DIAGNOSTIC ACCURACY OF SURGEON-PERFORMED FOCUSED ASSESSMENT SONOGRAPHY IN TRAUMA PATIENTS WITH BLUNT ABDOMINAL INJURY

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ABSTRACT

Background: Computerized tomography (CT) Scan is the gold standard for imaging in blunt abdominal trauma. Focused Assessment Sonography in Trauma (FAST) is a quickly performed screening technique aimed to detect collections of free fluid. **Objective:** To determine the diagnostic accuracy of surgeon-performed Focused Assessment Sonography in patients with blunt abdominal Trauma by taking operative findings as gold standard in detecting hemoperitoneum. **Methodology:** This cross sectional study was conducted in Department of Emergency and Trauma, Sheikh Zayed Hospital, Rahim Yar Khan from 1st January to 30th June 2015. A total of 167 patients with blunt abdominal trauma within 24 hours were included in this study. Surgeon performed Focused Assessment Sonography in Trauma(FAST) was done in all patients with Ultrasound Machine for detection of hemoperitoneum. All the patients were undergone through exploratory laparotomy and compared the findings of FAST. All this information was entered on Proforma. Data was entered and analyzed using SPSS version 16. **Results:-** The sensitivity, specificity, positive and Negative predictive value as well as accuracy of surgeon performed FAST in detecting hemoperitoneum were 83.8%, 92%, 90.5%, 86% and 88% respectively. **Conclusion:** FAST has a high accuracy. It can be included in the initial evaluation of adult patients with Blunt abdominal trauma (BAT) and it will assist in rapidly identifying the need for laparotomy.

Key Words: Blunt abdominal trauma, FAST, Hemoperitoneum.

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INTRODUCTION

Blunt abdominal trauma (BAT) is one of the cause of morbidity and mortality in adult patients presented in the emergency department, which usually occurs after road traffic accidents, fall from height or during sports.[1,2,3]

Computerized tomography (CT) Scan is taken as the gold standard for imaging in blunt abdominal trauma. Now a days this has replaced invasive diagnostic peritoneal leverage. However, CT has disadvantages including ionizing radiation, IV injection of radio iodinated contrast material, and time required for patient transport and scanning of critically injured or unstable patients.[4]

Focused Assessment with Sonography for Trauma (FAST) is a quickly performed screening technique aimed at exploring the deep peritoneal recesses to detect collections of free fluid, as an indirect sign of acute hemorrhage and visceral injury.[5] However, as reported it has variable results.[6,7,8,9] The utility of FAST is increasingly growing because of its rapid results, portability, freely available and lack of ionizing radiation.[8]

Most previous studies of FAST have been performed by radiologists or sonographers performing the scan. This involves the recall of off-site personnel and sometimes transporting a trauma patient to the radiology department, which can result in wasting of precious time and cause a delay in resuscitation of hemodynamically unstable patients.[9] So, we conducted this study to determine the diagnostic accuracy of the surgeon-performed FAST among patients with blunt abdominal trauma.

METHODOLOGY

This Cross Sectional Study was conducted in Department of Emergency and Trauma, Sheikh Zayed Medical College/Hospital, Rahim Yar khan, from 1st January to 30th June 2015. 167 patients with blunt abdominal trauma within 24 hours were included in this study. **Sample technique:** Non-probability consecutive Sampling.

Inclusion criteria: Patients with blunt abdominal trauma presenting within 24 hours, both males and females, age between 20 to 50 years and clinical signs of peritonitis.

Exclusion criteria: Patients with blunt abdominal

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trauma but managed conservatively and pregnant women. Informed consent was taken from the patients or relatives of the patients. Surgeon performed Focused assessment Sonography in Trauma (FAST) was done in all patients with Ultrasound Machine (Toshiba vision 200) for detection of hemoperitoneum. All the patients were undergone through exploratory laparotomy and findings were confirmed and compared with the finding of FAST. Laparotomy findings were taken as gold standard. All this information was entered on Proforma.

The study was started after approval from Institutional Review Board of Sheikh Zayed Medical College/Hospital, Rahim Yar Khan. Patients fulfilling the inclusion criteria were enrolled from Department of Emergency and Trauma, Sheikh Zayed Hospital, Rahim Yar khan. The demographic data (age and sex) and detailed history taken and clinical examination were performed. Data was entered and analyzed using SPSS version 16. The quantitative variable i.e. age was presented as mean and standard deviation. The qualitative variables i.e. sex, chronic liver disease, obesity, congestive cardiac failure and presence or absence of hemoperitoneum (on both surgeon performed FAST and surgical findings were presented by calculating frequency and percentages. Diagnostic accuracy, sensitivity, specificity, positive predictive value and negative predictive value of surgeon-performed FAST was calculated.

RESULTS

A total of 167 patients with blunt abdominal trauma within 24 hours were included in this study. Most of the patients were from 21 to 40 years of age as presented in figure I. The mean age of the patients was 34.49±7.28 years. Out of 167 cases, 108(64.67%) were male and 59(35.33%) female. Forty three (25.75%) were obese, chronic liver disease was observed in 28 (16.77%) cases, and 23 (13.77%) patients had CCF.

The sensitivity, specificity, positive and negative predictive value as well as accuracy of surgeon performed FAST in detecting hemoperitoneum were 83.8%, 92%, 90.5%, 86% and 88% respectively. (Table II).

Accuracy of surgeon performed FAST in detecting hemoperitoneum was above 83% for all groups. In different groups accuracy of surgeon performed FAST is as follows, for male 88.9% and for female 86.4% Diagnostic accuracy of surgeon-performed FAST in detecting hemoperitoneum for obese cases was 83.7% and non-obese group 89.5%.

Figure I: Age distribution of the patients (n=167)

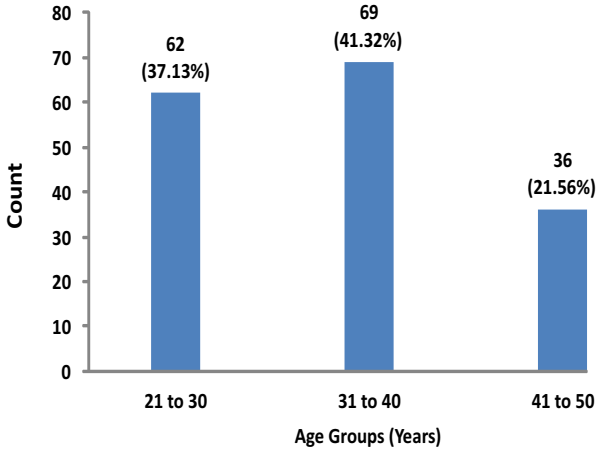

Table II: Diagnostic accuracy of surgeon-perfomed fast in detecting hemoperitoneum

Surgeon Performed FAST In Detecting Hemoperitoneum	Surgical Finding In Detecting Hemoperitoneum		Total
	Positive	Negative	
Positive	67	7	74(44.3%)
Negative	13	80	93 (55.7%)
Total	80(47.9%)	87(52.1%)	167 (100%)

Sensitivity = 83.8%
Specificity = 92%
PPV = 90.5%
NPV = 86%
Accuracy = 88%

DISCUSSION

Blunt trauma to abdomen represents the commonest mechanism of abdominal injury.[10,11] Focused assessment with Sonography for trauma (FAST) is being used in adult patients to identify free fluid in the abdomen and assist in deciding surgical intervention.[10] FAST is replacing diagnostic peritoneal levage (DPL) in the algorithm of investigation of abdominal trauma.[12,13,14]

In this study the mean age of the patients was 34.49±7.28 years. Out of 167 cases, 108 (64.67%) were male and 59 (35.33%) female. In Fleming et al[6] study the mean age of participants was 41 years in which 62% of the patients were male which is similar to our study.

Focused assessment with Sonography for Trauma (FAST) is a quickly performed screening technique

aimed at exploring the deep peritoneal recesses to detect collection of free fluid, as an indirect sign of acute hemorrhage and visceral injury.[5] Boulanger et al in a prospective nonrandomized study showed that FAST based algorithm was rapid, less expensive and had a similar incidence of delayed diagnosis and accuracy as CT scan or DPL based algorithm. [15]

In present study the sensitivity, specificity, positive and negative predictive value as well as accuracy of surgeon performed FAST in detecting hemoperitoneum were 83.8%, 92%, 90.5%, 86% and 88% respectively. In a previous study diagnostic accuracy of surgeon performed FAST was tested among 89 patients with sensitivity of 81%, specificity of 100%, negative predictive value of 97%, positive predictive value of 100% and an accuracy of 97%.[9] In Fleming et al study,[6] FAST had a specificity of 94.7% (95% CI: 0.75-0.99) and sensitivity of 46.2% (95% CI: 0.33-0.60). Positive predictive value of 0.96 (0.81-0.99) and negative predictive value of 0.39 (0.26-0.54). Several studies have investigated the reliability and accuracy of FAST scanning in trauma centers. A Cochrane systematic review found that the sensitivity for detecting hemoperitoneum in trauma patients with FAST was 85 - 95% and the specificity of 90%[16] which is comparable to our study. FAST scanning expedites disposition of trauma patients, decreasing time to definitive care and reducing demands for CT scanning.[17]

McCarter et al,[18] showed that extensive training sessions and examination were not necessary for trauma surgeons to overcome the learning curve associated with FAST. Surgeons in their report gained an accuracy of 90% from the outset of their clinical experience with this modality. Buzzas et al,[19] concluded that surgical residents could safely perform focused examination. The sensitivity of FAST in Soundappan et al[9] study was 80%.[10,16,20] where the studies were performed by sinologists or radiologists. This supports McCarter's finding that learning curve is short for surgeon performing FAST scans.

In this study accuracy of surgeon performed FAST was also high for male 88.9% and 86.4% for female cases. Diagnostic accuracy of surgeon-performed FAST in detecting hemoperitoneum for obese cases was 83.7% and non-obese groups were 89.5%. Knudtson et al[21] recently reported on the use of surgeon-performed US in detecting haemothorax in the trauma suite with a specificity and accuracy of 99.7% and 99.4%, respectively.

Early detection of intra-abdominal injury is crucial in allowing the clinician to optimize the treatment for patients with blunt abdominal injury. CT Scan remains the gold standard investigation for assessing these patients, however it may not be possible to perform a CT Scan for numerous reasons, some of the most common being haemodynamically instability or pregnancy. FAST scan has clear potential advantages over CT scan. It is quick to perform, portable; allowing it to be performed at the bedside and does not expose patients to radiation.

A direct comparison of FAST and DPL showed FAST scans to be a good alternative, with a similar specificity and a much lower complication rate.[22] FAST has since largely supplanted DPL for blunt trauma assessment.[23] While CT scanning remains the gold standard in terms of radiological assessment.[23,24] It has been proposed that FAST may be an acceptable alternative in resource-poor facilities, where CT is largely unavailable without transfer like in our country.

CONCLUSION

In this study surgeon-performed focused assessment with Sonography for Trauma has a high specificity and accuracy for detection of free fluid in peritoneal cavity in blunt abdominal trauma patients. It may be included in the initial evaluation of adult patients with Blunt abdominal trauma for rapidly identifying the need for laparotomy.

Conflict of interest:

The authors have declared no conflict of interest.

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