

EVALUATION OF OPERATIVE AND NON OPERATIVE MANAGEMENT OF BLUNT PAEDIATRIC LIVER INJURIES

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ABSTRACT:

Fifty four patients with blunt liver injuries were managed over the last 5 years (March 1991 - March 1996). Their age range was $1\frac{1}{2}$ to 12 years. Thirty eight were managed non operatively without morbidity or mortality and 16 patients underwent operation, 4 patients due to isolated blunt liver injuries and 12 patients required operation due to associated intra-abdominal injuries, with 2 post operative deaths. The last patient was operated 20 days post injury due to delayed bile leakage. Overall mortality was 3.7%.

Our criteria for operative intervention were unstable haemodynamic inspite of adequate fluid replacement, transfusion requirement of half of the patient's blood volume 35 ml - 40 ml blood / kg body weight. Early transfusion within 2 hours of admission, aspirated fluids other than blood and 25% or greater lobar disruption with moderate to severe haemoperitonium, on CT Scan.

Inspite of non operative management of liver injury gains wide spread acceptance, still there is a number of patients need operative intervention. So, the aim is to early identify those patients need for surgery to avoid delay in treatment.

INTRODUCTION:

The attitude suggested at present by the majority of authors in the management of serious liver contusion favours conservative treatment to excision¹. Little attention has focused on patients who fail this form of therapy or who undergo early operation due to haemodynamic instability. As a result, children with blunt liver injuries who are given a trial of non operative management are subject to the potential risks and indecision that accompany this form of care^{2,3}. So, early identification of patient requiring operation will limit the adverse effects of secondary injuries caused by hypovolaemia and hypoxia. Further more, it may prevent delayed rupture of the liver and reduce the long term

risk associated with excessive blood transfusions.

PATIENTS and METHODS:

Fifty four children, 36 male and 18 female with blunt liver injuries were seen and managed over the last 5 years (March 1991 - March 1996). Injury was sustained from motor vehicle accident or bad fall, age range was 1 $\frac{1}{2}$ to 12 years.

Initial evaluation and resuscitation was done in emergency room. For stable patients, Ultrasonography (US) was performed and CT Scan if there was free intraperitoneal fluids (FIF). The patients were then monitored with strict bed rest and constant clinical and laboratory assessment in Intensive Care Unit (ICU) for at least 72 hours depending on the extent of liver injury by CT Scan.

Ultrasonography was obtained every 24 hours and liver functions weekly until hepatic damage was seen to be stable. Studies were performed once a week until complete resolution.

Exploratory laparotomy was done for:

- a) Child who continues to be in shock from haemorrhage despite resuscitation.
- b) Developed instability inspite of continued resuscitation.
- c) Who received blood transfusion more than half of his estimated blood.
- d) Who aspirated abdominal fluids other than blood.
- e) Who CT Scan showed big liver tear more than 25% of lobar damage.

RESULTS:

The most common mechanism of injury was road traffic accident 37 patients (68.5%), followed by bad fall 17 patients (31.5%). Of 54 patients were managed over the last 5 years period, 38 patients were managed non operatively without morbidity or mortality (10 isolated liver injury and 28 associated injury), two of them received blood transfusion 30 - 35 ml / kg / body weight. All liver enzymes returned to normal within 3 to 8 weeks and injured liver was resolved by US within 2 - 3 months and type of liver injury by CT Scan ranging from I, II and III Table (1).

Table (1): Types of Liver Injury.

Type 1 Capsular tear and parenchymal disruption less than 1 cm. (fig. 1).
Type 2 Parenchymal fracture of 1 - 3 cms. (fig. 2).
Type 2a With subcapsular haematoma less than 10 cms. (fig. 3).
Type 2b With superficial laceration of less than 10 cms. (10 - 15%).
Type 3 Parenchymal fracture of more than 10 cms. (20 %).
Type 3a With subcapsular haematoma more than 10 cms. (fig. 4).
Type 3b With stellate lesion that arrive to the hilum of the liver (25 %).
Type 4 Lobar fracture 30% - 35%
Type 4a With massive intraparenchymal haematoma. (fig. 5 and 6).
Type 5 Bilobar fracture plus rupture of vena cava and supra hepatic veins > 50%. (fig. 7).

Note : All injuries were accompanied with haemoperitoneum.

Sixteen patients underwent surgery, 12 patients for associated other system injuries (spleen, kidney, pancreas, intestinal injury, IVC), Table (2), with 2 post operative deaths, one from severe crushed chest and severe head injury and the other from uncontrolled haemorrhage (IVC and hepatic vein). The last one was operated 20 days post injury from delayed bile leakage from sloughed necrotic area in the left lobe, with healing after successful debridement and drainage.

Four patients with isolated liver injury had various degree ranging from simple deep laceration with sub-capsular haematoma to severe stillate rupture of the right lobe, underwent successful surgery ranging from debridement, segmentectomy to segmentectomy and R hepatic artery ligation without morbidity or mortality.

Table (2): Associated Injuries

Associated injuries	Non-Operative	Operative
	n = 38	n = 12
Head Injury	16 (57%)	10 (83%)
Thoracic		
Pulmonary cont.	3 (10%)	7 (58%)
Myocardia cont.	-	1 (8%)
Rib fracture	5 (17%)	8 (66%)
Abdominal:		
Spleen	6 (21%)	6 (50%)
Kidney	5 (17%)	3 (25%)
Pancreas	-	1 (8%)
Intestine	-	2 (16%)
Bladder & Urethra	-	2 (16%)
Pelvic fracture	2 (7%)	2 (16%)
Long bone fracture	8 (28%)	5 (41%)

n = Patient Number

Table (3): Indications For Laparotomy

1. Continued unstable signs inspite of adequate fluid replacement
2. Transfusion requirement of half of the patient's blood volume
3. Early transfusion within 2 hours of admission
4. Aspirated abdominal fluids otherthan blood (bile, intestinal content)
5. Big liver laceration more than 25% of right lobe by CT Scan.

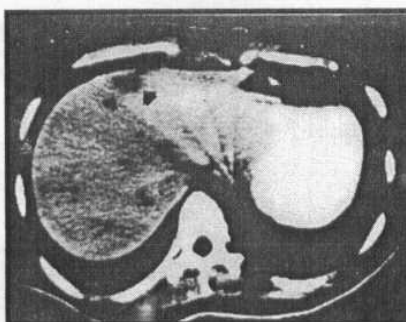


Fig. 1: CT showed a small capsular tear with a very small haematoma.

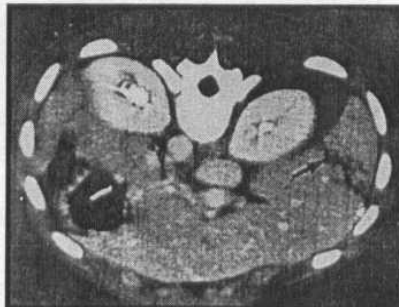


Fig. 2: CT scan with contrast showed parenchymal tear (fracture) in Rt. hepatic lobe about 3 cms.

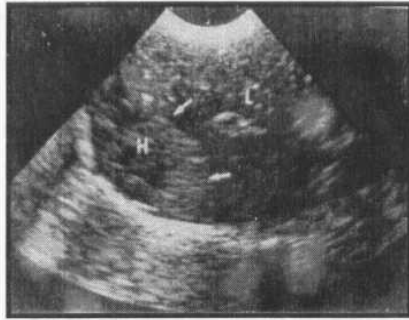


Fig. 3: U.S. revealed a hepatic tear with a subcapsular hematoma. 8 x 3.5 cms.

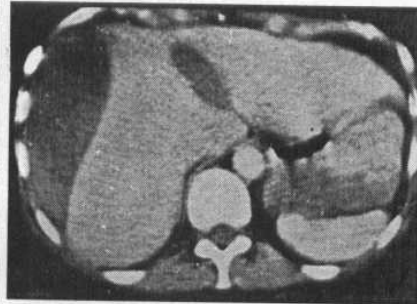


Fig. 4: Plain CT Scan showed a big subcapsular hematoma.

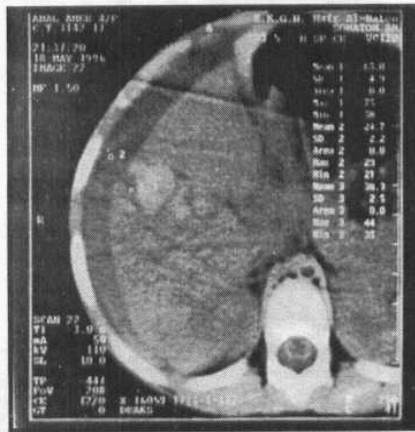


Fig. 5: CT Scan showed a Rt. hepatic Fracture with intra parenchymal hematoma and haemoperitoneum.

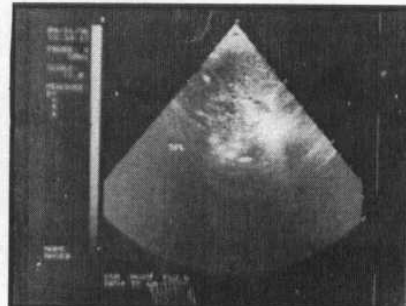


Fig. 6: U.S. showed an intra parenchymal hematoma.

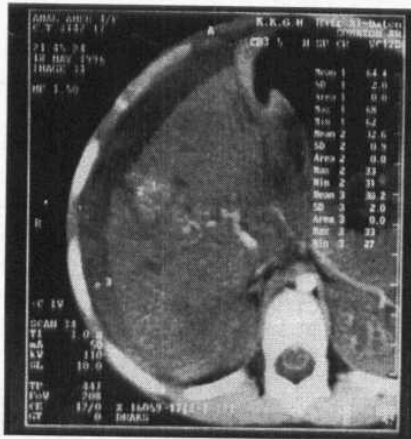


Fig. 7: CT Scan showed a bilobar fracture with parenchymal collection and haemoperitoneum.

DISCUSSION:

Although, several studies have reported successful non operative management of blunt liver injuries in children; little attention has focused on patients who fail this therapy or who undergo early operation due to haemodynamic instability^{4, 5}

Isolated blunt liver trauma is rare (25% in our study) being seen more commonly in association with injury to other organs^{6, 2, 7, 5, 8}. The liver is less commonly injured than spleen, but rupture of the liver with severe haemorrhage from intrahepatic vascular structures, extra vasation from major ducts can lead to a poor prognosis⁹. In deciding whether to proceed with exploratory laparotomy, it is necessary to take into consideration the volume of replacement as well as other clinical signs¹⁰, Table (3).

Table (3): Indications For Laporatomy

1. Continued unstable signs inspite of adequate fluid replacement
2. Transfusion requirement of half of the patient's blood volume
3. Early transfusion within 2 hours of admission
4. Aspirated abdominal fluids otherthan blood (bile, intestinal content)
5. Big liver laceration more than 25% of right lobe by CT Scan.

Determining the needs for operative intervention for blunt paediatric liver injury is not difficult, when patients present with haemodynamic instability and distended abdomen. Greater difficulty is encountered when the patient show early or late evidence of haemodynamic instability, but respond to fluids resuscitation; CT Scan is indicated if the child can be stabilized, because it provides specific information about the location and extent of organ injury and qauntitative assessment of intraperitoneal fluids^{11,12}.

Our result suggest operative intervention is inevitable for paediatric patients with large stillate fractures of the liver Type 4 (4 patients) and with major hepatic vein or retrohepatic vena caval injury (2 patients) and injury involving porta hepatitis (1 patient) and other associated intraabdominal injury with unstable haemodynamic (12 patients) Tab (2). Attempts to avoid operations in patients with these injuries, subjected them to possible secondary organ injury due to unexpected hypotension, excessive transfusion, sepsis due to seeding of necrotic liver tissue, delayed rupture and haematobilia^{2,3,13,14,15}.

The most common cause of death among the patients in this study was uncontrolled haemorrhage due to hepatic vein and vena caval injury (1 patient) followed by severe other associated chest and head injury (1 patient). Non operative management is an advance in the treatment of isolated liver trauma in children¹⁰.

Our opinion is that Type 1,2 and 3 liver injury can be treated conservatively with minimum morbidity (38 patients). As selective non operative management of paediatric liver injuries gains wider acceptance, indications for surgery must be recognized early, if the patient is haemodynamically unstable and has evidence of intra-abdominal haemorrhage; he need to go operating room. If patient is stable following fluids resuscitation and US showing minimal or moderate fluids and peritoneal taping proved blood only, an immediate CT Scan of the abdomen is indicated to estimate the amount of fluids and the degree of lobar injury. If lobar disruption is greater than 25% or near to portahepatis, this indicate surgical intervention, if there is ongoing haemorrhage as evidenced by a need for transfusion within 2 hours of admission or total transfusion volume is in excess of 35 ml / kg / body weight within 24 hours of admission, it is likely that operative intervention will be necessary to control the haemorrhage³. Early recognition of clinical and radiological indications for operative management, should improve the morbidity and mortality associated with paediatric liver injury.

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التقييم الجراحي والغير جراحي لإصابات الكبد غير الحادة في الأطفال

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يشتمل التقييم الدراسى على اربعة وخمسون طفلاً مصاباً بإصابات كبدية غير حادة فى الفترة ما بين مارس ١٩٩١ الى مارس ١٩٩٦ (خمس سنوات) ، وكانت أعمارهم ما بين سنة ونصف واثني عشر عاماً ، وثمانية وثلاثون طفلاً مصاباً ، تم علاجهم بدون جراحة وليست بينهم مضاعفات أو وفيات ، ستة عشر طفلاً أجريت لهم الجراحة بسبب أربع إصابات كبدية منعزلة وإثني عشر طفلاً بإصابات داخل البطن مع الإصابة الكبدية وحدثت الوفاة في حالتين بعد الإجراء الجراحي . والمريض الأخير أجريت له الجراحة بعد ٢٠ يوماً من دخول المستشفى بانسكاب السائل المرارى و نسبة الوفيات الكلية ٣,٧٪ .

المعايير التى اتبعتها للتدخل الجراحي :

- عدم ثبات ديناميكية الدم على الرغم من استمرار المحاليل الإحلالية .
 - احتياج لنقل دم أكثر من نصف حجم دم المريض (٣٥ مم - ٤٠ مم) لكل كجم من وزن المريض.
 - نقل الدم خلال الساعتين الأولى لدخول المستشفى .
 - شفت سوائل باطنية أخرى غير الدم .
 - تمزق ٢٥٪ أو أكثر من فص الكبد مع تجمع دموى بريتنوى معتدل أو غزير بالأشعة المقطعية والموجات الصوتية .
- إنه على الرغم من انتشار وزيوع الطريقة الغير جراحية لإصابات الكبد الغير حادة إلا أنه مازال هناك عدداً من المرضى الذين يحتاجون للتدخل الجراحي .
ولذلك كان هدف البحث هو التعرف على تلك الحالات لتجنب التأخير فى العلاج الجراحي .

