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Study On Sensitivity And Specificity Of Fast In Diagnosis Of Blunt Abdominal Trauma Emergencies.

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ABSTRACT

Traumatic injury is the leading cause of death among individuals younger than 45 years old. Eighty percent of traumatic injury is blunt with the majority of deaths secondary to hypovolemic shock. In fact, intraperitoneal bleeds occur in 12% of blunt trauma therefore, it is essential to identify trauma quickly. The optimal test should be rapid, accurate, and non-invasive. Historically, providers performed diagnostic peritoneal lavage (DPL) to detect hemoperitoneum. While extremely sensitive (96% to 99%) and specific (98%), DPL is an invasive procedure with a complication rate of 1%. To study the sensitivity and specificity of FAST in diagnosis of Blunt Abdominal Trauma. Analysis of Sonographic scan findings and it's correlation with operative findings wherever possible. This Prospective observational study was 60 conducted for One and half year (January 2017 – June 2018) at Tirunelveli Medical College and hospital. Trauma patients admitted in TVMCH casualty satisfying the inclusion and exclusion criteria . Data is collected with regards to demographic characteristics, patient complaints / symptomatology, physical examination is done-mode ultrasound with frequency of 3-5 MHz / curvilinear probe is used to assess the acoustic windows. The results of FAST are confirmed by CT abdomen and CT chest (gold standard).Results of FAST were correlated with intra-operative findings wherever applicable. 93% of cases (56 patients) were in the age group of 13 to 60 years. Only 1 patient was in pediatric age group (below 13 years) and 3 patients were above 60 years.The most common presentation was left upper quadrant pain (19 cases) followed by right lower quadrant pain (11 cases) Considering symptomatology, most of the patients presented with vomiting as a complaints followed by abdominal distension. Shifting dullness was demonstrated in 5 patients and 3 patients presented with hematuria. Perihepatic collection was the most common finding in FAST, followed by perisplenic and pelvic collections. None of the patient showed any pericardiac collection during FAST. Using McNemar's equation, the diagnostic avidity of FAST was calculated and the sensitivity was found to be 96.67% and specificity 100%. When FAST showed perihepatic collection, intra-operatively, 25% were found to be liver injury followed by splenic injury (20%), hollow viscus perforation (20%) and hollow viscus perforation with mesenteric tear (20%). Isolated mesenteric tear was seen in 15% cases. When FAST showed perisplenic collection, intra-operatively, 69% were found to be splenic injury followed by liver injury (25%), mesenteric tear (6%) When FAST showed pelvic collection, intra-operatively, 50% were found to be hollow viscus perforation, followed by urinary bladder injury (33%), hollow viscus perforation with mesenteric tear (17%) The management of trauma patients is usually with an interprofessional team including trauma nurses. While FAST is useful in trauma patients, it has limitations. Clinicians should be aware that the point of care ultrasound image acquisition and interpretation is limited by the provider's experience; the patient's body habitus; and the presence of bowel gas, pneumoperitoneum, or pneumomediastinum. Serial eFAST exams and advanced imaging are warranted in these situations based on the patient's hemodynamic status.

Keywords: trauma, emergency, diagnosis.

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INTRODUCTION

As the population in India is increasing, there is increase in incidence of RTA and violent trauma. Abdominal trauma includes those cases where there is injury to one viscus or more viscera with or without any external penetrating injury [1]. Today the most common causes of abdominal trauma are: motor vehicular accidents of blunt abdominal injury accounting for 75-80% followed by sport injuries, blows and kicks over abdomen, fall from height, fall of heavy objects over abdomen, crush and burst injuries. The detection of abdominal trauma is a frequent diagnostic problem in multiple injured patients [2]. Delay in diagnosis and treatment of abdominal trauma substantially increases morbidity and mortality in trauma patients due to bleeding from solid organs or vascular injury or infection from perforation of a hollow viscus [3]. The most important preoperative management of patients with abdominal trauma is to ascertain the need for laparotomy. Thus, screening test must be highly sensitive and quick. It is clear advantage to the operative surgeon if the same test is sensitive enough for citing the organ of injury, especially when conservative approach towards trauma is being popularized today [4,5]. The present study outlines the role of ultrasound in the evaluation of abdominal trauma and to assess the diagnostic validity of FAST, thus helping surgeons in making accurate diagnosis and proper management of cases.

MATERIALS AND METHODS

This Prospective observational study was 60 conducted for One and half year (January 2017 – June 2018) at Tirunelveli Medical College and hospital. Trauma patients admitted in TVMCH casualty satisfying the inclusion and exclusion criteria.

Methodology

Data is collected with regards to demographic characteristics, patient complaints / symptomatology, physical examination is done. B-mode ultrasound with frequency of 3-5 MHz / curvilinear probe is used to assess the acoustic windows. The results of FAST are confirmed by CT abdomen and CT chest (gold standard). Results of FAST were correlated with intra-operative findings wherever applicable.

Inclusion Criteria

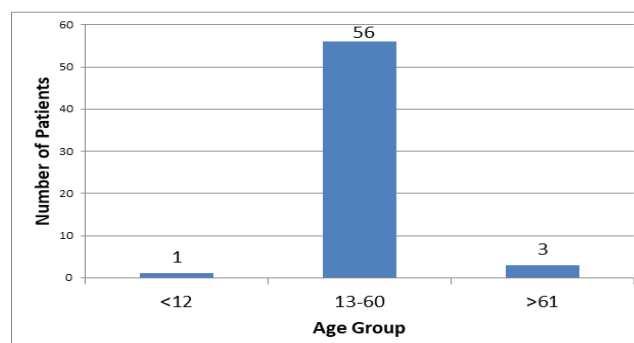
- Trauma patients presenting in TVMCH casualty with complaints of abdominal pain and injuries.
- Cases are included irrespective of Age & Sex.

Exclusion Criteria

- Trauma patients presenting in TVMCH casualty without any complaints of pain abdomen or injury.
- Patients with suspected Head injury
- Patients with penetrating abdominal injuries.

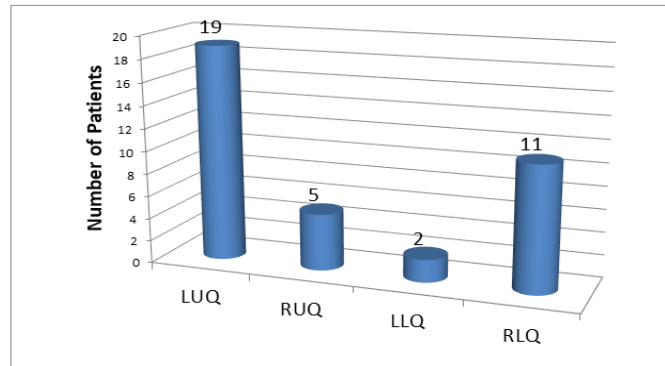
RESULTS

Graph 1: Age Distribution



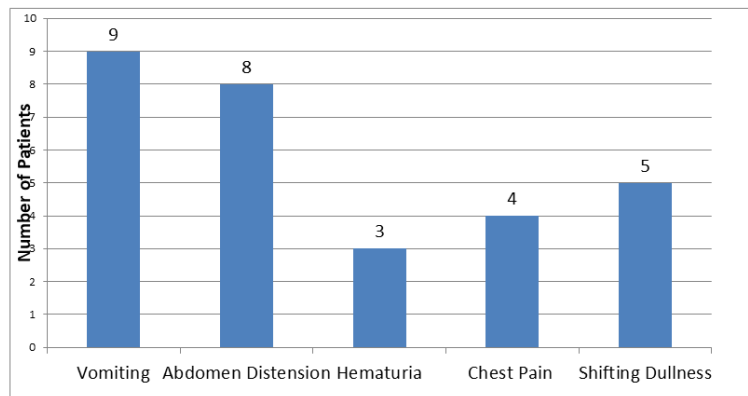
Graph 1: 93% of cases (56 patients) were in the age group of 13 to 60 years. Only 1 patient was in pediatric age group (below 13 years) and 3 patients were above 60 years. Out of total 60 patients, 48 patients were male amounting to 80% and 12 patients were female amounting to 20%

Graph 2: Abdominal Pain



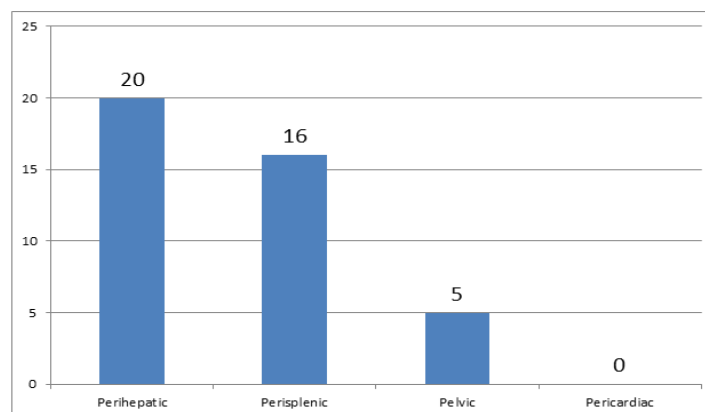
Graph 2: The most common presentation was left upper quadrant pain (19 cases) followed by right lower quadrant pain (11 cases)

Graph 3: Symptomatology



Graph 3: Considering symptomatology, most of the patients presented with vomiting as a complaints followed by abdominal distension. Shifting dullness was demonstrated in 5 patients and 3 patients presented with hematuria.

Graph 4: Fast Analysis



Graph 4: Perihepatic collection was the most common finding in FAST, followed by perisplenic and pelvic collections. None of the patient showed any pericardiac collection during FAST.

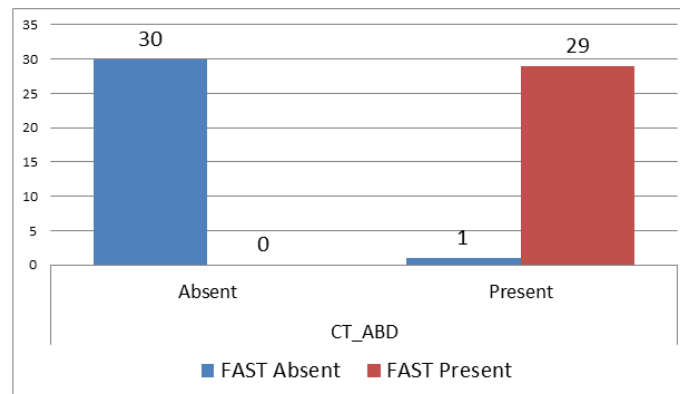
Table 1: Diagnostic Avidity Of Fast

FAST	INTRA OPERATIVE FINDINGS		PVALUE
	ABSENT	PRESENT	
ABSENT	30	1	1.000
PRESENT	0	29	

SENSITIVITY	SPECIFICITY	PPV	NPV
96.67%	100%	100%	96.77%

Using Mc Nemar’s equation, the diagnostic avidity of FAST was calculated and the sensitivity was found to be 96.67% and specificity 100%.

Graph 5: DIAGNOSTIC AVIDITY OF FAST

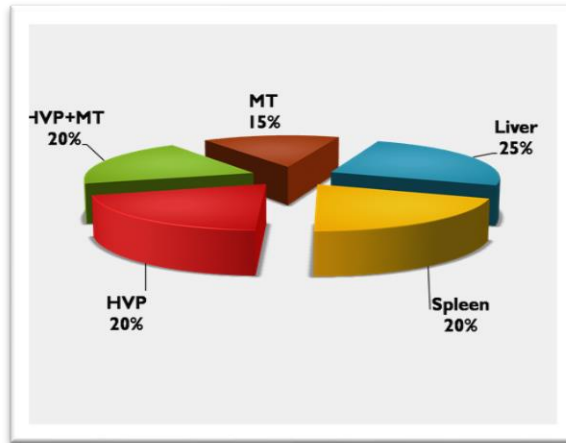


Graph 5: This bar diagram shows the diagnostic avidity of FAST in comparison to CT-scan (gold standard) in detecting free fluid. When Ct-scan demonstrated free fluid in 30 cases, FAST demonstrated the same finding in 29 cases. FAST failed to detect free fluid only in one case.

Table 2: Intra Operative Findings

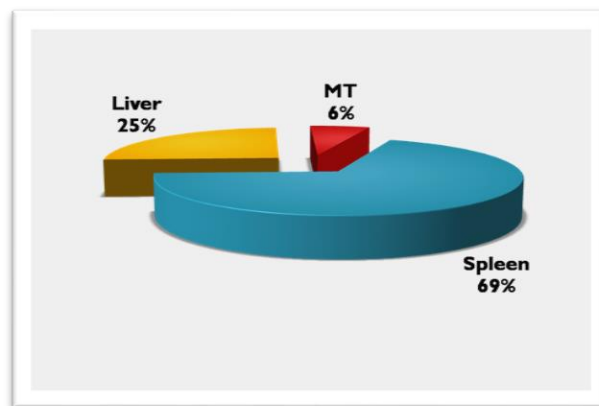
	Frequency	Percent
SPLEENIC INJURY	11	18.3
LIVER INJURY	5	8.3
HOLLOW VISCUS PERFORATION	4	6.7
MESENTERIC TEAR	3	5.0
BLADDER INJURY	3	5.0
HOLLOW VISCUS PERFORATION WITH MESENTERIC TEAR	4	6.7

Graph 6: Correlation Of Peri Hepatic Collection With Intra Operative Findings



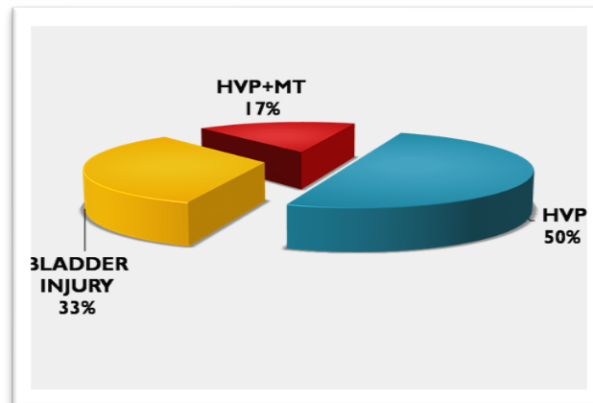
When FAST showed perihepatic collection, intra-operatively, 25% were found to be liver injury followed by splenic injury (20%), hollow viscus perforation (20%) and hollow viscus perforation with mesenteric tear (20%). Isolated mesenteric tear was seen in 15% cases.

Graph 7: Correlation Of Peri Splenic Collection With Intra Operative Findings



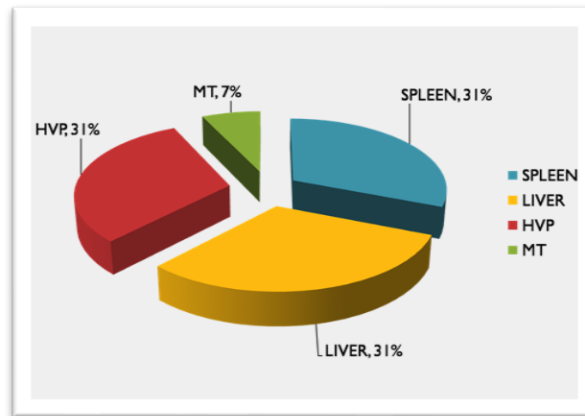
When FAST showed perisplenic collection, intra-operatively, 69% were found to be splenic injury followed by liver injury (25%), mesenteric tear (6%)

Graph 8: Correlation Of Pelvic Collection With Intra Operative Findings



When FAST showed pelvic collection, intra-operatively, 50% were found to be hollow viscus perforation, followed by urinary bladder injury (33%), hollow viscus perforation with mesenteric tear (17%)

Graph 9: Correlation Of Multiple Window Collection With Intra Operative Findings



Graph 9: When FAST showed multiple window collection, intra-operatively, splenic injury, liver injury and hollow viscus perforation were 31% each. While 7% showed isolated mesenteric injury.

DISCUSSION

In this prospective observational study of 60 patients, admitted with blunt abdominal trauma following RTA, Assaults, Fall from height and sports injuries; only one patient was in pediatric age group of < 13 years, while 56 patients were in the age group of 13-60 years amounting to 93% [6]. When compared on gender prospective 48 cases (80%) were found to be males, while 12 cases (20%) were females. Most of the patients presented with left upper quadrant pain (19 cases) followed by right lower quadrant pain (11 cases), right upper quadrant pain (5 cases) and left lower quadrant (2 cases). Considering other symptomatology most of the patient had associated vomiting (9 cases) and abdominal distension (8 cases). 5 patients presented with shifting dullness and 3 patients presented with hematuria [7,8]. On analysis of FAST, Perihepatic collection was the most common occurrence followed by peri splenic collection. A total of 13 patients presented with multiple window collection on FAST, out of which 9 patients showed combined peri hepatic and peri splenic collection while 4 patients showed combined peri hepatic and pelvic collection. Isolated pelvic collection was seen in only 5 cases. On investigation with gold standard CT scan, FAST failed to diagnose free fluid in only one case. [9,10] The most common overall intra operative finding was Splenic injury (18.3%) followed by hepatic injury (8.3%) and hollow viscus perforation with or without mesenteric tear. Only 5% cases of blunt abdominal trauma had isolated urinary bladder injury and mesenteric tear each respectively [11]. analysis of 13 patients with blunt abdominal trauma, who had shown multiple window collections in FAST, intra operatively 4 cases had splenic injury, 4 cases had hepatic injury, 4 cases had hollow viscus perforation and only 1 case had mesenteric tear. Considering each window separately and analyzing them with intra operative finding; when FAST demonstrated peri hepatic collection, only 25% were hepatic injury while splenic injury and hollow viscus perforation with or without mesenteric tear were 20% each respectively [12,13]. When FAST demonstrated perisplenic collection 69% were splenic injury followed by 25% hepatic injury and 6% mesenteric tear. When FAST demonstrated pelvic collection 50% were hollow viscus perforation followed by 33% urinary bladder injury and 17% hollow viscus perforation with mesenteric tear [14,15].

CONCLUSION

Blunt abdominal trauma (BAT), is a critical situation with a high level of morbidity and mortality among all age groups. Diagnostics and management are still a challenge, since the presentation is often not obvious during the initial assessment. The prevalence of intra-abdominal injury in patients with BAT is approximately 13 % (1). The most common mechanism of BAT is road traffic accident (RTA) (such as motor vehicle accidents and auto-pedestrian accidents). Other causes include falls, direct hit to the

abdomen because of assault, fight, and sport related injuries. According to the findings, it seems that FAST could be a valuable and reliable modality in detecting free fluid even in stable patients with BAT. FAST can be performed by emergency residents and specialists, who are just as reliable as radiologists. Future studies are recommended to evaluate the added benefits of FAST.

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