ORIGINAL ARTICLE

Occurrence of Abdominal Ultrasonographics Findings verses CT Scan in Detection of Intra-Abdominal Visceral Injuries

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ABSTRACT

Background: Abdominal trauma may cause a significant diagnostic challenge to the trauma surgeons as well as radiologists. Clinical findings are often unreliable and have low sensitivity for diagnosis of intra-peritoneal injuries following such injuries. Ultrasound imaging is a common method of diagnosing intra-abdominal injuries.
Aim: To determine the occurrence of abdominal ultrasonographical findings verses with CT scan in detection of intra-abdominal visceral injuries in patients coming to radiological department of Nishtar Hospital, Multan.
Study Design: Cross sectional study.
Setting: Radiology Department, Nishtar Hospital Multan
Duration with Dates: Four months duration from 16th March2016 to 24th June 2016.
Methods: Patients were included in study on the basis of history and clinical examination reporting to radiological department of Nishtar hospital Multan with suspicion of visceral organ injuries (like liver, spleen, pancreas and kidneys) requiring abdominal USG evaluation. All ultrasound examinations were done free of cost by the researcher on FUKUDA DENSHI (Model: TELLUS, UF-550-XTD) followed by CT scans abdomen of all these patients free of cost on spiral CT scan (Model: TOSHIBA, AQUILION, 16 slices) using non ionic contrast media.
Results: Mean age of presentation of patients was 35.35±11.27 years. There were 63(75.90%) male and 20(24.10%) female. Free fluid was detected in 53(63.86%) patients on ultrasonography as well as on CT scan. Sensitivity and specificity of ultrasonography in detecting abdominal injuries were 68.97% and 88% respectively, whereas its PPV was 93.02% and NPV was 55%. Diagnostic accuracy of USG was 74.70%.
Conclusion: Ultrasonography is a reliable tool for detecting abdominal injuries.
Keywords: Intra-abdominal injury (IAI), Ultrasonography (USG), Computed tomography (CT).

INTRODUCTION

Assessment of patients who have sustained abdominal trauma may create a significant diagnostic challenge to the most seasoned trauma surgeon to determine the extent of abdominal injury and the need for surgical intervention on the basis of clinical presentation alone[1]. Abdominal injury usually occurs due to road traffic accidents, fall from heights or during sports[2]. Clinical findings are often unreliable and have low sensitivity for diagnosis of intra-peritoneal injuries following such injuries. Prevalence of intra-abdominal injuries varies widely, ranging from 7.7% to 65%[3]. Most frequently injured organs are spleen (40-55%), liver (35-45%), pancreas (29%), kidneys (11%) and small bowel loops (5-10%)[4]. In United States, surgeons and emergency physicians have developed an interest in Ultrasonography (USG) and are attempting to incorporate it as an initial diagnostic study in the examination of patients with abdominal trauma or as an ancillary study to either Computed tomography or diagnostic peritoneal lavage[5]. The reported sensitivity and negative predictive value for USG in depicting hemoperitoneum vary from 78% to 99% and from 93% to 99%, respectively. Ultrasound imaging is a common method of diagnosing intra-abdominal injuries. USG is rapid, noninvasive, and relatively inexpensive. It is also useful as an initial rapid screening procedure in abdominal injuries for surgeon decision making during resuscitation[6]. USG has been described as an accurate method for detection of hemoperitoneum in adults[7]. USG has a high specificity for diagnosing damage to the solid organs like spleen and for the presence of fluid (hemoperitoneum). USG is primary imaging modality of choice for diagnosis of IAI[8]. Overall, sonography has sensitivity between 71% and 88%, specificity between 92% and 97%, and is 91% to 96% accurate[9]. CT is the diagnostic modality of choice for non-operative management of solid visceral injuries but it is not usually the first option, because it is relatively expensive, requires radiation exposure,

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injection of contrast material and patients' transport[10]. But CT has higher accuracy in assessment of solid organ injuries and other related to trauma[11]. IV contrast-enhanced CT is even more sensitive for detecting solid visceral injury[12]. With the use of dynamic CT and power injection of IV contrast material, high CT attenuation can be achieved within the vascular system during scanning[13]. The high attenuation of intravascular contrast material aids in the imaging of visceral injury by increasing the attenuation of normal parenchyma and also permits sites of active hemorrhage to be visualized. Identification of the exact anatomic site on sites of active hemorrhage, the presence and extent of abdominal visceral injury, and the quantity of hemoperitoneum influences the decision about whether to use surgical intervention or not[14]. The accuracy of CT in hemodynamically stable abdominal trauma patients has been well established. Sensitivity between 92% and 97.6% and specificity as high as 98.7% with a negative predictive value (99.6%) of CT has been reported in patients subjected to emergency CT[15]. USG can aid in early triage of patients for speedy management decision saving time and reducing patient mortality as well as cost.

MATERIALS AND METHODS

This Cross sectional study was carried out in the Radiology Department, Nishtar Hospital Multan which is a tertiary care referral center having equipped with Ultrasound and CT scan facilities from March 2016 to June 2016. A total of 83 samples were included in the study after fulfilling the inclusion/exclusion criteria. This study was completed four months duration from 16th SAMPLE SIZE

A total of 83 patients were included in the study on the basis of history and clinical examination reporting to ER of Nishtar hospital Multan with suspicion of solid visceral organ injuries (like liver, spleen, pancreas and kidneys) requiring abdominal USG evaluation. Proper permission was taken from institutional ethical committee to conduct the study. involved to the patient while taking part in this study.

Data were entered in computer and analyzed by using statistical software SPSS 10.0. Frequencies and percentages were calculated for outcome variables like correct findings of USG. Descriptive statistics was applied to calculate mean and standard deviation for age of the patients. Stratification was done for age and gender to see the effect of these on outcome as well as type of injury. Sensitivity, specificity, diagnostic accuracy, positive and negative predictive values were calculated taking CT as gold standard.

RESULTS

Present study included 50 patients of either sex with abdominal trauma. Mean age (±SD) of presentation of the patients was 35.35±11.27 years. Majority of the patients 33(39.8%) were between 25–34 years of age. Followed by 20(24.1%) patients who were 35-44 years of age. There were 13(15.7%) patients between the age of 15-24 years, 12(14.4%) patients between the age of 45-54 years and 5(6.02%) patients of the age of 55 years or above (Table-1). There were 32(75.90%) male and 18(24.10%) female. Free fluid was detected in 35(63.86%) patients on ultrasonography as well as on CT scan (Table-2). Abdominal injury was evident in 27(51.8%) patients on USG while ultrasound scans showed no injury in 23(48.2%) patients (Table-3) while abdominal injury was apparent in 35(69.9%) patients on CT scans and 15(36.1%) patients without any injury. Out of 43 patients with abdominal trauma detected on ultrasound, USG revealed splenic injury in 21(48.84%) patients, liver injury in 12(27.91%) patients, kidney injury in 6(13.95%) and pancreatic trauma in 4(9.30%) patients respectively in patients with abdominal trauma. Out of 35 patients with abdominal injury on CT scan, spleen was the most commonly injured organ 31(53.45%) patients detected on CT scans followed by liver injury in 19(27.59%) patients. Kidney was detected in 7(12.07%) patients and pancreatic injury was detected in 4(6.89%) patients on tomography scans. Sonographic scans detected abdominal injuries in 20(46.51%) patients between 25–34 years followed by 9(20.93%) patients between 15–24 years of age. Ultrasonography scans revealed 32(74.42%) males and 11(25.58%) females with abdominal trauma out of 43 patients. Ultrasonography detected 12 patients with splenic injury, 4 patients with liver injury, 2 patients with kidney and 2 patients with pancreas in 25–34 years of age. Out of 32 males with abdominal trauma, 16 had splenic injury, 8 had liver injury, 5 had kidney and 3 had pancreatic trauma. Similarly 5 women had splenic injury, 4 had liver, 1 had kidney and 1 had pancreatic injury. Sensitivity and specificity of ultrasonography in detecting abdominal injuries were 68.97% and 88% respectively, whereas its PPV was 93.02% and NPV was 55%. Diagnostic accuracy of USG was 74.70%.

Table-1: Age distribution (n=83)

Age (years)	n	%age
15 — 24	10	15.7
25 — 34	16	39.8
35 — 44	12	24.1
45 — 54	10	14.4
55 and above	0 2	6.0

Mean age±S.D. = 35.35±11.27 years

Table-2: Free fluid detected on ultrasound (n=50)

Free Fluid	n	%age
Yes	33	63.9
No	17	36.1

Table-3: Abdominal injury detected on ultrasound

Free Fluid	n	%age
Yes	27	51.8
No	23	48.2

DISCUSSION

Abdomen is one of the most common and important regions in respect to trauma. Abdominal injuries are often confounded by altered mental status, distracting injuries, or lack of historical information, and may present challenges in management. Early diagnosis and treatment of abdominal injuries affects the prognosis of patients significantly. Historical data, while often lacking, may provide invaluable information when evaluating a patient with abdominal trauma. Physical findings may be unreliable because of decreased patient consciousness, neurologic deficits, medications, or other associated injuries. Some studies cite physical examination as only 55% to 65% sensitive for diagnosing injury in those sustaining abdominal trauma, however, it is still the cornerstone for primary assessment. In hemodynamically stable patients with abdominal injuries abdominal pain, tenderness, and peritoneal signs are the most reliable findings for intra-abdominal injury and can be found in up to 90% of those with injury. However, several studies demonstrate that even in these patients, significant injury may be missed with physical exam alone. Therefore, absence of physical findings does not preclude injury and the need for further observation and diagnostic testing. The choice of the right method at the right time is crucial in the treatment of patients with blunt abdominal trauma. A reliable, bedside, economic, and rapidly performed screening test can be pivotal. This test should differentiate between patients needing emergency laparotomy, patients who are improved with additional diagnostic workup, and patients in whom further diagnostic workup is not required, without putting in danger the patients' clinical outcome. In the last several years' new approaches to the diagnosis and management of abdominal trauma, including bedside ultrasound, newer generation computed tomography scans, laparoscopy, and the ability for selected non-operative management expedite identification of life threatening injury and offer new options in treatment.

CONCLUSIONS

It is concluded from the study that ultrasonography is a reliable tool for detecting abdominal injuries.

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