk A. G.
5310

Pan Q.
4451

Panadero Del Olmo L.
5871

Panadès M.
5589

Pandin P. C. A.
4951
5027
5417

Panichakul K.
5110

Panoska A.
5624

Pantazopoulos C.
4884
5880
5969

Panteleou K.
4831
5218
6173

Panteliou E.
5178

Papa A.
6270

Papadima A.
6417

Papadopoulou E.
5474

Papaioannou A.
5438

Papamichail K.
5753

Papaspyrou D.
5405

Parada Alvarez M. F.
4867

Parczany K.
5063

Pardines Rico S.
4917
5573

Pardo Rodríguez Á. E.
5471

Park H. S.
6383

Park J.
4776

Park J. B.
4896

Park J. C.
5037

Park J. I.
5853

Park J. S.
4518

Park S.
5136
5738

Park S. G.
5039

Park S. H.
4491
4580
5045
5960
6202
6230
5296

Park Y. H.
5039
5287

Paromov K.
4709
5459

Parra M. J.
4559

Parrilla L.
4658

Parvais M.
5027

Pascual Arellano M.
4888

Pascual C.
5760

Pasechnik I.
5943

Paseiro G.
6237

Pasero D.
4963

Pasko V.
4808

Passavanti M. B.
5422
5464

Patel J. M.
4444

Patel S.
5120

Patlazhan G.
4728

Pato R.
5641
6275

Patten S.
5920

Patuleia D.
5609

Paulino A.
4883
5625
6264

Paunovic Z.
5614

Pavelić G.
6320

Pavičić Šarić J.
5188

Pavlidis M.
4398

Pavlík P.
5745

Pavlovski B.
5613

Paykush V.
4952
4958

Pazó L.
5455

Pazó Sayós L.
6034

Pazó-Sayós L.
5550
5926

Peci J.
6270

Pécora F. S. T.
5024

Pedoto A.
4885

Pedrosa E.
6324

Pedrotti D.
6059
6066
6083
6090
6100
6136

Peduto V. A.
5199

Peixer I.
5005

Peixoto A. R.
6328

Peixoto C.
4713

Pekrul I.
4536
5501

Pellegrini M.
5149

Peña D.
5802

Penedos C.
5520
5545

Peng L.
5743

Peng T. C.
4371

Peralta C. F. A.
5024

Perdomo J.
5833

Perdomo J. M.
5329

Perdomo Linares J. M.
5553

Perea Fernández M. S.
5982

Pereira A.
4945
6203
6262

Pereira A. I.
4620
5984

Pereira C.
4458
4830

Pereira De Alencar Araripe P.
4977

Pereira E.
5988

Pereira I.
5625

Pereira M.
5436
5976

Pereira R. I.
4861

Pereira Sandra
4511

Pereira T.
4883

Pereira V.
6329
6371

Perello Cerdà L.
5047

Perera R.
4888

Perez A.
6002

Pérez Á.
6065

Pérez A. I.
5462

Pérez C.
5483
5565

Perez D.
5448
6194

Pérez Guerrero J. A.
6101
6114

Pérez Hernández A. I
5379

Perez Ramirez Á.
5338

Pérez Requena A.
5180

Pérez Sancho E.
6224

Pérez Solaz A.
4720

Perioperative Medicine Research Group
5821

Peris F.
4372
5897
5930
6004

Perosanz Silvo C.
4754

Pesic M.
5356

Pessoa Neto A.
5686

Pestana C.
6197

Pestaña Lag
5458

Peters N.
4752

Petersen P.
4473

Petrini G.
5155

Petrova Anna
4632

Petrovic S.
5594

Petruseva A.
4753

Petrusheva A.
4586
5572

Peyton P.
5238

Pezikoglou I.
4872

Pfister O.
5874

Piacherski V.
5807

Pichon I.
5607

Pidhirnyi Y.
4487

Pietroski Dos Santos N.
6140

Pikulska A.
4590

Pimenta K.
6390

Pimentel I.
6213

Pınarlı F.
5795
5857

Piñeiro P
5448
6002

Pineschi G.
5167
5846

Ping F.
6013

Pinheiro A.
4827

Pinho C.
6135
6328

Pinho-Oliveira Vitor
4511

Pinn F.
5831

Pinnschmidt H. O.
5719
6308

Pinto A. M.
4712
6107
6299
6312
6326

Pinto C.
4660
5843

Pinzón Lozano L. J.
6118

Pires Asseiro M.
6263
6300

Pires Chakkour H.
5621

Pires M.
4388

Pires M. A.
5990

Pires R.
6376

Pirinc Sasioglu G.
4971

Pistiolas G.
5373
6201

Pitcher B.
5978

Pitoni S.
4740

Piva S.
5904
6077

Pivac V.
6004

Piwowarczyk P.
4375
5837

Pizarro Calderón A. G.
6020

Pla Bosch J.
6012

Pla Escriva G.
5632
6196

Planas Roca A.
6094
6139

Plasschaert S.
5899

Plaza A.
5626
5812

Plaza Valiente C.
5649

Plechysta Y.
4393
4395

Ploshchenko Y.
5276

Plotkin Y.
4784

Poelaert J.
4433

Pogatzki-Zahn E.
4996

Polanco Suriel F. A.
5471

Polat R.
5857

Polutak A.
4841

Pominalnaya V.
5270

Poomsawat S.
5110

Popescu M.
4939

Popescu R.
4934
5213
5672

Porta L.
5139

Porteiro Mariño L.
6060

Portela I.
4619
4883

Porto D.
4799

Poskus T.
5052

Posner K.
5209
5864

Posthuma L. M.
5425

Pota V.
5422
5464

Pourzitaki C.
4872

Pouwer A.
4975

Poves Álvarez R.
5376

Povoa P. G.
5735

Povsic Cevra Z.
6246

Povšić-Čevra Z.
6178

Pozzi T.
5526

Praciano A. M.
6091

Prada J.
6337

Prada-Hervella G.
4491

Pradhan U.
4850

Prados Martínez M.
5210

Pratas A.
5645
5650
5652

Prause G.
6251

Prawannoa K.
5177

Preckel B.
4993
5314
5425

Probst S.
4396

PRODIGY
4843

Proença M.
4316

Protasiewicz M.
5138

Pu H. H.
4903
5237

Pua Y. H.
5252

Puertas J.
4719

Pueyo Periz E. M.
5611

Puig-Ramos A.
5926

Pujol E.
5511

Pujol G.
4737

Pulmonary Engineering Group Dresden
5282
5283

Pultrum B. B.
4691

Pushkin A.
5390

Putzer G.
4918

Pyeon T.
5725

Qiu F.
5797

Qiu Y.
4676
6331

Quesada Carrascosa M.
5151

Quiney N.
4638

Quiñones-Hinojosa A.
5681

Quintana B.
5455
6032

Quintana Villamandos B.
5456

Quintana-Villamandos B.
5521
5550
5910
5926
5993
6009
6034

Quintao V.
5608
5617

Quintas D.
5665

Quintela O.
6130

Raatiniemi L.
5275

Rábago G.
5642

Rabkin V.
6113
6147

Radovanovic D.
4860

Radwan T.
4584

Rahimi P.
4714

Raimondo P.
6192

Rajaleelan W.
4513

Rajpert K.
5957

Rakanovic D.
6319

Ramadan R.
5674

Ramanathan S.
4418

Ramirez C.
6003

Ramirez Herron S.
5802

Ramirez J.
5987

Ramirez P.
5978

Ramirez Paesano C.
5740
5866

Ramirez-Boix P.
5741

Ramis Bou T.
5082

Ramos Cerro S.
6278

Ramos De Castro R.
4685

Ramos Delgado I.
5956

Ramos I.
6148

Ramos Luengo A.
4764

Ramos Polo R.
6196

Ramos Riesgo T.
5521

Ramos S.
4920

Ramos Soto M.
5471

Ran X.
5283
6176

Ranalter M.
4918

Rancan L.
5995

Ranganath A.
5602

Rao K.
4931

Rasmussen L. S.
4604
5858
6011

Rasulo F.
5904
6077

Rasulo F. A.
5117

Ratenberry W.
5300

Rattanaarpa S.
5371

Rattanakosonsri T.
5110

Rattenberry W.
6260

Rattray A.
4922

Rauer Alcover F.
6277

Raviolo M.
4804

Ray B. R.
4876

Raynard Ortiz M.
5206

Real Navacerrada M. I.
5949

Real Valdés R.
5871

Rebelo C.
4458

Recasens L.
5204

Refaeli - awin E.
6075
6113
6147

Refaey K.
5681

Rehberg B.
4960

Rehberg- Klug B.
4456

Rehman W.
4405

Reinikainen K.
4633

Reinoso F.
5205

Reip W.
5322

Reis A.
4713

Reis A. T.
6068

Relvas F.
6275

Ren Y.
4787

Renaudier M.
6195
6225

Rene L.
6281

Réparaz Grávalos P.
5458

Resendes H.
5489
5508
5576

Resta R.
5199

Restall D.
4382

Rewers M.
4604

Rex S.
4588

Rey C.
6194

Rey González R.
5875

Reyes Escobar B.
4867

Reyes L.
4801

Reyes M. A.
6065

Reynvoet M.
5899

Rho J. H.
5034

Ribas Ball M.
5592

Ribas M.
5629

Ribas R.
5603

Ribeiro A. F.
5009

Ribeiro C. R. R. D.
6259
6276

Ribeiro J.
4376
4388

Ribeiro M.
6087

Ribeiro R.
5544

Ricart Hernéndez A.
6196

Richard S.
5129

Riedel T.
5737

Rimaitis M.
4321

Rimmele T.
4617

Rimmelé T.
4987
4992

Ripolles Melchor J.
5622

Ripollés-Melchor J.
4761
6237

Risberg E.
4443
5149

Risco R.
5325

Risgaard B.
5858

Risk M.
5851

Riva T.
5737

Rivas E.
6313
6331

Rivas N.
4718

Rivera Cogollos M. J.
5573

Rivera H.
5808

Rivera P.
5524

Rivet A.
5413

Rivoli A. L.
5167
5846
6063
6089

Rizal Bin Abdullah H.
5255

Roasio A.
4804

Roberto A.
4514
5005

Robles M.
5929

Robu C. B.
4589

Rocha T.
5641

Rocha V.
6299

Rockholt M.
4348

Ródenas F.
5499

Rodiera C.
5018

Rodiera J.
5740
6003

Rodiera Olivé J.
5866

Rodrigues A. M.
5990

Rodrigues Alves D.
6036

Rodrigues C.
5543

Rodrigues D.
5609

Rodrigues F.
4977
5156

Rodrigues G.
5976

Rodrigues I.
5160

Rodrigues J. T.
4713

Rodrigues M.
6185

Rodrigues Nascimento J. C.
6000
6091
6099

Rodrigues Nunes Filho R.
4977

Rodrigues Nunes R.
4977
5189
6000
6058

Rodriguez Arias J. J.
4616

Rordriguez C.
5632

Rodríguez C.
4486
6141

Rodriguez E.
6298

Rodriguez L.
6022

Rodríguez M.
5499

Rodriguez Maurell C.
6172
6196

Rodríguez Miranda C. D.
5802

Rodríguez Pérez A.
4796
5128
5170

Rodríguez Pérez A. E.
5210

Rodríguez Prieto M.
5649

Rodriguez Roca M. C.
4523

Rodríguez Roca M. C.
4486
5205

Rodríguez Rodríguez L.
5201

Rodriguez Tesouro A.
4758

Rodríguez U.
6081

Rodriguez Velasco G.
4800

Rodríguez-Martínez S.
5454

Rodríguez-Rodríguez P.
5550
6034

Roesberg M.
6071
6193
6310

Roges Robledo X.
5629
5965

Roloff Cardoso G.
6372

Román L.
5145
5616
6081
6141

Romano C.
6164
6252

Romanuk D.
4393

Romdhani C.
6205
6272
6288

Romera A.
4822

Romera Rabasa A.
5338

Romero Berrocal A.
6349
6379

Romero I.
6081
6141

Romero N.
5072

Romero Téllez J. D.
4720

Romont M.
5305

Ron Villalba Z.
5781
6145

Ronel I.
4474

Ronel R.
4474

Roofthooft E.
4588

Roriz D.
5963
5988

Rosboch G.
4976

Rosboch G. L.
4943

Rosenthal R.
4841

Rosinha D.
5532

Rosseland L. A.
5168

Rossi P. I.
4816

Roth G.
6037

Roth S.
4459
4461

Roth Z'Graggen B.
5847

Rottiers R.
4645

Roungeris L.
4912

Rousseau C.
4485

Rouxel P.
4684

Rouxinol-Dias A. L.
5917

Roy A.
5981

Rozner E.
4522
5487

Ruan X.
5776

Rubio Aguilera A. I.
4761

Rubio Baines Í.
6042
6076
6242

Rubio I.
5642

Rubio Murias P.
5982

Rudenko V.
4836

Rudin M.
4522
5487

Rudolph S. S.
6011

Rueda M.
5204
5616

Ruemmler R.
4904

Rugaan A.
4455

Rui G.
5392

Ruiz Cantador J.
5205

Ruiz De Castañeda M. D.
6161

Ruiz De Castañeda Zamora M. D.
6395

Ruiz De Las Heras J.
4399

Ruiz Velasquez E. J.
6400

Rumpold-Seitlinger G.
6407

Ruslan N.
5935

Russell D. A.
6103

Russo A.
5787

Russo E.
5594

Rutkovskiy Roman
4632

Ryan D.
5915

Rybka M.
5708
5770
5972

Rypulak E.
5837

Ryu C.
5039
5287

Rzecki Z.
5538

Sá A.
4669

Sá A. F.
5967
6098

Sa S.
6341

Saafan T.
5849

Saatli H. B.
5516

Saba G.
5617

Saban M.
5795
5857

Sabate S.
5599

Sabaté S.
5145
5204
5349
5442
5616

Sabelnikovs O.
6187
6219

Saçak B.
5291

Saduikyte B.
5563

Sadurní M.
6141

Saeki N.
5085
5646
6029

Saez C.
5157
5620

Saez Ruiz E.
5533

Saez-Ruiz E.
6237

Safak B.
6124

Saglam S.
5709

Sagün A.
6235

Sahin A. S.
5815
5827

Sahinovic M.
5478

Sahinovic M. M.
4545
5382

Said Criado I.
4966

Sailer M.
6407

Saini K.
4881

Sainz I.
5800

Sainz Mandiola Iñaki
5800

Saiti A.
4398

Sakaguchi K.
5257

Sakai N.
4425

Sakamaki D.
4905

Sakamoto N.
4540

Sakamoto S.
4497

Sakar M.
5291

Sala P.
6400

Sala-Blanch X.
6010

Salaroli C.
5633

Salas Rezola E.
4917

Salazar C.
5669

Salcedo M. L.
5051
5202

Salehi S.
5749

Salem A.
4584

Sales F.
5591
6016
6092

Sales F. I.
6073
6106

Salgado H.
5984

Salgado S. S.
5767

Salihoglu Z.
5815

Salihoğlu Z.
5827

Salomao L.
6390

Salvachúa Fernández R.
4365

Salvador Bravo M. J.
5379

Salvador Gozalbo L.
5151

Salvador S.
6001
6134
6340

Salzburg Mountain Medicine Research Group
5133

Samardziski I.
5613

Samerchua A.
4357

Sammarco R.
5139

Samoila B.
4934
5213

Sampaio C.
6303
6334

Samuel J.
4463
4829

San Luis Calo E.
4580

Sanahuja Blasco J. M.
4718

Sánchez C.
4857

Sánchez García A. M.
6101
6114

Sanchez Garcia S.
5775

Sánchez García S.
5180

Sánchez López A.
5829
6047

Sanchez M. E.
5629

Sanchez Merchante M.
5622

Sanchez N.
6337

Sánchez Pérez E.
5440

Sánchez Posada D.
6145

Sánchez Quirós B.
5376

Sánchez Royo E.
5206

Sanchez Royo M. E.
6060

Sanchez Salamero S.
5775
5781

Sanchez T.
6337

Sánchez Tabernero Á.
4936

Sanchez Villegas J. M.
5586

Sánchez Zamora P.
4685
4806

Sánchez-Martín C.
5454

Sanchez-Migallon Perez V.
6060

Sanchis Dux R.
4936

Sanchis Veryser C. A.
5151

Sandesc D.
5546

Sandhar T.
5662

Sanhá M.
6252

Sanjuan E.
4822

Sanjuan Lopez E.
5338

Sansone P.
5214
5464

Santana M.
5812

Santana Ortega L. M.
5128
5170

Santé Serna L.
5513

Santiago Almeida Coutinho R.
4977

Santiago B.
5601

Santos C.
5988
6398

Santos F.
6135
6328

Santos G.
6036

Santos I. A.
6177

Santos P.
5984

Santos S.
4484
4592
4762
4886
6263

Santos T.
5439

Sanz Iturbe M.
4512

Sanz M.
4822

Saponaro A.
5989

Saracoglu A.
5163
5343
5747
6030

Saraçoğlu A.
5291
5332

Saracoglu K. T.
5709
5958

Saracoglu T.
5477
6030

Saraiva A.
4615

Saraiva F.
6236

Saraiva L.
6035

Saraiva R.
4834
5160
5625
5992
6064

Saran A.
4721

Sardana R.
4721

Sareban M.
5133

Sargant N.
5981

Sarıcaoğlu F.
5595

Sarkele M.
6219

Sasakawa T.
5400

Sato A.
5695

Sato Campana C.
5621

Sato K.
5854

Sato M.
5703
5804

Sato N.
5061

Sato T.
4653

Sato Y.
4700
5337

Sato-Boku A.
5257

Satoh D.
4338

Satoh Y.
4315
4778

Satomoto M.
4544
4722
4894

Sattler B.
4657

Savchenko S.
4681

Savic L.
4320

Savic N.
5581

Savir S.
4358
4378

Savoldelli G. L.
4932

Savvina I.
4632
4729
4742

Sawada A.
5946

Sawamura S.
5447

Sawashita Y.
5983

Saxena S.
5013

Sazhyn D.
4728

Sazonov V.
4747

Scafuto A.
5214

Scarlatescu E.
4939

Schädler D.
4657

Schaefer M.
6298

Schäfer L.
5133

Schaller S.
5078

Scharffenberg M.
5282
5283
5945
6176

Scheeren T.
4572

Scheuermann S.
5659

Schicho K.
6407

Schick-Bengardt X.
5719

Schiefer L.
5133

Schippers F.
4396

Schiraldi R.
4486

Schizas D.
5753

Schlack W.
5314

Schlaefer A.
5322

Schläpfer M.
5847
6043

Schlatter S.
4992

Schmidt J.
6222

Schmidt M. T.
6043

Schneider G.
5761

Schneider S. O.
5416

Schober P.
4794

Schoettker P.
4316

Schofield N.
4931

Schöpe J.
5416

Schorer R.
4316

Schreiberova J.
5164

Schrier B.
4825

Schuh G.
6249

Schumann S.
6222

Schütt P.
4567

Schweizer T.
5097
5323

Schwiebert C.
5178

Sciberrras S.
5928

Scicluna J.
5928

Scuderi V.
5928

Seabra M.
4660

Sebelev K.
4729

Seeberger E.
5874

Seelen M.
4542

Segala V.
4804

Seier K.
6160

Seiki Mestre Okabayahi L.
6372

Seixas F.
5436
5452

Sekita A.
5854

Sekiya K.
4462

Sekiyama H.
5447

Sękowska A.
4973

Selcuk Sert G.
5575

Selçuk Sert G.
5841

Semenkova T.
4967

Sendino C.
6240

Seneviratne R.
4793

Seo H.
4428

Seong H.
5296

Sergin D.
4642
4765
5366

Sermeus L.
4868

Serra C.
5199

Serra S.
4640

Serrano A.
5072

Serrano H.
4758

Serrano M.
5620

Serrano Martín M.
5913

Serrano Zueras C.
6349
6379

Serviços Médicos de Anestesia Ltda - Hospital Sirio Libanês
5831

Sessler D.
5999

Sessler D. I.
6335

Settanni D.
4740

Shafizadeh E.
5788

Shang J.
6013

Shapeton A.
5674

Sharlai K.
6105
6142
6182

Shatalin D.
5290

Shatil B.
6325
6382

Shcherbak A.
5770

Shelton C.
5935

Shemer R.
4877

Shen Y. C.
5892
5944

Sher A.
6188

Sherwin A.
4639

Shetty A. N.
4745

Shevtsova G.
5932
5940
5952
5968
5973

Shiba H.
4521

Shiba S.
4815

Shibata S.
4587
5362

Shibata S. C.
5250
5272

Shibli K.
5215

Shifman E.
5069

Shih C. C.
4873

Shih K. C.
5350

Shih P. Y.
5962

Shime N.
6029

Shin C. S.
5644

Shinjoh E.
5109

Shinya S.
5064

Shirasaka T.
4644

Shirgoska B.
4510

Shirozu K.
4648

Shitrit A.
4432

Shkembi P.
4982

Shoeib H.
4320

Sholin I.
6159

Shosholcheva M.
5006

Shoszafirovaholcheva D.
5006

Sia I.
5080

Siddique Z.
6274
6301

Sierra P.
5442
5599

Sifaki F.
5373
5438
5446

Sijercic S.
5317

Silva A.
4458

Silva A. L.
4954

Silva A. P.
6014

Silva C.
6191

Silva De Paiva F. D.
6000

Silva E.
5020
5705
5831

Silva G. M.
5735

Silva Garcia J.
4399

Silva Gil L.
5866

Silva L.
5740
6003

Silva M.
4769
6006
6164
6211
6245
6252
6259
6276

Silva M. J. S.
4640
4655

Silva R.
5489
5508
5576

Silva R. P.
5917

Silva S.
6021

Silva V.
5651

Silva Villar L.
5111

Silveira C.
4772
6089

Sim E.
5104
5255

Sim E. Y.
4686
4694
5298

Sim S.
5396

Sim Y. E.
4675
5252
5336

Simao Esteves
4511

SIMCLINIC
5329
5637

SIMCLÍNIC
5553
5774

Simic D.
5614

Simón C.
5995

Šimunić-Forić A.
6178

Sinedino B. E.
5024

Singh A.
5694

Singh A. K.
4881

Singh M.
4858

Singh V.
5002
5577
5585
5884
6188
6314

Sipahi Çalış A.
4642

Sira Martinez C.
5456

Sirarat S.
5110

Sirisom M.
5177

Siryy V.
4952
4958

Sitbon P.
4684

Šitum I.
6165
6282

Sivevski A.
5572
5613

Sivevski A. S.
5750

Sivrioglu D.
6039

Skallerup Andersen A.
4738

Skalski J.
5321

Skandalou V.
4398

Skeledzija-Miskovic S.
4860

Skorokhod K.
5377

Skrisovska T.
4601
5399

Smailys A.
5486

Smetkin A.
5873

Smid-Nanninga H.
4691
4825

Smirnova V.
5029

Smolders J.
5569

Snachez Novas D.
4775

Sneyers Closa M.
5180

So K. Y.
5054
5121

Soares S.
6063

Sobczyk S.
5766

Sobot Novakovic S.
6319

Soehle M.
4811

Sofianou A.
5639
5840

SoFraSimS: Sociéte Francophone de Simulation en Santé
4987

Sola E.
4512

Solak S.
6124

Solanki S. L.
5120

Solberg O. G.
5168

Solchaga I.
5331
5455

Solchaga Sanchez I.
5456

Soldevilla Garcia M.
4614

Sole Guixes J.
5775

Solomon C.
5981

Solovjova J.
6219

Somerhausen L.
6171

Somjit M.
5177

Sommer Alias D`abate M. J.
5661

Song J.
5718

Song S.
5396
5852

Sonnino C.
4740

Soriano Cosculluela E.
5513

Soriano E.
5339

Soro M.
4559

Sorokina O.
5598

Sotero N.
4769

Soto Ejarque J. M.
5047

Sousa A.
5156

Sousa C.
5682

Sousa I.
4713

Sousa M.
5917

Souza Nani F.
5621

Sovalkova M. S.
5515

Soysal S.
5163
5747

Spáčilová H.
5745

Spadaro S.
4707

Spandole S.
5669

Spangenberg A.
5159

Spanish Perioperative Cardiac Surgery Research-Group
6333

Spannagl M.
4536
5501

Spasovski S.
5613
5750

Spicek-Macan J.
4507

Spinelli A.
5339

Spirovski Z.
6044

Spraider P.
4918

Sriswasdi P.
5371

Stachtari C.
5446
6201

Stahlschmidt A.
5789
6249
6372

Stamatakis E.
5773

Stamatopoulou M.
4438

Stamoulis K.
5405

Stamov V.
4808
5921

Stanciulescu E. L.
4817

Stang M. V.
4816
5540

Stankovic N.
5614

Stavridis S.
4753

Stefan M.
4939

Stefanini M.
5117

Stefanovic D.
5218
6173

Steinberg I.
4943
4963

Steiner L. A.
4841

Steinfath M.
5406

Stepanovs J.
5985

Stertsou E.
5469

Stessel B.
4645
4646
5124
5305

Stevanovic P.
4578

Stinga J. L.
5767

Stojanovic M.
4578

Stojanovic Stipic S.
4372
5897
5930
6004

Stojkovska A.
6086

Stolle Dueñas D.
4365

Stosic M.
5581

Stoudek R.
4601

Stouffs A.
4921

Stourac P.
4601
4605
4641
5399

Straßberger-Nerschbach N.
5397

Stratigopoulou P.
5753
5759
5765
5783

Streletskaya Y.
4747

Strong J. A.
4478

Struys M.
4636

Studer M.
6043

Study Group: Baptista CR, Bettencourt M, Carrapatoso G, Neves P, Neto L, Saraiva L, Granja, C, Azevedo L.
6184

Study Group: Baptista CR, Carrapatoso G, Martinho J, Neto L, Oliveira C, Saraiva L, Azevedo L, Granja C.
6054

Study Group: Bettencourt M, Carrapatoso G, Martinho J, Monteiro C, Neves P, Oliveira C, Azevedo L, Granja C.
6035

Stufano M.
5883
5989

Su F. W.
6096

Suárez E.
4888

Subirà González A.
5206

Subirana L.
4550

Subramaniam R.
6405

Sudani T.
4425

Sudha T.
4721

Sueys L.
5569

Suga Y.
4900

Sugimoto K.
4930

Sugimoto Y.
4900

Sugiyama D.
4521

Sugiyama Y.
5360

Suh D. S.
5253

Suiaga D.
4756

Sujica M.
5614

Sukhonos R.
5794

Sumner R.
4544

Sun D.
5677

Sun Y.
5023
5232
6356

Suñe M.
4718

Sung C. H.
4732

Suppan M.
4349

Suprun U.
4814

Sureda B.
5626

Surojananon J.
5177

Suslov O.
5794

Susnjar S.
6319

Suzuki A.
4905

Suzuki K.
4339

Suzuki T.
4897
5400

Suzuki Y.
5703
5804

Svane C.
6011

Svare A.
5450

Svensson R.
6216

Svorcan P.
4578

Svraka D.
4576

Swenson E. R.
5133

Swinnen V.
4645

Swinnen W.
5569

Symonides M.
5957

Sysiak-Sławecka J.
4375

Szabo A.
6315
5948

Szabó A.
5758

Szabó M.
4560

Szczukocka M.
4375

Szécsi B.
5758

Szekely A.
6037
6315
5948

Székely A.
5758

Tabatabaian Kheirkhah N.
5513

Taboada Muñiz M.
5045
6202

Taboada Munñiz M.
6230

Tabolcea I.
5313

Tachibana K.
4902

Tacquard C.
5137

Taharabaru S.
5257

Tai W. H.
4674

Tai Y. H.
4412
4415
4929

Taira T.
4470

Takagi S.
5400

Takahashi K.
4905

Takahashi M.
5337

Takaki S.
4585
5695
5739

Takamori S.
5068

Takasaki Y.
4462

Takayanagi M.
5327

Takenaka J.
5854

Takeuchi M.
4462
4930

Takrouni Y.
4455

Talavan Serna J.
5454

Taleço T.
4577

Talreja V. K.
5493
5497
5498

Tamayo E.
6333

Tamburri-Bariain R.
5729
5736

Tamosuitis T.
4321

Tan B. P. Y.
4694

Tan F.
5105

Tan J.
5104

Tan K. S.
6160

Tan L. H.
4810

Tan P. Y. B.
4622
4675
5252

Tan Y. R.
4959

Tanaka H.
4585

Tanaka M.
5109

Tanaka N.
58

Tanaka Y.
4429

Tang J.
5523

Tang Y.
5706
5850
5953

Tank J.
6287

Tanwar S.
4721

Tao Z.
5392

Tapias L.
5626

Taptygina E.
4610

Tarabrin O.
5794

Tarasenko S.
4836

Tarhouni M. A.
6272

Taruishi C.
4425

Tas Tuna A.
5198

Tasevski L.
6055

Tassoudis V.
6231

Tatic M.
4860

Taura S.
5284
5292
5363
5716

Tavares C.
5617

Taverna M. V.
6281

Tavoularis D.
5474

Tawif T. A.
5259

Tayama J.
4743

Tebar Cuesta M. I.
5949

Tebar M. I.
5051
5202

Teijido C.
5011
5015
5016
5185
5851

Teijido C. A.
4816
5540
5661
5767

Teixeira C.
6365

Teixeira J.
4920

Teixeira V.
6398

Tejedor A.
4736

Tejedor Navarro A.
4731
5611

Tekeli A. E.
5299

Tekely E.
5837

Teles A.
5954

Teles D.
5936
5954
5990

Teles J. G.
5243

Telo M.
6213

Temelkov A.
5522

Ten Hoope W.
4993

Tena B.
4562
5329
5833

Tena Blanco B.
5774

Teng W. H.
5060

Tenreiro G.
5591

Teo W. W.
4362

Terada H.
5983
6050

Terada R.
5327

Terada T.
4540

Tercero F. J.
5359

Tercero J.
4801

Termorshuizen F.
4549

Terradillos E.
5448
6194

Terreehorst I.
4608

Tesoro R.
4349

Teunissen C.
4546

Tevet A.
5872

The Lundbeck Foundation Centre for Fast-track Hip and Knee Replacement Collaborative Group
4473

Theiler L.
5097
5323
5737

Theodoraki K.
5773

Therond C.
4992

Theusinger O. M.
4567

Thibault S.
5796

Thienpont E.
6171

Thierens H.
5107

Thin T. N.
4622
4694
5252
5298
5336

Thiriet C.
5727

Thomas C.
4975

Thomas J.
5002

Thomas O.
4752
4975

Thorarinsdottir H.
4348

Thorat P.
5178

Thudium M.
5397

Thudium M. O.
6287

Ti L. K.
4362

Tian M.
5090
5098
5263

Tianyao Z.
5743

Tigchelaar C.
5381

Tiglis M.
5772

Tijero Paramo M. T.
5111

Timur H. T.
5516

Ting C. K.
5060
5113
6096

Tinoco J.
5532

Tinoco J. R.
4577

Tircoveanu R.
4546
4573

Tofani G.
5544

Toivonen T.
5275

Tokar I.
4558

Tokic B.
4424

Tol-Bueving A.
4825

Toleska Doneska M.
6086

Toleska M.
5657
5667
6409

Tollinche L.
4323

Toma D.
4756

Toma D. I.
5546

Tomás A. S.
6001
6340

Tomescu D.
4939

Tomić Mahečić T.
6346

Tommasoni N.
4804

Tonelotto B.
5831

Tong Q. J.
5094

Tonkovic D.
5780

Tonković D.
5805

Tore Altun G.
5723

Toriumi T.
4497

Torlinski T.
4741

Tormos P.
5315

Tornai T.
4560

Torra M.
5589

Torra Riera M.
5586

Torrão C.
4863

Torre Oñate M.
6379

Torres A. D.
5680
5687

Torrinha S.
5683

Tövisházi G.
4560

Townley S.
4382

Toyama S.
5703
5804

Traglia M.
6281

Trajkova R.
5584

Trambulova J.
6055

Tran L.
4684

Trantzas P.
5840

Trefna M.
4542

Trembach N.
5530

Trikoupi A.
5438
6201

Trillo Urrutia L.
4614

Tripathi M.
4557

Tripković M.
6346

Triquell X.
5589

Trompeo A. C.
4963

Troncoso Prada E.
6118

Trost D.
6249

Trposka A.
5657
5667
6409

Trposka Poposka A.
6086

Trujillo Morales H.
4796

Truong H. N.
4951
5027
5417

Tsai H. J.
4873

Tsai H. T.
4725

Tsao C. M.
4873

Tsao M. Y.
5113

Tsaousi G.
4872

Tsay P. J.
4783

Tseng K. Y.
5704
5892

Tsou M. Y.
4412
4415
4654
4677
4680
4790
4809
5060
6096

Tsuang F. Y.
4732

Tsubaki N.
4407

Tsuji T.
5085
5646

Tsujikawa S.
4791

Tsukamoto M.
5284
5292
5363
5716

Tsukinaga A.
4893

Tsuneyoshi I.
4644

Tsutsumi Y.
5085
5646

Tsutsumi Y. M.
6029

Tu H.
4520

Tucic I.
6282

Tucić I.
6165

Tudoroiu M.
4939

Tuğcugil E.
4980

Tullo L.
5955

Tumer M.
5467

Tümer M.
5567
5595
5816

Tunçdemir Y. E.
5299

Tuncer Z.
5769

Turan A.
5999
6313
6331
6335

Turan A. Z.
5477
5958
6030

Turegano F.
5448
6194

Turenok A.
5972

Turgeman Y.
4522
5487

Turgut H. Z.
4924

Turgut N.
4792

Tütüncü A. Ç.
4971

Tvarno C.
5432

Tzefronis D.
4524

Tzelepi V.
4448

Tzeng S. T.
4371

Tzima C.
5840

Tzima M.
4374
4697
4831
5218
6173

Tzimas P.
5469

U. Adachi Y.
5257

Ubre M.
5325

Uchida E.
5243

Uchida T.
4907
5337

Uchino H.
4587
5347

Ueda K.
4325

Ugliola D.
5955

Ujal Pradhan, MD
4850

Ulm B.
5078
6028

Umar M.
6260

Umeh U.
5514

Umuroğlu T.
5332

Ungureanu R.
5772

Unsel M.
5827

Upryamova E.
5069

Usas E.
6229

Ushakov A.
5873
5896

Usikyan E.
5166

Utrilla Cid N.
6009

Utrilla Perez M.
6060

Utsumi I.
5670

Uyar E.
5291

Uysal A. I.
5878

Uyttenboogaart M.
4545

V. Lemos Neto S.
5167
6063
6089

Vachnadze D.
5328

Vahabzadeh-Monshie H. R.
4418

Vaitkaitis D.
6229

Valbuena Maldonado M.
5134
5147
5169

Valdoleiros S. R.
4863

Valencia Ó.
4919

Valencia Orgaz O.
5571

Valencia Sola L.
4796

Valente E.
4352

Valente F.
5005

Valente L.
5923

Valente M.
6369
6377

Valenti B.
4719

Valentim A.
6203
6262

Valero Bernal J. F.
6118

Valero D.
5239

Valero R.
4737
4801
5359
5466
5637

Valero W.
5239

Valle A.
4550

Vallejo Tarrat A. I.
5913

Vallés J.
5808
5929

Valls A.
5018

Valls-Ontañón A.
5756

Valsamidis D.
4398
5773

Valverde S.
4718

Van Belleghem V.
5908

Van Berlaer G.
5588

Van Boven M.
4589

van Cuilenborg V.
4608

Van De Velde M.
4588

Van Den Brom C.
4794

Van Der Linden P.
4591

Van Der Sande M.
5425

Van Dijck M.
4528

Van Greunen M.
5640

Van Haperen M.
5314

Van Hecke D.
4951
5027
5417

Van Hoeylandt E.
5569

Van Limmen J.
4950
5107
5433

Van Loo M.
5899

Van Meurs M.
4636

Van Obbergh L.
4951
5027
5313
5417

Van Regemorter V.
4921

Van Rossum P.
5124

Van Velzen M.
5375

van Zuylen M. L.
4993

Vanags I.
4811

Vandekerckhove M.
4606

Vandemoortele O.
5908

Vandenheuvel M.
5059

Vandermeulen J.
4968

Vanhonacker D.
4433

Vanhoorebeeck F.
4704

Vanlergberghe C.
5916

Vanlommel J.
4606

Vanpeteghem C.
4978

Vara E.
5995

Varandas J.
4830

Varela A.
6194

Varela Cabo J. A.
5448

Varela Durán M.
4966

Varela Gacia O.
5331

Varela O.
5201
6022
6130

Varela-Cabo A.
4453

Variadis D.
5469

Varosyan A.
4335

Varvinskiy A.
4610

Vasconcelos C.
5686

Vasconcelos L.
4669

Vasileiadis K.
5446

Vasilieva E.
4610

Vavoura A.
4735
5207
6243

Vaz Gomes M.
5009

Vaz I.
6164
6211
6252
6276

Vazquez-Gonzalez M.
4784

Veenith T.
4741

Vega Cruz M. S.
4936

Vega M.
5565

Veiras Del Rio S.
5960

Velardo M.
4711

Veliziotis I.
4744

Velovan R. R.
5546

Vendrell M.
4562

Venema A. M.
5478

Vera Sabater P.
5573

Vera-Sanchez M. B.
5312

Verbrugge L.
4646

Verçosa N.
4402

Verhaeghe C.
5752

Verhoeve S.
4545

Verougstraete M.
5433
5569

Vescovo A.
4621

Vester-Andersen Morten
5432

Viaene K.
5916

Viana P.
5537

Viberti I.
5139

Vicente Guillén R.
6224

Vicente M.
5867

Vicente Orgaz M.
4685
4764
4806

Vicol A. M.
6261

Videc Penavic L.
5356

Videnovic N.
4424
4860

Viedma Crespo S.
4749

Viegas Ribeiro M.
4376

Vieira A.
4484
4592
4886
4920
6263

Vieira A. L.
4762

Vieira C.
6223
6267
6352

Vieira D.
4886

Vieira F.
5917

Vieira I. R.
4458

Vieira J.
5651

Vieira M.
5665
5686

Vigorito M.
5682

Vikmanis A.
5985

Vilà E.
6081

Vila González M.
6047

Vilà Justribò X.
6145

Vila Rubina G.
4749

Vilardell E.
5763

Vilaseca I.
6010

Vilchez Monge A. L.
5111

Vilcinis R.
4321

Vilhena I. R.
4662
4664

Villalba Mir P.
5586

Villanueva Carpintero M. D. G.
5134
5147
5169
6161

Villanueva Carpintero M. G.
6395

Villanueva Mena-Bernal J. A.
6138

Villar T.
4719

Villazala González R.
5134
5147
5169

Villela D.
5601

Villela N.
5601

Vinogradova R.
4967
5494

Viola Malet M.
4942

Virk M.
5514

Visscher M.
5425

Vitor Paula
4511

Vives M.
6333

Vivona L.
5945

Vodianytskyi S.
4826

Vogiatzaki T.
4448
5451
6084

Volchkov V.
5377
5390

Volchkova E.
5390

Volk T.
5416

Volkov D.
4709

Volkov O.
5355

Volkova Y.
6182

Volpe D.
5923

Volta C. A.
4707

Vorozhka I.
5972

Vos J.
4572

Vrancken J.
4646

Vucemilovic H.
5823

Vukičević Štironja D.
5188

Vuletic Brletic A.
5356

Vullo A.
6047
6278

Vuoti S.
4633

Vyzhigina M.
4656

Wada A.
5362

Wagenaar W. L. S.
4691

Wagner R.
5745

Wahdan A.
4584

Waldhorn M.
5661
5767

Wall T.
4639

Walz R.
4461

Wang D.
5706
5924

Wang G. J.
5924

Wang H.
5383

Wang J.
5423

Wang L.
4730
4734
6056

Wang L. F.
4451

Wang L. K.
4515

Wang M. L.
4903
5237
5964

Wang Q.
5033

Wang R.
5824

Wang S.
4471

Wang S. J.
4895
5398

Wang T. Y.
5288
5541
5562

Wang X.
4520
4652
4778
5677

Wang Y. C.
4317
4389
4674

Wanishpongpan S.
4357

Warberg E.
4942

Watanabe Y.
4724
5739

Watanebe R.
4325

Watremez C.
4546
4921

Weatherhead W.
4570

Weber C.
6291

Weber W. P.
4841

Webster S.
6411

Weifeng Tu
5776

Weifu Lei
5776

Weiniger C.
4474
5290
5519
5836

Weiniger C. F.
4988
5559

Weiping C.
4368

Wenchu W.
5699

Wenzel C.
6222

Wesseler S.
6308

Westzaan N.
6417

Whitehouse T.
4741

Wiarda H.
4825

Willems A.
4591

Willems H. C.
4993

Williams A.
5483
5565

Williams J.
4390
4391

Willner I.
4784

Winckles S.
5640

Windels A.
4827
5645
5650
5652

Winter R.
6407

Wirth S.
6222

Wittenstein J.
5282
5283
5945
6176

Wittig J.
6251

Wittmann M.
5397

Wolfskeil M.
4950

Won Y. J.
4518

Wong J.
4959

Wong Y. C.
4783

Wonjun C.
5040

Woo J. H.
6383

Woo S.
4516

Woo S. J.
5852

Wood N.
6411

Wouters P.
5059
5421
5752

Wu C. C.
4873

Wu C. Y.
4674
4678
4725
4732

Wu H.
4415

Wu H. L.
4412
4929

Wu L. L.
5673

Wu M. H.
4389

Wu N. H.
4371

Wu S.
4553
4788
5706

Wu S. H.
5881

Wu S. Z.
4409

Wu W.
5797

Wu W. W.
6005

Wuethrich P. Y.
5053
5086
5326

Wulfert F.
5384

Wyffels P.
4950
5107
5421
5433

Xará D.
6168

Xavier A.
5651

Xavier C.
4376
4883

Xia W.
5698

Xiao W.
5698

Xie M.
5822

Xie W.
4478

Xinyi W.
5751

Xiong J.
5706

Xiong T.
4734

Xu M.
5850

Xu Y.
6248

Yahya M.
6288

Yaish Reina Y.
4379

Yakar M. N.
4792

Yalcin A.
5310

Yalcindag A.
5605

Yaldiz M.
4714

Yamabe R.
4596

Yamada T.
5267

Yamagata K.
4431

Yamakage M.
5946
5983
6050

Yamaki R.
4743

Yamamoto A.
4845

Yamamoto N.
5200

Yamamoto S.
4909
4937

Yamamoto Y.
4544
4907
5337

Yamane Y.
4596

Yamashita T.
4902

Yamashita Y.
5703

Yamaura K.
4648
5722

Yan T.
5444
5924

Yang C.
4538
5383
5751

Yang G.
4422

Yang H.
4676

Yang H. S.
5692

Yang J.
4441
5850
5953

Yang S. C.
5092

Yang Y.
4422
5023
5232

Yao W.
4553

Yao Y.
4643
4734

Yap S. H.
4959

Yapıcı D.
6235

Yassen K.
5259

Yasui M.
4338

Yattah Y.
4490

Yazici I.
5265

Yee C.
4849

Yefimova O.
4836

Yeh C. C.
4535

Yeh C. Y.
4654

Yek J.
5255

Yek J. J. L.
4686
4694

Yemets H.
5742

Yeniay H.
5516
5900

Yeo L.
5105

Yeo V.
4377

Yevsieieva V.
4681

Yew M.
4409

Yi J. W.
4428

Yildirim Guclu C.
6124

Yıldız N.
5815
5827

Yildiz Y.
4525

Yilmaz M.
5477
5958

Yin Y. Q.
4451

Yip K. W.
5582

Yokose M.
4552
4585
5695

Yokoyama T.
5284
5292
5363
5716

Yoo G. E.
5664

Yoo J.
5127

Yoo S. K.
5644

Yoo Y. C.
5720
5748

Yoon M.
5718

Yoon M. H.
5256

Yorozuya T.
4462

Yoshikawa Y.
5946
5983

Yoshimura M.
4497
5254

Yoshino J.
5068
5109

Yoshinuma H.
4407
4521

Yoshitani K.
4893

Yu C. H.
4821

Yu H.
5368

Yu J.
5776

Yu J. H.
5296

Yuan H.
4723

Yuan T.
5090
5098
5263

Yudin G.
5708
5770

Yuguang Huang
5776

Yun S. H.
5037

Yunxia Z.
5698

Yurt E.
5958

Zaballos M.
5201
6022
6130

Zabolotskikh I.
5530

Zabrodskaya J.
4729

Zac L.
5414

Zacharowski K.
6291

Zafarov A.
4379

Zagorulko O.
5932
5940
5952
5968
5973

Zah Bogovic T.
5780

Zahn P.
4996

Zaitsev A.
5166

Žaja A.
4953

Zamidei L.
6040

Zamora A.
5867

Zamorano J. Á.
5995

Zarate E.
4942

Zarins C. K.
5194

Zarzava E.
5446

Zarzuela Nuñez E.
5949

Zattera L.
5524
6148

Zaytsev A.
5270

Zdolsek J.
6216

Zdravkovic M.
5148

Zdravkovic R.
4424
4860

Zegan-Baranska M.
4590

Zellans E.
5194

Zemou S.
4374
4831
6173

Zenati M.
5674

Zeng W.
5320

Zeng Y. S.
4408

Zengin S.
5343
5747

Zengin S. Ü.
5332

Zenha S.
4945
6109
6132
6150
6162

Zenkina L.
4681

Zerbetto Sbrissa G.
6249

Zhang H.
4475

Zhang H. Y.
4386

Zhang J.
4730
5090
5098
5263
5658
6013

Zhang J. M.
4478

Zhang L.
4478

Zhang P.
5824

Zhang Q.
4451
5031

Zhang S.
5741

Zhang W.
4441
5023
5797

Zhang W. S.
6005

Zhang Y.
5091

Zhanmin Y.
4368

Zhao S.
4384

Zhao W.
4384

Zheng T.
5420

Zheng X.
4643
5320
5420

Zholos A.
5890

Zhou B.
4730

Zhou C.
4384

Zhou J.
4734
5953

Zhovnir V.
5742

Zhu M.
5209

Zhu Q.
4652

Zhu S. N.
5924

Zhu T.
4386
5033
5333

Zhu Z.
5091

Zhukova S.
4656
5166
5270

Ziebart A.
4904

Zitta K.
5063
5406

Zlatkova M.
5750

Zlochevskiy O.
5655

Zlojutro B.
4576

Zlotnik A.
4358
4378
4379
4490

Zöllner C.
5322

Zorca S.
5674

Zorrila Vaca A.
5680

Zuccarini F.
4744

Zukowski M.
4590

Zuo Y.
4652

Zupcic M.
6320

Zurita S.
4523
5205

Zyambo M.
5541

Acid-base equilibrium,metabolic acidosis
4459
5105
5765
6113

Acid-base equilibrium,respiratory acidosis
5737

Acupuncture
5416

Age factors
4944
5988
6417

Airway
4421
4528
4580
4601
4604
4734
4808
4986
5200
5363
5371
5466
5477
5958
5984
6300

Airway,anatomy
4371
4468
4469
4513
4658
4755
5018
5166
5311
5340
5373
5571
5840
5907
5963

Airway,complications
4453
4513
4805
4843
4982
5049
5225
5483
5515
5624
5658
5665
5896
5935
5990
6020
6046
6134
6145
6168
6202
6411

Airway,complications, Blood,loss, Complications,airway obstruction
5836

Airway,infections
5515
5594

Airway,obstruction
5615
5846
5913
6118
6299

Airway,pharynx
5360

Airway,pressure
6065

Alcohol,Heart,arrhythmia
4871

Allergy
4608
4945
5379
5667
5916
6240

Allergy,Risk
5328

Anaesthesia
6369

Anaesthesia,audit
4382
4592
5159
5535
5899
5908
6103
6237

Anaesthesia,audit, Surgery,laparotomy, Organizations,Royal College of Anaesthetists
4405

Anaesthesia,day-case
4642
4706
4749
5039
5047
5089
5415
5471
5954
6049
6173
6261
6281

Anaesthesia,dental
4952
4958
6178

Anaesthesia,depth
4520
5265
5725
6177
6197

Anaesthesia,emergency service
4349
4638
4748
4804
5097
5114
5269
5275
5448
5556
6248
6411
6419

Anaesthesia,general
4327
4328
4335
4338
4374
4380
4384
4389
4451
4462
4565
4570
4609
4640
4657
4662
4670
4691
4753
4765
4800
4808
4825
4850
4890
5147
5205
5377
5413
5439
5477
5548
5574
5584
5602
5622
5737
5766
5840
5886
5922
5976
5978
5985
6173
6265
6390
6395
6417

Anaesthesia,geriatric
4436
4638
4748
4765
4876
4993
5033
5138

5170
5210
5332
5336
5350
5366
5929
5943
6075
6086
6106
6113
6147
6298

Anaesthesia,neurosurgical
4653
4723
4737
4742
4756
4794
4801
4872
5291
5295
5417
5478
5738
5805
5826
5926
6082

Anaesthesia,obstetric
4432
4474
4486
4577
4588
4616
4725
4727
4816
4927
4949
4973
4988
5002
5024
5064
5077
5287
5290
5327
5451
5577
5585
5621
5747
5774
5812
5872
5887
5897
5936
5979
5982
6064
6071
6161
6163
6173
6303
6319
6325
6329
6382

Anaesthesia,
otolaryngological
5199
5207
5533

Anaesthesia,paediatric
4418
4530
4535
4580
4591
4601
4646
4669
4772
5039
5068
5109
5317
5338
5343
5371
5467
5532
5567
5607
5608
5770
5815
5832
5875
6012
6014
6076
6153
6183
6193
6310
6320

Anaesthetic
techniques,bronchoscopy
4658

Anaesthetic
techniques,conduction
5366
6398

Anaesthetic
techniques,endobronchial
4479
5506

Anaesthetic
techniques,extradural
4711
5322

Anaesthetic
techniques,fibreoptic
5571

Anaesthetic
techniques,hypothermia
4407
5677
6005

Anaesthetic techniques,i.v.
4408
4843
4963
4979
5019
5441

Anaesthetic techniques,i.v.
regional
4645
4697
5094
5124
5305
6086
6261

Anaesthetic
techniques,induction
6055

Anaesthetic
techniques,inhalation
4656
4746
4881
4971

Anaesthetic
techniques,laryngoscopy
4601
5267
5366
5466
5595
5771
5840
6181

Anaesthetic
techniques,preoxygenation
5572
5622
5687

Anaesthetic
techniques,regional
4357
4365
4386
4506
4510
4621
4664
4681
4709
4728
4732
4813
4827
4833
4836
4845
4868
4897
4910
4943
5052
5118
5167
5169
5234
5270
5438
5514
5618
5640
5651
5673
5719
5740
5756
5802
5813
5915
5970
6010
6016

6063
6085
6089
6092
6107
6140
6156
6198
6201
6205
6324
6328
6409

Anaesthetic techniques,subarachnoid
4352
4615
4796
4800
5013
5561
5631
5987
6106

Anaesthetic techniques,topical
6326

Anaesthetics gases
4773
5377
5593

Anaesthetics gases,nitrous oxide
5144

Anaesthetics gases,trace concentrations
4769

Anaesthetics i.v.
5383

Anaesthetics i.v.,etomidate
4441
5797

Anaesthetics i.v.,ketamine
5615
5798
6335
6405

Anaesthetics i.v.,propofol
4652
5090
5098
5119
5263
5300
5308
5414
5751
5776
5795

Anaesthetics i.v.,steroid
4606

Anaesthetics i.v.,thiopentone
5798

Anaesthetics local
4784
5796
5824
5843
5995

Anaesthetics volatile
5238
5246
5368
5847

Anaesthetics volatile,atmospheric pollution
4489

Anaesthetist,activity
4810

Anaesthetist,risks
4382
4592
5602
5831

Analgesia,obstetric
4388
5069
5312
5352
5626
5632
5992
6060
6157
6188

Analgesia,paediatric
6124

Analgesia,patient-controlled
4556
5750
6039

Analgesia,postoperative
4393
4521
4558
4584
4890
5040
5052
5213
5274
5511
5563
5655
5719
5967
6119

Analgesia,postoperative,
4885

Analgesia,pre-emptive
4838
5121

Analgesic techniques,extradural
4576
4660
4883
5066
5073
5957

Analgesic techniques,infiltration
5923
6243
6386

Analgesic techniques,regional
4867

Analgesic techniques,regional,i.a.
4596
5307
6130

Analgesic techniques,subarachnoid
4444
5613

Analgesics
4979
4990
4996
5113
5207
5308
5486
5682
5743
5820

Analgesics opioid
4766
4925
5085
5560
5646
5704
5978

Analgesics opioid, Stress
6308

Analgesics opioid,addiction
5375

Analgesics opioid,morphine
4390
4485
6171

Analgesics opioid,morphine
4704

Analgesics, non-opioid
5766

Anatomy,jugular vein
6274

Antagonists
4633
5044

Antagonists, neuromuscular block
4980

Antibiotics
5904
6148

Antibiotics, Pharmacokinetics
5883

Arterial pressure
4761
5382

Arterial pressure,drug effects
4919
4950
5692
6302

Arterial pressure,hypertension
4316
4720
4919
5440
5455
5550
6056

Arterial pressure,hypotension
4639
4743
4919
5053
5086
5145
5254
5530
5773
6272

Arterial pressure,measurement
5922

Arteries,aorta
4837
5401
5919

Arteries,cannulation
4436
5031

Arteries,cerebral
6287

Assessment
4589
4761
5111
5178
5212
5325
5452
5617

Assessment, preanaesthetic
4755
5362

Assessment, preanaesthetic,
5450

Blood,anticoagulants
4375
4536
4629
4659
4817
5501
5806
6224

Blood,chemotaxis
4557
5693

Blood,coagulation
4718
4907
5157
5337
5722
5788
5808
5981
6261
6291

Blood,erythrocytes
5276
5620

Blood,glucose
5056

Blood,haemofiltration
6192

Blood,haemoglobin
4622
5195
5589
5599

Blood,haemolysis
4839

Blood,leucocytes
4557
5063
5406

Blood,loss
4743
5168
5296
5326
5589

Blood,lymphocytes
4966

Blood,neutrophils
4781
5092

Blood,platelets
4781
4806
5770

Blood,transfusion
4412
4536
4677
4731
4806
5276
5442
5586
5589
5620
5625
5633
5693
5929
5981
6081
6091
6099
6282
6292

Blood,volume
4451

Brain,anaesthesia, molecular effects
4876
5232

Brain,blood flow
4773
6114

Brain,cerebral cortex
5581
5823
6066

Brain, electroencephalography
4745
5761

Brain,GABA
4564

Brain,hippocampus
4729

Brain,injury
4378
4422
4490
5772
6114

Brain,intracranial haemorrhage
4341
4344
4345
4632
5594
6224

Brain,intracranial pressure
5014
5129
6172

Brain,ischaemia
4340
4341
4342
4343
4345
4422
4904
5233
6114

Brain,magnetic resonance imaging
6077

Brain,metabolism
4341
4343
4344
4587
5042

Brain,synapses
4682
5398
Burns
4980

Calcium channel block
4720

Cancer
5272
5720
5943

Carbon dioxide,partial pressure
5523

Cardiorespiratory system
4471
5874
5976

Cerebrospinal fluid
5381
5609
5904
6038

Chemotherapy,cancer
4718
5128

Clinical trials
4932
5932
5968
5981

Complications
4368
4457
4538
4608
4691
4825
4841
4863
5078
5156
5170
5209
5452
5487
5516
5617
5829
6132
6141
6249

Complications, Intensive care,infections
6153

Complications,abscess
4685
5045

Complications,accidents
4576
5243

Complications,acidosis
5180
5460

Complications,adult respiratory distress syndrome
4375

Complications,airway obstruction
4795
4959
5149
5595
6181

Complications,alcohol abuse
5460

Complications,anaemia
5195
5442
5599
5625
6346

Complications,anaphylaxis
4320
4338
4517
4586
4608
5137
5159
5667
5702
5917
6068
6240

Complications,anatomy
5658

Complications,aneurysm
6032

Complications,aortic valve disease
5075
5659
6270

Complications,apnoea
6125

Complications,arrhythmia
4980
5487
5670
5854

Complications, arteriovenous malformation
6327

Complications,arytenoid dislocation
5658

Complications,aspiration
4379
4515
4719
4959
5519

Complications,atelectasis
5807

Complications,burns
4579

Complications,cardiac arrest
4461
4517
5047
5677
5800
5859
5884
5917
6145
6330

Complications,catheter migration
5239

Complications,catheter misplacement
4348
4458
5435
5670

Complications,chylothorax
5960

Complications, coagulopathy
4544
5202
5218
5603

Complications,coma
5772

Complications, compartment syndrome
4578

Complications,convulsions
4377

Complications,death
4754
5194
5210
5522
5935
6099

Complications,diabetes
4362
5105
5420

Complications, disseminated intravascular coagulation
4967

Complications,dural puncture
4788
5987
6334

Complications,eclampsia
4376
4433

Complications,embolism
5897

Complications,emphysema
4409
5520
5639

Complications,extubation tracheal
4528
5781
5972

Complications,fistula
5456

Complications,haematoma
5864
6181

Complications, haemorrhage
4398
4424
4719
5693
6081

Complications, haemorrhagic disorder
4399
5642
5779

Complications,head injury
4729

Complications,headache
4433
5672
6322

Complications,hepatic
4330
4595
5523

Complications, hiatus hernia
5930

Complications, hypertension
4894
5163
6001
6149
6175

Complications, hyperthermia
5120
5460

Complications, hypervolaemia
5873

Complications,hypotension
4517
4674
4678
5067
5110
5257
5644
5783
6191

Complications,hypotension
4552

Complications,hypothermia
4796
6075

Complications, hypothermia, Neuromuscular block
6150

Complications, hypovolaemia
6036
6216

Complications,hypoxia
5362

Complications,infections
4747
5205
5339
5745
5760

Complications,instrumental delivery
6315

Complications,intubation endobronchial
6029
6046

Complications,intubation tracheal
5097
5121
5466
5591
6020
6178
6202

Complications,liver disease
5218
6159
6207

Complications,meningitis
5904

Complications,morbidity
4473
4639
4861
5128
5349
5516
5616
5956

Complications,multiple organ dysfunction syndrome
4629
4685
4939
4966
4967
5139
5605

Complications,muscular dystrophy
4793

Complications,myocardial infarction
4877
4930
5145
5204
5428

Complications,myotonic dystrophy
5579
5650

Complications,neurological
4325
4433
4546
4912
4913
4944
5033
5469
5544
5727
5789
5833
6331

Complications, neuromuscular disease
4641
5496
5576
5645
6185

Complications,neuropathy
5253
5913
6135

Complications,obesity
4462
4694
5267
5560
5766

Complications,obstructive sleep apnoea
4686
4858
5199

Complications,oedema
6240

Complications, Parkinsonism
5221

Complications, phaeochromocytoma
4735

Complications, pneumothorax
4765
5553

Complications,porphyria
5454
6097

Complications,positional
5885

Complications, postoperative desaturation
4795
5331
5363
5639

Complications,pulmonary
5104
5413
5741
5924

Complications,pulmonary hypertension
4512
4679
4874
5133
5529
5657

5878
5949
6356

Complications,pulmonary oedema
4735
5045

Complications,renal
4618

Complications,respiratory
4562
5083
6094

Complications,septicaemia
4557
4578
4632
4729
4747
4967
5045
5116
5464
5494
5522
5605
5798
5955
6278

Complications,shivering
4648
4934

Complications,skin injury
5775

Complications,spinal injury
5910
6047

Complications,stenosis
4953
6234

Complications,stridor
4898

Complications,tension pneumothorax
4409

Complications,thrombosis
4768
5047
5206
6159
6224

Complications,trauma
4550
4814
5633
5913
6011
6194

Complications,ultrasound
4408

Diabetes
5080
5255
5350
5644
6216

Donors,organ transplantation
4595
4823
5072
5129
5251
5524
5758
5823

Drug delivery
5881

Drug delivery,volume
4929

Education
4395
4550
4724
4789
4987
5082
5965

Education, Stress,
Education,medical students
4992

Education,continuing
4604
4610
4810
5143
5314
5448
5534
5541
5935
5965

Education,medical students
4617
4987
5245
5399
5405
5562
5582
6187
6220
6229

Education,untrained personnel
4814
5039
5553
5665
6187
6220

Ehlers-Danlos syndrome
4655

Eisenmenger’s syndrome
4815

Embolism,air
5543

Enzymes,creatine kinase
5111

Epilepsy
4863

Equipment,airway
4374
4426
4497
4782
4805
5136
5373
5396
5622
6138
6275

Equipment,alarms
4323
5928

Equipment,anaesthesia machines
4657

Equipment,breathing systems
4470

Equipment,bronchoscopes
5456

Equipment,cannulae intravascular
5711

Equipment,catheter guides
6100
6260

Equipment,circulatory support devices
4893
6009

Equipment,electrodes
5243

Equipment,extracorporeal circulation
4375
4453
5072

Equipment,heat-moisture exchangers
4909

Equipment,helicopters
5633

Equipment,laryngoscopes
4900
4937
5669
5861
5921
5990

Equipment,laryngoscopes fibreoptic
4513
5861
6211

Equipment,masks anaesthesia
4869
6197

Equipment,monitors
4570
5259
5323
5425

Equipment,oxygen concentrators
5422

Equipment,pulse oximeters
4339
4622

Equipment,standardization
4425

Equipment,stimulators
4414

Equipment,tourniquets
5854

Equipment,tubes double-lumen
5573

Equipment,tubes nasopharyngeal
4458
5292

Equipment,tubes tracheal
5292

Equipment,tubes tracheostomy
4805

Equipment,ultrasound machines
4395
4436
4721
4741
5134

Equipment,valves
4551
6230

Equipment,ventilators
5422
6251

Equipment,warming devices
4516

Ethics
4823

Eye,intraocular pressure
4448

Eye,pupil
5117

Fetus
4888
5804

Fluid balance
4540
4559
4590
4731
5310
5332
5749
6094

Fluids,i.v.
4906
5259
5313
5326
5524

Gastrointestinal tract
4754
4942
6355

Gastrointestinal tract,endoscopy
4409
4869
5456
5698
5705

Gastrointestinal tract,endoscopy
4520

Gastrointestinal tract,endoscopy, Surgery,vascular, Assessment, preanaesthetic
6245

Genetic factors
4564
6207

Geriatrics
4799
5170

Head,injury
4714
5920

Heart,angiography
5859

Heart,arrhythmia
4640
4659
5487
6006
6417

Heart,arrhythmia, electroversion
6330

Heart,blood flow
6182

Heart,blood flow, myocardial
5205
6056

Heart,cardiac massage
5853
6330

Heart,cardiac output
4540
5107
5433
5787

Heart,cardiopulmonary bypass
4322
4573
5770
6105
6142

Heart,catheterization
4522

Heart,congenital defects
4355
4753
4902
4954
5009
5016
5592

Heart,coronary artery bypass
4317
5404
6236

Heart,coronary occlusion
4522
5983

Heart,esmolol
6302

Heart,ischaemia
4922
5145
5194
5333
5349
5432
5852

Heart,myocardial function
4522
4902
5059
5575
5822
5841
5955

Heart,myocardial function, Intensive care,infections, Monitoring, echocardiography
6004

Heart,myocardial preservation technique
6086

Heart,myopathy
6009

Heart,resuscitation
4414
4752
4896
4906
4975
5474
5629
5677
5859
5916
5930
6251

Heart,tamponade
6160
6191
6196

Heart,transplantation
5540
5758

HELLP syndrome
4831
5215
6019

History,anaesthesia
5694

Hormones, adrenocorticotrophic
5155

Hormones,corticosteroid
4340
4342
4343
4344
4345

Hormones,somatostatin
5107

Hyperbaria,chamber
5489

Hypertrophic obstructive cardiomyopathy
4712
6276

Hypnotics benzodiazepine
6184

Hypothermia
4516
5629

Hypoxia
5009
5133

Immune response
4636
5458
5464
6340

Induction,anaesthesia
5644

Infection,bacterial
4605
4747
5780
6101
6207

Infection,central nervous system
4913
5464

Infection,control
4741

Infection,nosocomial
5760

Infection,pulmonary
5522

Infection,upper respiratory tract
5139

Infusions,i.v.
5533

Intensive care
4372
4585
4605
4641
4873
5051
5288
5310
5459
5546
5664
5827
5989
6202
6292
6355

Intensive care,audit
5884

Intensive care,infections
4358
4618
4629
4632
4685
4741
4966
5760
5772
5883
6148
6195
6225

Intensive care,sedation
4641
4700

Interactions (drug)
4871

Intubation endobronchial
4903
4975
6229

Intubation endobronchial, complications
4937

Intubation nasotracheal, complications
5311
5892

Intubation nasotracheal, technique
5363
5944

Intubation tracheal
4426
4792
5061
5166
5311
5371
5669
5964

Intubation tracheal, complications
4974

Intubation tracheal,difficult
4374
4453
4468
4469
4755
4875
5049
5097
5267
5450
5488
5595
5637
5683
5759
5763
5771
5861
5900
5921
6020
6031
6055
6138
6211
6275
6337

Intubation tracheal,difficult, Neonates
6295

Intubation tracheal,extubation
4455
4902

Intubation tracheal,technique
4428
4900
4905
5669
5984

Intubation tracheal,training
4975
5245
5965

Intubation tracheal,training,
5477

Ions,calcium
4822

Ions,magnesium
4700

Ions,potassium
4676
4787

Ions,sodium
4549

Kidney,blood flow
5839

Kidney,failure
4451
4705
4894
5188
5255
5739
5742
6036
6333

Kidney,filtration,glomerular
5458

Kidney,function
4761
5053
5086
5524
5931
5989

Kidney,lithotripsy
4562

Kidney,metabolism
5494

Kidney,transplantation
4542
5931

Larynx,laryngoscopy
5450
5683
5759

Larynx,laryngoscopy fibreoptic
5781

Larynx,vocal cords
4898
5365

Liver,blood flow
4758
4931
4950
5107
5433

Liver,damage
5839
6000

Liver,disease
6091
6242

Liver,function
4461
4462
6000

Liver,hepatotoxicity
5377

Liver,metabolism
5837

Liver,transplantation
4399
4595
4758
4931
5188
5315
6000
6091
6099
6159
6242

Lung,adult respiratory distress syndrome
4618
5282
6145

Lung,atelectasis
4740
4797
5723
5807
6030
6176

Lung,compliance
5037

Lung,damage
5282
6101

Lung,endotoxaemia
4475

Lung,fluid balance
4849

Lung,function
5945

Lung,gas exchange
5238

Lung,hyperoxia
4339

Lung,hypoxia
5422

Lung,mechanics
5945
6176

Lung,model
4470

Lung,pneumothorax
6365

Lung,respiratory distress syndrome
5526
6379

Lung,transplantation
4701
4754
6033

Lung,vasculature
5133

Malignant hyperthermia
4514
5111
5513
6213

Measurement techniques,airway obstruction
5716

Measurement techniques,arterial pressure
4316

Measurement techniques,carbon dioxide
5323

Measurement techniques,cardiac output
4540
5164
5521
6022
6246

Measurement techniques,coagulation
5218
6278

Measurement techniques,Doppler echocardiography
5962

Measurement techniques, electromyography
4977
5400
5866

Measurement techniques, electrophysiology
5083

Measurement techniques, fibreoptic
5292
5314

Measurement techniques, neuromuscular block
5866

Measurement techniques, oximeters
4545
5708
5849

Measurement techniques, plethysmography
5332

Measurement techniques, thermodilution
5521
5993
6022

Measurement techniques, thrombelastography
4321
4718
5788
5794
6278
6282

Measurement techniques, ultrasound
4590
4675
4701
4726
5014
5049
5288
5310
5426
5709
5987
6030

Measurement techniques, ventilation volumes
5037
5873
6165

Membrane,erythrocyte
4415

Memory
4384

5946

Metabolism,endocrine
4340
5459
5758
6061

Metabolism,energy expenditure
4459

Metabolism,fasting
4719
5794

Metabolism, hyperglycaemia
4579

Metabolism,hypoglycaemia
4662

Metabolism,insulin
4579

Metabolism,lactate
4459
5494

Metabolism,oxygen consumption
5752

Microcirculation
4572

Model,acute pain service
4614
4615
4680
6314

Model,cardiomyopathy
6400

Model,computer simulation
4789
5060
5143
5637
5774
6187
6213

Model,gas dynamics
4470

Model,mathematical
5447

Model,neonatal respiratory distress syndrome
6349

Model,pharmacodynamic
5060
5725

Model,pharmacokinetic
6096

Model,respiratory failure
4917

Model,statistical
6028

Monitoring,anaesthetist activity
5497
5498

Monitoring,apnoea
4843

Monitoring,arterial pressure
4316
5783

Monitoring,carbon dioxide
5323
5703

Monitoring, carboxyhaemoglobin
5006

Monitoring, cardiopulmonary
5315
5873
5993

Monitoring,computerized
5928

Monitoring, depth of anaesthesia
5085
5530
5646
6003
6058
6264

Monitoring, echocardiography
4613
5254
5288
5315
5674
5955
5962
6036
6191

Monitoring, electrocardiography
4764

Monitoring, electroencephalography
5436
5725

Monitoring, evoked potentials
4759
4899
6341

Monitoring, extracorporeal circulation
4461
5629
6195
6225

Monitoring,intensive care
4578
5129
5695
5918
5922
5993
6249

Monitoring, intracranial pressure
5709

Monitoring,intraoperative
4609
4639
4968
5117
5265
5397
5414
5421
6109
6132
6139
6308

Monitoring,motion artefact
5602

Monitoring,neuromuscular function
4389
4511
4764
5400
5508
5662
5738
5866

Monitoring,oxygen
4339
4811
5858
5896

Monitoring,temperature
4796
5635

Monitoring,ultrasound
4487
4924
5166

Monitoring,ventilation
5526

Muscle skeletal
4675
4940

Muscle skeletal,relaxation
4764

Myasthenia gravis
5686
6286

Myotonia dystrophica
5005

Neonates
4491
4560
5528
5735

Nerve,damage (postoperative)
5483
5953

Nerve,somatic
5027

Nerve,synaptosome
4895

Nerve,transmission
4682
4951

Neuromuscular block
4457
4633
5044
5444
5662
5738
5741
5748
5943
6109
6132
6162
6177

Neuromuscular block, Anaesthesia,depth, Recovery,postoperative
5879

Neuromuscular block,allergy
4320
4586

Neuromuscular block,allergy
4338

Neuromuscular block,antagonism
4511
5044
5301
5508

Neuromuscular block,recovery
4511
5508
5652
5793

Neuromuscular block,rocuronium
4586
5916
6073
6197

Neuromuscular block,rocuronium
5400

Neuromuscular block,rocuronium, Drug delivery,infusion, Antagonists, neuromuscular block
5160

Neuromuscular block,tubocurarine
6083

Non-opioid
4979
5113
5207
5308

Non-steroidal anti-inflammatory drugs
4391
5052
5092

Operating rooms,personnel
4414
4724
4804
5582

Organizations,European Community
4443
4804

Oxygen,inspired concentration
5858

Oxygen,saturation
4869
5560

Oxygen,therapy
5793
5858

Oxygen,tissue
5757

Pain
4431
5034
5588
5699
5748
5876
5973
6184

Pain, Anaesthetics i.v.
4744

Pain, Monitoring,intraoperative
4446

Pain,acute
4484
4524
4736
4776
4826
4886
5214
5256
5611
5769
5850
6212
6377
6383
6407

Pain,chronic
4324
4456
4523
4574
4619
4821
4840
4925
4936
5680
5718
5867
5940
5952
6035
6203
6223
6231
6262
6267
6301
6352

Pain,experimental
4644
5023
5055

Pain,injection
4423

Pain,neuropathic
4478
4778
5598
5601
6135

Pain,postoperative
4463
4561
4654
4684
4713
4738
4860
4921
5236
5719
5999
6054
6235

Pain,tourniquet
5762

Parasympathetic nervous system,atropine
5237

Parasympathetic nervous system,glycopyrronium
5237
5364

Partial pressure,alveolar-arterial
6059

Pharmacodynamics
5060

Pharmacokinetics,
4800

Pharmacology,analgesics opioid
5121

Pharmacology, benzodiazepines
4396

Pharmacology, dose-response
4412

Pharmacology, preservatives
5333

Physics,flow
5414

Physics,fluid dynamics
6216

Physiotherapy
5104

Placenta
6050

Position,effects
5009
5670
5785

Position,prone
4528
4743
5164
5446

Position,sitting
5903

Potency,anaesthetic,age factors
4876

Preanaesthetic
4589
4761
5111
5178
5212
5325
5452
5617

Pregnancy
4720
4834
5011
5821
5851
6164
6219
6252
6336

Premedication
6288

Protein,albumin
5326

Psychological responses, Education
4372

Raynaud's phenomenon
5545

Receptors,cholinergic
5924

Records,anaesthesia
4323

Records,medical
4323
5948

Recovery
4633
5580
5978

Recovery,cognitive
4429
4993
5376
5420
5441
5469
5499
5617
5833
5903
6013

Recovery,neurological
4342

Recovery,postoperative
4425
4463
4473
4520
4606
4942
5083
5104
5198
5252
5298
5364
5390
5425
5489
5569
5652
5664
5749
5793
5931
6162
6405

Reflexes,laryngeal
4898

Research,anaesthesia
4932
5148
5405
5474
6292

Research,animal
4422
4773
5333
5605

Risk
4861
5078
5452
5616
5874
5953
6028

Safety
4380
4382
4550
4570
4592
4793
4799
4829
4841
4932
5209
5276
5329
5546
5559
5571
5582
5639
5705
5871
5881
5917
6282

Safety, Ions,potassium
5877

Safety,drug
4576
5364
5767

Safety,equipment
5425
5695

Safety,techniques
5559
5665
5695
5767
6134

Scoliosis
6259

Sedation
4688
4689
4767
5020
5199
5384
5533
5705
5716
6096

Serotonin (5-hydroxytryptamine), antagonism
4402

Sleep
4722
4987
5664

Sleep apnoea
6090
6178

Statistics
4724

Sterilization,povidone-iodine
4515

Stress
4617
4890
6034

Stress, Monitoring, cardiopulmonary
6139

Surgery,abdominal
4615
4691
4748
4790
5120
5355
5432
5880
5897

5956
6148
6237

Surgery,aneurysm
6277

Surgery,autonomic response
5265

Surgery,cardiovascular
4322
4438
4567
4659
4857
4906
5250
5521
6138
6291

Surgery,craniotomy
4830
5127
5681

Surgery,endoscopy
6096

Surgery,gastrointestinal
4809
4873
5139
5930
6141
6242

Surgery,gynaecological
4780
4960
5516

Surgery,hepatic
4399
4485
4553
4758
4931
5259
5298

Surgery,laparoscopy
4402
4497
4782
4884
4917
5014
5185
5396
5462
5537
5709
6030
6136
6381
6400

Surgery,laparotomy
4638

Surgery,maxillofacial
4515
4795
4900
5373
5624
6055
6275

Surgery,metabolic response
5459
6312

Surgery,neurological
4783
5151

Surgery,non-cardiac
4429
5349
5469
5616

Surgery,ophthalmological
4620

Surgery,orthopaedic
4463
4473
4606
4916
4944
5210
5569
5586
5929
6113
6147

Surgery,otolaryngological
4458
5360
5683

Surgery,paediatric
4605
5816
6037

Surgery, phaeochromocytoma
4735
6021

Surgery,plastic
4731
5243

Surgery,postoperative period
4546
4705
4841
4894
5078
5105
5128
5272
5321
5392
5428
5565
5789
5831
5924
5969
6094
6237
6249
6263
6372

Surgery,preoperative period
4468
4469
4525
5178
5255
5298
5325
5356
5413
5599
5794
5837
5948
6054

Surgery,preoperative period, Complications, anaemia
6241

Surgery,preoperative period, Induction, anaesthesia
6084

Surgery,spinal
4425
5164
5649
6081
6177

Surgery,thoracic
4507
4917
4929
5029
5113
5272
5538
6002
6025
6044

Surgery,thyroidectomy
4982
5748
5781
6008
6371

Surgery,tracheotomy
4658

Surgery,transplantation
5823

Surgery,transplantation, Education,continuing, Education
5661

Surgery,urological
4825
5442
5523
5620
5625

Surgery,vascular
5194
5423
5948
6042
6087

Surgery,war injuries
5729
5736

Sympathetic nervous system,clonidine
5189

Sympathetic nervous system,dexmedetomidine
4485
4518
4643
4979
5057
5113
5117
5299
5308
5320
5359
5489
5706
5716
5857
5903
6400
6405

Sympathetic nervous system,dexmedetomidine, Anaesthetics volatile, Brain,hippocampus
5091

Sympathetic nervous system,dopamine
6021

Sympathetic nervous system,ephedrine
4978

Sympathetic nervous system,noradrenaline
5433

Sympathetic nervous system,salbutamol
5877

Systemic lupus erythematosus
5015

Temperature,body
4516

Temperature,metabolism
5920

Temperature,regulation
5246

Theories of anaesthetic action,cellular mechanisms
4384

Toxicity
4441
4769
5458

Toxicity,local anaesthetics
4775
4791
5201
5767

Toxicity,neurotoxicity
4315
4730
4913
5232

Transfusion
6419

Transfusion, autotransfusion
5188

Transfusion,complications
6419

Transfusion,stored blood
5628
5839

Uterus
6021

Uterus,oxytocin
5177

Veins,complications
6015
6355

Veins,jugular
4408
5346
6101

Veins,venepuncture
4395

Ventilation,airway pressure
4497

Ventilation,airway resistance
5037

Ventilation,anaesthetics
5615

Ventilation,apnoea
4562
5687
5737
6043
6376

Ventilation,artificial
6251

Ventilation,carbon dioxide response
6043

Ventilation,high frequency jet
4797

Ventilation,hyperventilation
6165

Ventilation,hypoventilation
6313

Ventilation,mechanical
4455
4487
4590
4657
4707
5061
5807
6074
6165
6176
6222
6349
6379

Ventilation,muscle, diaphragm
4487
4701
6098

Ventilation,muscle, respiratory
4457
5020
6098

Ventilation,one-lung
4918
4976
5054
5283
5362
6040
6065

Ventilation,one-lung, Equipment,tubes tracheal
5753

Ventilation,pattern
4904

Ventilation,positive end-expiratory pressure
4904
5284
5347
5614

Ventilation,postoperative
5061

Ventilation,pressure support
4371

Ventilation,spontaneous
5282

Ventilation,transtracheal
5778

Ventilation,ventilation-perfusion
5238

Vomiting,antiemetics
4884

Vomiting,nausea
4402
4564
4762
4942
5969

Vomiting,nausea, anaesthetic factors
4920
5641
5890

Vomiting,nausea, anaesthetic factors
5493

Vomiting,nausea, patient factors
4982
5493

European Society of Anaesthesiology **ESA**

Munich, Germany

Euroanaesthesia 2021

THE EUROPEAN ANAESTHESIOLOGY CONGRESS

29 May - 31 May