

ROLE OF CT SCAN IN DIAGNOSIS OF ACUTE ABDOMEN

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ABSTRACT:

Fifty three patients with clinical diagnosis of acute abdomen were included in this study (33 males and 10 females). Accurate diagnosis of acute abdomen is vital for correct management. CT scan is the first imaging modality for detection and diagnosis of acute abdomen and help to select the type of operation needed. All the patients were exposed to CT scan. CT scan results were compared with final clinical and surgical results.

INTRODUCTION:

The term acute abdomen refers to the presence of an acute attack of abdominal pain that may occur suddenly over a period of several hours. The patient with this symptoms complex may confront the surgeon, internist, pediatrician and obstetrician, creating a problem in clinical diagnosis requiring an immediate or urgent

decision regarding the etiology and method of treatment .

CT is one of different imaging modalities which are adopted for patients with acute abdomen to provide valuable data that contribute to a nearly accurate diagnosis.

Aim of the work:

The aim of the work is to assess the accuracy of CT scan in diagnosis of acute abdomen.

MATERIAL and METHODS:

This study was conducted prospectively on 43 selected patients 33 males , 10 females their ages ranged between 2.5-70 years referred to the diagnostic CT imaging department from emergency department and other disciplines of Al Hussein and Bab Sharia Universal Hospitals for urgent assessment of possible causes of their acute abdominal pain.

Scheme of Examination:

For each patient the following data would be recorded;

* Medical history and clinical examination ; including case number, sex , age, clinical presentation, clinical examination and laboratory results whenever found

* Provisional clinical diagnosis as stated by managing clinician .

Technique of CT followed in scanning:

CT sections are done in 8mm thickness every 8mm from the top of diaphragm through the bottom of the kidneys, then every 20mm through the pelvis . Evaluation of the scan sections were done primarily on the CT monitor with different window settings for abdomen and chest . Reconstruction in the sagittal or coronal planes were done when needed.

Follow up of cases which might include conservative and surgical manage-

ment and post-operative histopathology if available.

RESULTS:

This study was conducted, prospectively on 43 selected cases referred to the diagnostic imaging department for assessment with a history of acute abdominal pain complete documentation of all cases was done, including age, sex, clinical presentation, clinical examination, laboratory results, applied diagnostic imaging procedures and final diagnosis. The imaging diagnosis done by CT scan and compared with final clinical and surgical diagnosis. Statistical analysis of data was carried out and tabulated the selected cases involved 33 males and 10 females their ages ranged between 2.5- 70 years.

The verification of the results, being true or false was done. Then statistical calculations of sensitivity, specificity and accuracy of CT scan in diagnosis of acute abdomen was done .

Table (1): True and false computed tomographic diagnosis in acute abdominal conditions.

Compute tomographic diagnosis	Number	Percentage
True positive	38	88.337 %
False positive	2	4.65 %
True negative	3	0.98 %
False negative.	0	0.00 %

Table (2): Sensitivity, Specificity, and Accuracy of computed tomographic diagnosis of selected 43 cases with acute abdominal conditions.

sensitivity TP/(TP+FN)	specificity TN/(TN+FP)	accuracy TP+TN/(TP+TN+FP+FN)
100%	60%	95.3%

TP = True positive
FP = False positive

TN = True negative
FN False negative

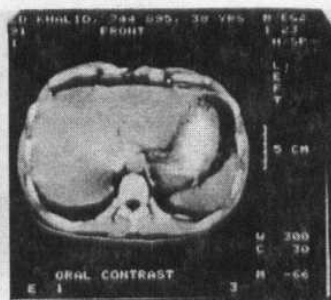
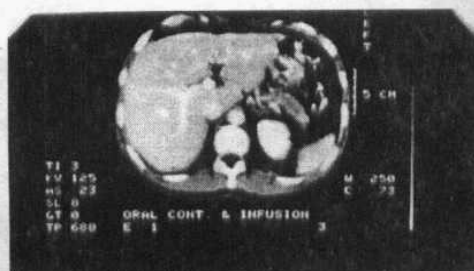
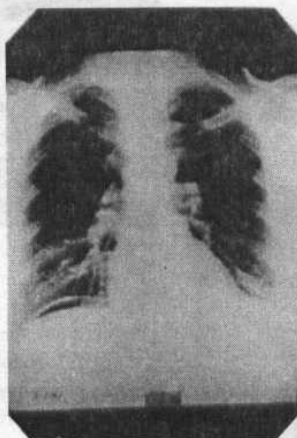


Fig. (1): Ruptured duodenal ulcer A: Chest upright view shows air below the right hemidiaphragm.
B: CT abdomen precontrast film with free gas at peritoneal cavity, around the stomach and liver
C: CT abdomen post contrast film with free gas at peritoneal cavity around the stomach and liver.
NB: Immediate laparotomy was decided.

The surgeon found perforation at ulcerate area at the region of duodenal cap.
Repair with omental flap was done and drainage was applied.

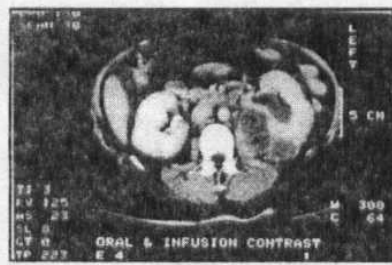


Fig. (2): Left renal abscess with perirenal extension.

CT Abdomen : Left renal abscess with considerable extension into the perirenal and paranrenal spaces.

NB. CT guided aspiration and drainage of abscess was performed.

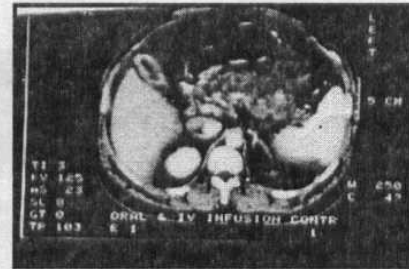
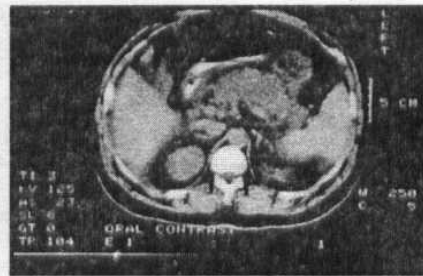


Fig. (3): Acute pancreatitis

A: CT abdomen with irregular outline, diffusely enlarged pancreas that showed mixed densities in some areas.

B: CT abdomen post contrast film with patchy contrast enhancement of pancreas.

NB: Conservative treatment was carried out and the condition subsided about 2 weeks later.

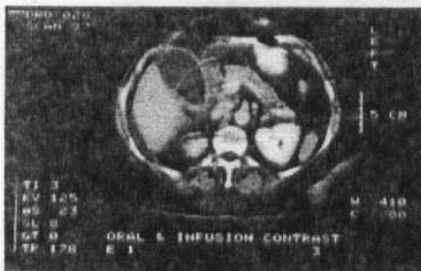
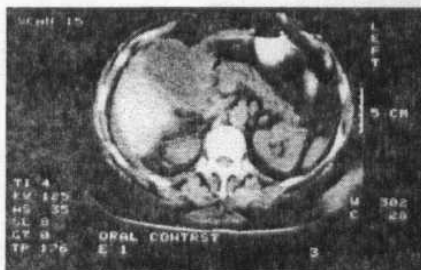


Fig. (4): Acute pancreatitis with chronic calculous cholecystitis (A&B).

CT abdomen with distended thickened walled gallbladder, as well as areas of mixed densities in pancreatic parenchyma at post enhancement film.

NB: Conservative treatment was decided and the condition subsided 3 weeks later, after which cholecystectomy was done.

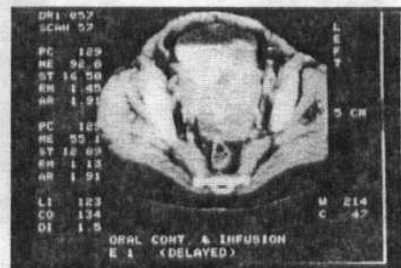


Fig. (5): Post operative pelvic (Abscess)

CT pelvis shows marginally enhanced multilocular mass between the rectum and uterus.

NB: Laparotomy was done with drainage of abscess.

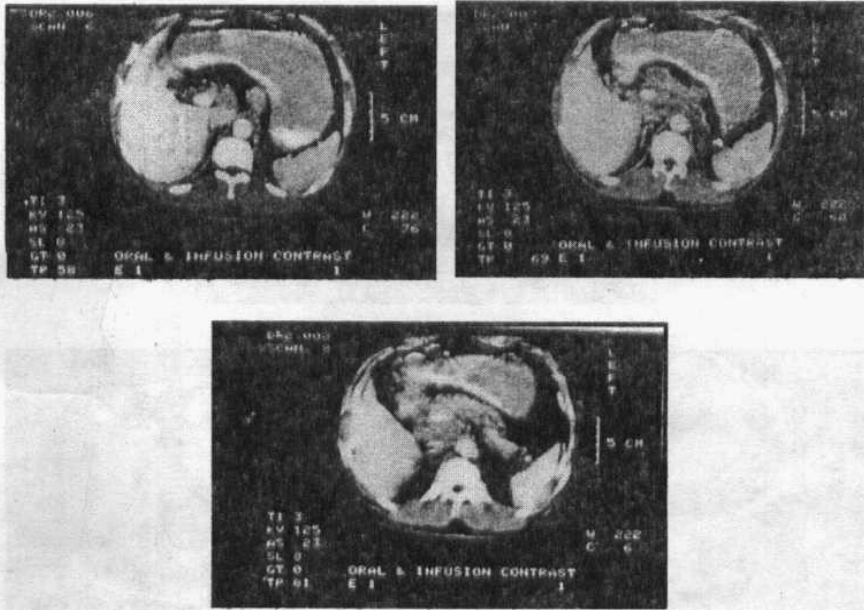


Fig. (6): Pyloric carcinoma causing acute abdomen by gastric outlet obstruction (A,B,&C).

A large mass extending from pyloric region of stomach, posteriorly and marginating with the head of pancreas. Multiple lymph nodal masses along lesser curvature of the stomach, porta hepatis and in paraaortic region in retroperitoneum.

DISCUSSION:

The term acute abdomen implies presentation of patient to his or her doctor with a history of undiagnosed abdominal pain lasting less than one week.

Prudent use of imaging techniques facilitates diagnosis and management of many abdominal emergencies. Faced with multiplicity of imaging procedures, the physician must select the appropriate modality and sequence. Failure to do so may delay or mask the diagnosis or even suggest an incorrect diagnosis. The choice of appropriate techniques is best made by

consultation between clinician and radiologist. CT scan beside plain X-ray and ultrasonography is available in most radiological department.

Under certain circumstances, the need for surgical management will supersede or obviate the need for imaging procedures as in most cases of appendicitis and abdominal catastrophes such as ectopic pregnancy and ruptured abdominal aortic aneurysm. When surgical treatment is needed but not urgently, or a medical conditions is present, abdominal imaging has a major role.

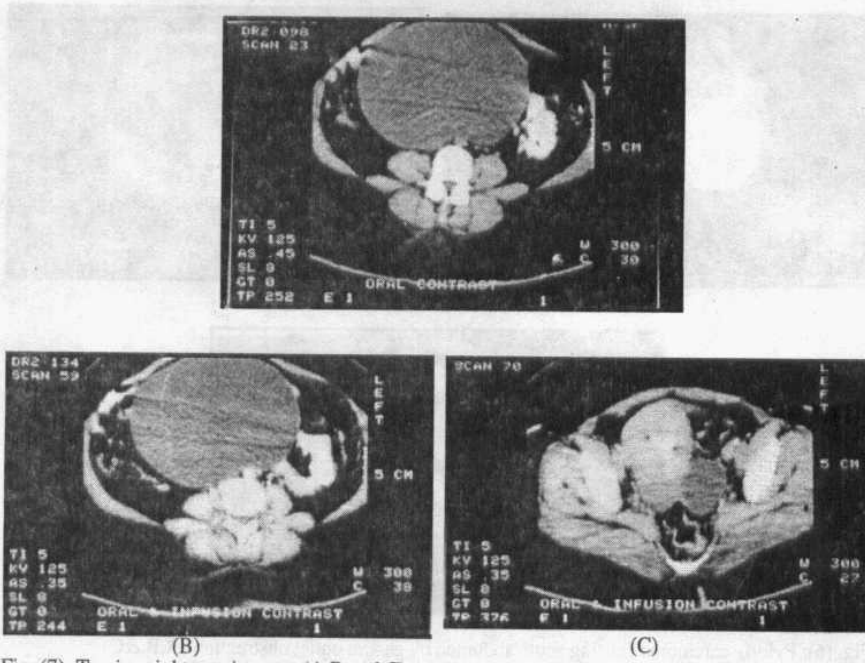


Fig. (7): Torsion right ovarian cyst (A,B and C).

CT Pelviabdomen : shows a large well defined cystic mass arising from right adnexal region extending up in the abdomen bulging the anterior abdominal wall.

NB: Laparotomy was made and right salpingo-oophorectomy including the huge cyst was done.

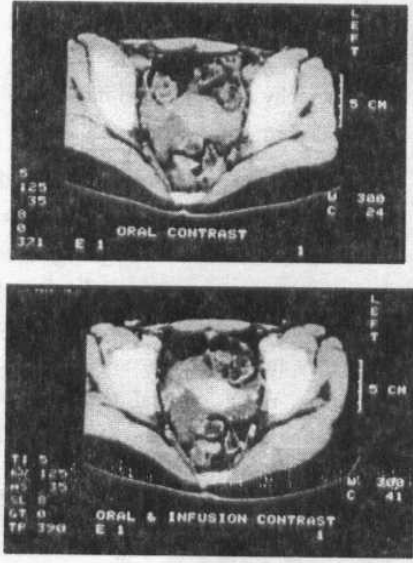


Fig. (8): Ruptured hemorrhagic corpus luteum cyst.

CT. PELVIS (A AND B) oral and infusion contrast films. SHOW right parauterine ill defined swelling with fluid collection at douglas pouch. the bowel showed slight patchy enhancement.

NB: Laparotomy was done excision of cyst was achieved with preservation of the remaining affected ovary. A drain was ap-

Jeffrey (1988) conducted that CT had a major impact on the clinical management of patients with diverse abnormalities as pancreatitis, blunt abdominal trauma, or intra-abdominal abscesses. Also, CT was rapidly emerging as a clinically important method of imaging patients with acute gastrointestinal abnormalities as diverticulitis, bowel obstruction and infarction and abscesses secondary to intestinal perforation. In addition CT was now a primary method of guiding a variety of intra-abdominal interventional procedures, such as percutaneous drainage of abdominal abscesses. According to Korobkin et al, (1980)

CT was more accurate than US in detecting abdominal abscesses.

Van Sonnenberg et al,(1984) estimated that approximately 90% of all intraabdominal abscesses could be safely approached percutaneously with CT guidance with success rates on order of 85% in large series.

In the present study CT was utilized in 50 patients. No false negative results were obtained in this study, indicating the extreme sensitivity of CT (100%) and only 2 false positive diagnosis indicating a high specificity of 60% and accuracy of 95.3%. Computed tomography guidance of interventional techniques was carried out in management of 7 cases, 5 cases with intraabdominal abscesses, 1 case with hepatic hematoma, and one case for biopsy from suspected malignant hepatic neo-

plasm. These results were in agreement with the reports of Jeffrey (1988), Korobkin et al.(1980), Van Sonnenberg et al. (1984).

The use of CT in the evaluation and management of blunt abdominal trauma was advocated by Wing et al., (1985) being non-invasive, easy to perform and had been shown to be highly sensitive (100%), specific (96%) and accurate (97-6%). This report was accepted and coincided with reports of Ishikawa (1986), Mccort (1987) as well as with Heller and Verdile (1992) whose added that the relative ubiquity of CT scanners with the popularization of diagnostic peritoneal lavage technique had led to the development of protocols dictating operative and non operative therapy based largely on those two diagnostic measures. In the present study, there were two cases out of totally examined 50 selected cases (4%) who were victims of blunt abdominal trauma, in those cases CT showed with exact anatomical detail, the extent of injury involving the liver in both of them. These results agreed with reports of Wing et al., (1985). Ishikawa (1986), Mecort (1987) as well as with Heller and Verdile (1992).

Rotman et al., (1986) calculated 70% detection of pancreatic abnormalities with CT of unselected patients with acute pancreatitis and 100% of those with severe disease.

Siegelman et al., (1980) added that complications of pancreatitis including

peripancreatic fluid collection, pseudocyst, pancreatic necrosis and pancreatic abscess, could be detected using CT scan. Also Chang and Lepanto (1992) concluded that CT imaging remained the primary modality used in the evaluation of pancreas. In the present study, the CT diagnosis of acute pancreatitis whether focal or diffuse was reached out in 8 cases out of the totally examined 50 cases with CT, in 7 cases of them, the CT diagnosis of acute pancreatitis was unique modality reporting the pancreatic lesion. These results agreed with the reports of Rotman et al., (1980) and with Chang and Lepanto (1982).

CT scanning was the diagnostic modality of choice in cases of renal and peritoneal abscesses formation, since it defined the lesion, its extent, and surrounding anatomy (Moody et al., (1980).

Moreover, Loberant (1992) added that abdominal and pelvic CT with contrast enhancement provided an accurate picture of the anatomic and functional status of the kidney, including renal perfusion, so they could evaluate renal parenchyma and collecting system, the extra renal space, the course of ureters and filling of the urinary bladder. In agreement with these reports, CT was utilized in the present study in 8 cases with renal lesions, all cases had true positive results with CT diagnosis, 4 cases with tumour lesions (whether benign or malignant), 3 cases with renal ab-

cesses formations and one case at which CT was done and showed the adequacy of applied nephrostomy tubes to bilateral hydronephrotic kidneys resulting from a big retroperitoneal tumour diagnosed by U.S

In the present study, there was one case of symptomatic splenic arterial aneurysm, CT diagnosis was straightforward in diagnosing a splenic artery aneurysm with intramural thrombosis likely causing symptoms, This result agreed with the reports of Heller and Verdile (1982) whose stressed that in stable patient with suspected symptomatic abdominal aneurysm, the great detail provided by traditional contrast angiography or contrast enhanced CT scan ordinarily made one or both of those procedures the method of choice.

Accordingly, computed tomographic study is a powerful method to evaluate the full extraluminal extent of gastrointestinal abnormalities and to detect abnormalities of extraenteric organs and tissues. In some circumstances such as trauma and suspected abdominal abscess, CT should probably be the initial imaging test. Also, when other imaging tests are non-revealing, CT can prove valuable information and often suggest a clinically unsuspected gastrointestinal abnormality.

Mirvis et al., (1980) concluded that the use of CT scan in the diagnosis of acute cholecystitis had not been fully explored and it was not likely to be as helpful as ultrasound and nuclear medicine

studie. Since CT scan were very poor for detection of gall stones and much like ultrasound, detected only indirect signs of acute cholecystitis such as local edema and pericholecystic fluid collection Balthazar and Gordon (1989) concluded that CT would play a significant role in the detection and diagnosis of primary appendiceal lesions. They also added that the CT scan was useful not only in diagnosing and evaluating cases of complicated appendicitis but also in detecting mild uncomplicated forms missed by conventional radiology modalities. CT could cover extension of the disease for from the appendiceal region and was highly sensitive in depicting perforations with small amount of extraluminal air.

Whitley and Walsh (1985) achvised the use of CT as an adjunctive diagnostic modality for U.S in some gynecological lesions of acute abdomen, they stated that the ability of CT to provide specific information about the tissue density enabled differentiation between solid , fluid and fatty lesion

Summary and conclusion

The term acute abdomen refers to the presence of acute attack of abdominal pain that may occur suddenly over a period of several hours . Despite the fact that careful history taking and proper physical examination are essential for an accurate diagnosis of acute abdominal conditions . The need for adjunctive diagnostic imaging modalities are mandatory for rapid ac-

curate decision making the aim of this work was to assess the accuracy of CT in diagnosis of acute abdomen. This study was conducted, prospectively on 50 selected patients with acute conditions in period (1995-1997) computed tomography would supply the definitive diagnosis in patients whose plain radiographs and ultrasound were positive but did not yield a definitive diagnosis, or in patients with normal or equivocal plain and ultrasound studies. Computed tomography has the advantage of showing superb anatomical details of all abdominal structures, including the retroperitoneum, spine and abdominal wall .

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دور الأشعة المقطعية بالكمبيوتر في تشخيص الآلام الحادة للبطن

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يطلق إسم حالات البطن الحادة علي المرضى الذين يعانون من نوبات مفاجئة من آلام البطن التي قد تحدث سريعاً خلال عدة ساعات متعددة . ويتوجه المرضى إلى استشارة الأطباء المتخصصين ويواجه هؤلاء الأطباء بضرورة اتخاذ قرار فوري وعاجل . وتقوم وسائل التصوير الطبى المختلفة بدور رئيسى في فحص تلك الحالات حيث يتم التوصل إلى دقة وسرعة التشخيص الذى يمكن بواسطته تحديد نوع العلاج المناسب لذا كان الهدف من هذا البحث هو تقييم دور الأشعة المقطعية بالكمبيوتر في تشخيص مرضى آلام البطن الحادة من أجل سرعة التوصل إلى التشخيص الدقيق واتخاذ القرار المناسب للعلاج.

إشتمل هذا البحث علي ثلاثة وأربعون مريضاً يعانون من آلام البطن الحادة وتم تحويلهم إلى قسم الأشعة المقطعية من أقسام الجراحة والطوارئ بمستشفى باب الشعرية والحسين الجامعى وكانت دقة التشخيص بالأشعة المقطعية ٩٥.٣٪ وقد أثبت البحث أن الأشعة المقطعية تعطى التشخيص القطعى للمرضى الذين أوضح فحصهم بالأشعة العادية والموجات فوق الصوتية تشخيصاً إيجابياً ولكنه غير قطعى كما تمتاز الأشعة المقطعية بأنها تعطى صورة واضحة متكاملة لجميع أعضاء وأجزاء البطن والحوض والأجزاء الواقعة خلف الغشاء البريتونى.