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DIAGNOSTIC ACCURATENESS OF ULTRASOUND IN RECOGNITION OF VISCERAL INJURY IN BLUNT TRAUMA TO ABDOMEN

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Abstract:

Introduction: *Blunt abdominal trauma (BAT) is common in the emergency department. The present study aims to determine the incidence of spleen injuries following blunt abdominal trauma and the typical injuries leading to it. Spleen trauma is of great medical and legal importance.*

Aim: *To determine the diagnostic accuracy of ultrasound in the detection of visceral injuries in blunt abdominal trauma, taking into account CT as the gold standard.*

Methods: *This study cross-sectional was conducted at the Department of Diagnostic Radiology, DHQ Hospital Dera Ismail Khan for one-year duration from April 2019 to April 2020. The sample size was calculated using the WHO sample size calculator assuming a sensitivity of 93.3% 2.6, a specificity of 85% 2.6, an incidence of 65% 3, a desired precision of 10% and a confidence interval of 95%. It turned out to be 141. The sampling was done using the random sampling technique.*

Results: *In this study, the mean age was 30 years with an SD ± 2.13. Sixty-seven percent of patients are male and 33% of patients are female. The diagnostic accuracy of ultrasound of visceral trauma in blunt abdominal trauma was analyzed: ultrasound sensitivity 93.5%, specificity 84.8%, positive predictive value 82.8%, negative predictive value 94.3%, and diagnostic effectiveness 88.65%.*

Conclusion: *Ultrasonography has high diagnostic efficacy in screening patients with blunt abdominal trauma.*

Keywords: *ultrasound, computed tomography, visceral trauma, blunt abdominal trauma.*

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INTRODUCTION:

Visceral injuries in blunt abdominal trauma have become very common around the world; requires rapid evaluation and management [1-2]. Blunt abdominal trauma usually occurs as a result of a traffic accident of 62.86%, a fall from a height of 20%, a seizure 11.43%, and other 5.71%. The frequency of abdominal injuries varies considerably and ranges from 7.7% to 65% 3. Out of 70 patients, 52 (74.3%) were male and 18 (25.7%) were female. Ultrasonography has high diagnostic efficacy in screening patients with blunt abdominal trauma. Ultrasound will be considered a safer diagnostic tool [3-4]. It can be performed quickly at the patient's bedside, even without interrupting CPR. Ultrasound examination is usually limited to the detection of free fluid in the abdominal cavity (indirect sign of organ damage), abdominal parenchyma contusions, hematoma and lacerations (direct signs of injury. In the primary evaluation of trauma patients in the emergency department, ultrasound is common practice. Sensitivity and specificity). Ultrasound for the detection of visceral injuries in the abdominal cavity is 93.3% and 85%, respectively. CT is the gold standard in trauma patient evaluation because it is panoramic and very sensitive compared to ultrasound. According to previous studies, it can be used when available [5-6]. easy to perform, it is reproducible at short intervals and is able to provide information quickly, while ultrasound has a low sensitivity in detecting parenchymal damage and ignores major damage. In hemodynamically stable patients, the diagnostic method of choice is intravenous contrast CT [7-8]. useful in detecting abdominal injuries but they are certain and in conditions where it is difficult to do, e.g. in patients with contraindications to the use of CT contrast agents, exposure to radiation, and in patients with hemodynamics, because the patient must be transported to a radiological facility with lower income or to facilities, where such facility is not available. However, in such conditions, we can easily perform an ultrasound, it is easily available in most configurations and is cheaper. If this test proves that ultrasound is as reliable as CT in detecting blunt abdominal trauma, then we can provide the patient with a simple and economical alternative to CT.

MATERIALS AND METHODS:

The study included a total of 141 reported emergency cases with blunt abdominal trauma over the age of 18 and under 65, and excluded those that had already been operated on, were pregnant, had penetrating injuries or burned. conducted at the Department of Diagnostic Radiology, DHQ Hospital Dera Ismail Khan for one-year duration from April 2019 to April 2020. The study was conducted in patients with blunt abdominal trauma and strong clinical suspicion of IAI who were hemodynamically stable. Confirmatory variables were identified and excluded from my exclusion criteria. The ultrasound examinations were performed with a convex 3.5 / 5.0 MHz probe on the Mind ray Doppler US Machine. The presence of free fluid in the abdominal cavity was considered a positive symptom of hemoperitoneum. Visceral organs were assessed for parenchymal abnormalities including interstitial masses, hematomas, lacerations. In medical ascites (eg cirrhosis of the liver or other cause of non-traumatic intraperitoneal fluid), the free fluid was considered positive as hemoperitoneum cannot be excluded. The ultrasound was followed by a CT scan. CT examinations were performed using spiral CT. Free fluid with a damping value> 30 Hounsfield units (HU) is designated as hemoperitoneum. CT results were used as a diagnostic standard. The scans were viewed by one radiologist consultant from the diagnostic radiology department P.I.M.S who would be blinded to the ultrasound results. Data were analyzed in SPSS version 10. The mean, median, mode, and standard deviation were calculated for numerical data such as age and frequency percentages for categorical data such as gender. A 2 x 2 table was used to determine the sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy.

RESULTS:

Age distribution among 141 patients was analyzed as 42 (30%) patients in the age range 20-30 years, 50 (35%) patients in the age range 31-40 years, 35 (25%) patients in the age range 41-50 years, 14 (10%) of patients were in the age range 51-60 years. The mean age was 30 years with an SD ± 2.13 (Table 1).

Table 1: Age Distribution (n=141)

Age	Frequency	%age
20- 30 years	42	30
31-40 years	50	35
41-50 years	35	25
51-60 years	14	10
Total	141	100

The gender distribution of 141 patients was analyzed, as 94 (67%) patients were male and 47 (33%) patients were female (Table 2).

Table 2: Gender Distribution (n=141)

Gender	Frequency	%age
Male	94	67
Female	47	33
Total	141	100

The diagnostic accuracy of ultrasound of visceral trauma in blunt abdominal trauma was analyzed: ultrasound sensitivity 93.5%, specificity 84.8%, positive predictive value 82.8%, negative predictive value 94.3%, and diagnostic effectiveness 88.65% (Table 3).

Table 3: CT Scan VS Ultrasound Findings (n=141)

Ultrasound findings	CT scan findings		Total
	Visceral injury present	Visceral injury absent	
Visceral injury present	58(83%)	12(17%)	70(49%)
Visceral injury absent	4(6%)	67(94%)	71(51%)
Total	62(44%)	79(56%)	141(100%)

DISCUSSION:

Computed tomography is very sensitive in detecting blunt abdominal injuries. The sensitivity of computed tomography for the detection of visceral organs in our study was approximately 93.5%, and the specificity was 84.8%. This is similar to the study by Stafford et al, which showed 92.9% sensitivity to parenchymal damage and 84% specificity. Our results are also comparable to the studies by Kailidou et al. This is in line with Willmann's research. The mean age of the patients was 37.7 years, which is almost the same as found in most studies. In our study, the majority of blunt abdominal trauma was caused by road traffic accidents (70%). A study by Dattani et al also showed that a road traffic accident was the most common mechanism of abdominal injuries [9-10].

One case of kidney damage was missing in our study. The reason for the missed kidney damage on CT may be that the contrasting film was made very early, around 30 seconds [11-12]. According to the literature, in order to properly enhance the renal contrast, the exposure should be performed slightly later than in the case of normal abdominal computed tomography, ie approximately 70 seconds after the start of IV contrast infusion. IC injuries were omitted in CT, so the sensitivity and specificity of CT in bowel / mesenteric injuries were 75% and 100%, respectively, in our study. In a study by Stuhlfaut JW et al., 2 false negatives and 6 false positives were obtained. of these false positives were women and had minimal free fluid in the pelvis, which was not later confirmed on CT as a hemoperitoneum. The other two false positives were related to cirrhosis and medical ascites and were interpreted as non-traumatic CT abnormalities. In a study by Rhea JT et al. In 744 patients, out of 51 patients who had free fluid detected on ultrasound, false-positive results were obtained; of these 9 patients, 7 were women who had pelvic free fluid. Therefore, it was found that the majority of these false-positive results came from the physiological fluid observed in women [13-14]. In screening BAT patients with ultrasound, the most important concern is false negatives, not false positives. There were only 2 false negatives in our study. It is clear that in both the previous and our current study, one of the most important causes that led to the false-negative results was gastrointestinal injury. When there is no free fluid in the abdomen, ultrasound is not effective in detecting gastrointestinal injuries. Isolated solid organ trauma is another cause of false-negative results. OIS is a relatively new system with the sole purpose of establishing uniformity across studies and thus facilitating easy comparison. We found that the overall probability of surgical treatment increased with the higher degree of OIS of the parenchymal injuries, as in our study 7 out of 10 operated patients had Grade 3 and 3 out of 10 had Grade 4 trauma. The results obtained in our study are very similar to the results obtained in previous studies. To sum up, in patients with BAT, ultrasound should be the first diagnostic technique of choice. Since ultrasound has a high negative predictive value, we believe that it is enough to observe patients with clinical observation. If the ultrasound results are abnormal or unsatisfactory, a CT scan may be performed provided the patient is stable. The limitation of our study was the small sample size of 30 operated cases. The reason for being currently

blunt abdominal trauma is usually conservative treatment, and surgery for blunt trauma is usually not performed, especially in patients with normal abdominal CT scans. and the second reason that despite the high sensitivity of CT, surgeons routinely preferred ultrasound in our offices for blunt abdominal trauma, because resuscitation can be performed both during ultrasound and at the patient's bedside and there is no need to move the patient from the trauma center to the CT office. The second limitation of our study was lower sensitivity in detecting bowel / mesenteric and bladder injuries [15].

In conclusion, no local studies have previously been conducted to determine the role of CT in blunt abdominal trauma, but few studies have been conducted to assess the role of ultrasound in blunt abdominal trauma. Despite its limitations, it is a pioneering local study to determine the role of CT in the assessment of blunt abdominal trauma.

CONCLUSION:

Computed tomography has been shown to be very sensitive in identifying visceral injuries as well as the accompanying hemoperitoneum. Intestinal injuries and mesenteric injuries were detected with quite high sensitivity. We come to the conclusion that CT has a high accuracy in detecting blunt abdominal injuries.

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