

COMPARATIVE EVALUATION OF BLUNT ABDOMINAL TRAUMA WITH CT SCAN AND ULTRASONOGRAPHY

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ABSTRACT

Background: The emergency care of the patient with blunt abdominal trauma is critical and requires accuracy and efficiency with speed. Treating patients who had blunt abdominal trauma (BAT) is challenging and remains most demanding and critical for the acute trauma care. BAT accounts for the common cause of preventable deaths among cases of missed intra-abdominal trauma. **Material & Methods:** A total of 50 patients who had blunt abdominal trauma who were stable enough to give consent and undergo for both USG and CT scan were enrolled for study by simple random sampling. Clearance from Institutional Ethics Committee was taken before the start of the study and written informed consent for the study purpose was obtained from all the enrolled participants. **Results:** Out of the 50 patients of blunt abdominal trauma, 44 patients (88%) were detected by ultrasonography and 6 (12%) were missed. However, there was none case (0%) missed by CT scan, thereby having a sensitivity of 100%. This difference was statistically highly significant and the p-value was 0.013. **Conclusion:** CT scan is highly sensitive and better diagnostic modality for BAT than USG. USG can be preferred as an initial diagnostic modality for blunt abdominal trauma but it can leave some of the crucial and critical details of injuries which need immediate correction for the resuscitation of the patient. Hence, It is recommended if patients condition is stable than USG should be supplemented by CT scan.

Keywords: blunt abdominal trauma, CT scan, ultrasonography.

INTRODUCTION

The emergency care of the patient with blunt abdominal trauma is critical and requires accuracy and efficiency with speed. Treating patients who had blunt abdominal trauma (BAT) is challenging and remains most demanding and critical for the acute trauma care (1). BAT accounts for the common cause of preventable deaths among cases of missed intra-abdominal trauma. The prevalence of blunt abdominal

trauma is observed to be very high approximately 12-15%, and also accounts for high mortality rates around 80% of the cases among the road traffic accidents with a high male preponderance (2). BAT usually results from road traffic accidents, assaults, falls and recreational accidents. Blunt abdominal trauma due to road traffic accidents is associated with several risk factors, for example, an altered

mental state, distracting injuries and drug or alcohol intoxication (3). To evaluate and resuscitation of patients with BAT requires a detailed knowledge of complete pathophysiology of blunt abdominal trauma and shock along with high clinical skill and proper, highly specific diagnostic modalities to know the extent and severity of the trauma to undertake the complex operative and resuscitation procedures (4). Predominantly injured organs in BAT are the liver, spleen, small bowel, retroperitoneum, kidneys, and bladder, diaphragm, colo-rectum, and pancreas. Ultrasonography is being used from very long time for the screening of cases with blunt abdominal traumas to evaluating hemo-peritoneum, hematomas, contusions and lacerations (5). But it has its own limitation in evaluation the patients who are hemodynamically unstable and there may be lacuna of the free intraperitoneal fluid despite serious organ injuries. Another method of diagnosis for BAT is diagnostic peritoneal lavage but it is not very popular nowadays and rarely used because it requires invasive laparotomy (6).

The CT scan is the advanced diagnostic modality for the detection of solid organ injuries along with other related injuries for example trauma of vertebral column, thoracic cavity and pelvic fractures (7). An additional advantage of CT scan is to detect the source of hemorrhage, amount of blood, retroperitoneal injuries and injuries of the genitourinary system, duodenum and pancreas (8). The CT scan also has its limitation and shows low sensitivity for detecting diaphragmatic and hollow viscus injuries. Along with it is comparatively expensive and time-consuming and may cause adverse events when oral or intravenous contrast given (9). Hence, the present study was carried out to compare the efficacy of USG and CT scan for blunt abdominal trauma.

MATERIALS & METHODS

The present observational study was conducted at our tertiary care hospital in the department of radio-diagnosis. A total of 50 patients who had blunt abdominal trauma that was stable enough to give consent and undergo for both USG and CT scan were enrolled for study by simple random sampling. Clearance from Institutional Ethics Committee was taken before the start of the study and written informed consent for the study purpose was obtained from all the enrolled participants. All the patients were subjected to a pretested proforma and socio-demographic data were recorded along with detailed general physical and clinical examination. All the patients who had negative results for both the USG and CT scan, one or both the test could not be carried out, or discharged or leave the hospital without permission after short period were excluded from the study. The data were analyzed by using software's MS Excel 2010, Epi Info v7 and SPSS v22.

RESULTS

In the present study out of the total 50 patients, 37 were males and 13 were females with the male preponderance. The most commonly affected age groups were 18-25 years and 25-40 years. Both age groups had 18-18 participants, this higher prevalence may be due to this age group usually is involved more in road traffic accidents (Table 1).

Table 1: Age and sex wise distribution of study participants.

Age group	Males	Females	Total
4-17	2	0	2
18-25	15	3	18
25-40	12	6	18
>40	8	4	12
Total	37	13	50

In the present study, the most common cause of trauma found was road traffic accidents in 68% of the patients which was followed by fall from heights in 22% of the patients. Other common causes of blunt abdominal trauma in the present study weresports injuries, which was found among 6% of the patients which was followed by injuries due to physical violence, which was found in 4% of the patients. Out of these cases of blunt abdominal trauma, most common organ affected was liver, found to be involved in 80% of the cases, which was followed by spleen and it was found to be affected in 42% of the cases. Kidneys were affected in 38% of the cases and pancreas was affected in 8% of the patients. (Table 2)

Table 2: Distribution of patients based upon a cause of trauma and organs involved.

Parameters		Number of participants
Causes of trauma	Road traffic accidents	68%
	Fall from heights	22%
	Sport injuries	6%
	Fight	4%
Organs affected	Liver	80%
	Spleen	42%
	Kidney	38%
	Pancreas	8%

In the present study out of the 50 patients of blunt abdominal trauma, 44 patients (88%) were detected by ultrasonography and 6 (12%) were missed.

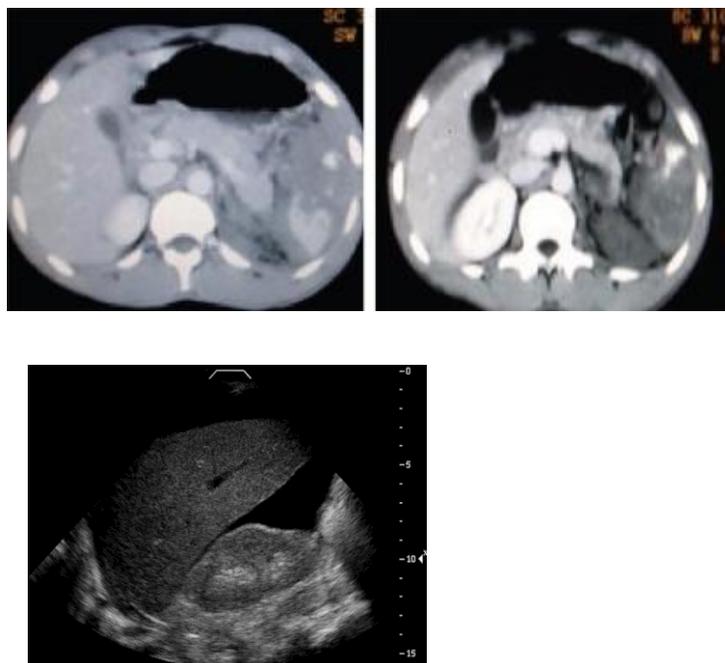
However, there was none case (0%) missed by CT scan, thereby having a sensitivity of 100%.

This difference was statistically highly significant and the p-value was 0.013. (Table 3)

Table 3: comparison of diagnostic modalities.

Diagnostic modality	Detected	Missed	P value
USG	44	6	0.013
CT scan	50	0	

Fig 1: CT and ultrasound imaging of blunt abdominal trauma



DISCUSSION

One of the leading cause of morbidity and mortality is trauma. Blunt trauma abdomen is the third most common injury reported after the injuries to the head and extremities. Approximate 25% of the patients of BAT require urgent surgical resuscitation to save the life. Blunt abdominal trauma is often very difficult to detect and diagnose because of no visible signs and also not assessable of clinical signs(10). Hence, we require an accurate method of diagnostic

modality to screen the patients of blunt trauma abdomen to early detect and prevent the morbidity and mortality to happen. Nowadays USG and CT scan are being used widely and replaced all previous methods of diagnosis. The main advantage of ultrasonography is that it can be performed bedside of the patient and immediately assess the extent of the injury and also it can detect free peritoneal fluid with high sensitivity (11).

Ultrasound for the blunt trauma abdomen has its limitation in detecting the parenchymal injuries, because of the absence of hemoperitoneum often seen in patients with traumatic injuries to solid organs. Hence, for diagnosis the abdominal injuries, USG alone is not a fully accurate method (12). In a study conducted by Taylor et al, among patients of blunt abdominal trauma in a large sample size cohort study, reported that peritoneal fluid was served a need for laparotomy in a maximum number of patients and there was no peritoneal fluid detected among 37% of the cases with the BAT (13). Another study conducted by Emery et al reported similar results and found that USG as high sensitivity and accuracy (14).

In the present study, the most commonly affected age groups were 18-25 years and 25-40 years. Both age groups had 18-18 participants, this higher prevalence may be due to this age group usually is involved more in road traffic accidents. 44 patients (88%) were detected by ultrasonography and 6 (12%) were missed. However, there was none case missed by CT scan, thereby having a sensitivity of 100%. A study conducted by Vadodariya et al among patients of blunt abdominal trauma reported nearly similar results to the present study and found that CT scan was 100% sensitive in the screening of BAT (15). Another study conducted by Mallik et al reported similar results to the present study and found that sensitivity of CT scan was higher than the sensitivity of Ultrasound (16).

In the present study, most common organ affected was liver, found to be involved in 80%

of the cases, which was followed by spleen and it was found to be affected in 42% of the cases. Kidneys were affected in 38% of the cases and pancreas was affected in 8% of the patients. A study conducted by Sato and Yoshii among the patients of blunt abdominal trauma reported nearly similar results to the present study and found that liver was most common organ to be affected followed by spleen then kidney which was followed by the pancreas (17). Another study conducted by Abu- Zidan et al, among patients of blunt abdominal trauma, in New Zealand, reported that sensitivity of CT scan was higher than the sensitivity of Ultrasound among stable patients since there was missed out cases by ultrasound (18). A study conducted by Luks F et al among cases of blunt abdominal trauma and reported that ultrasound is more versatile, easy to perform and cost-effective than CT scan with an accuracy of 94% (19). Shanmugana than K et al in their study found that CT scan should be preferred only if the patient is hemodynamically stable (20).

CONCLUSION

We concluded from the present study that CT scan is highly sensitive and better diagnostic modality for BAT than USG. USG can be preferred as an initial diagnostic modality for blunt abdominal trauma but it can leave some of the crucial and critical details of injuries which need immediate correction for the resuscitation of the patient. Hence, It is recommended if patients condition is stable than USG should be supplemented by CT scan.

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