ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

ORIGINAL RESEARCH ARTICLE

DIAGNOSTIC ACCURACY OF EXTENDED FAST IN BLUNT TORSO INJURIES: A COMPARATIVE STUDY WITH COMPUTED TOMOGRAPHY IN A TERTIARY CARE SETTING

Dr. S. Selva[1], Dr. S. Hema Akilandeswari[2*], Dr. P. S. John Sundar Singh[3], Dr. A. Rajesh[4]

[1]Assistant Professor, Department of Emergency Medicine, Coimbatore Medical College and Hospital, Coimbatore, Tamil Nadu, India.
[*2]Associate Professor of General Medicine, Department of Emergency Medicine, Government Medical College and Hospital, Pudukkottai, Tamil Nadu, India.
[3]Emergency Medical Officer, Department of Emergency Medicine, Government Medical College and Hospital, Pudukkottai, Tamil Nadu, India.
[4]Assistant Professor (Trauma care), Department of Emergency Medicine, Government Medical College and Hospital, Pudukkottai, Tamil Nadu, India.

Corresponding Author: Dr S. Hema Akilandeswari, Associate Professor of General Medicine, Department of Emergency Medicine, Government Medical College and Hospital, Pudukkottai, Tamil Nadu, India.
Email: hemaakilandeswari2021@gmail.com

ABSTRACT

Background & Aim: Blunt torso injuries are a major cause of morbidity and mortality, requiring rapid and accurate diagnosis to guide management. The Extended Focused Assessment with Sonography for Trauma (EFAST) is a portable, non-invasive tool for detecting thoracoabdominal injuries. This study aimed to assess the diagnostic accuracy of EFAST compared to computed tomography (CT), the gold standard, in evaluating blunt torso injuries.

Methods: This prospective observational study was conducted in the Emergency Department of Government Medical College, Pudukkottai, from January to June 2022. A total of 190 hemodynamically stable patients with suspected blunt chest and abdominal trauma were enrolled. EFAST examinations were performed and findings correlated with CT results. Diagnostic parameters, including sensitivity, specificity, and accuracy, were analyzed using SPSS version 25.

Results: EFAST demonstrated a sensitivity of 92.3%, specificity of 98.1%, and accuracy of 96.9% for abdominal injuries. For chest injuries, sensitivity was 100%, specificity was 97.3%, and accuracy was 97.7%. EFAST identified critical conditions such as pneumothorax (17.3%) and hemothorax (15.0%) with high reliability.

Conclusion: EFAST is a reliable, rapid diagnostic tool for blunt torso trauma, complementing CT in emergency settings, especially in resource-limited environments.

Keywords: Blunt torso trauma, EFAST, Diagnostic accuracy, Ultrasound in trauma, Computed tomography, Emergency care

INTRODUCTION

Blunt torso injuries, a significant concern in trauma management, are commonly encountered in emergency departments worldwide. These injuries often result from high-velocity accidents such

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

as road traffic collisions, falls, or assaults, and they present a diagnostic and therapeutic challenge due to the complex anatomy and potential for life-threatening internal damage. Rapid and accurate evaluation of these injuries is crucial for determining the appropriate management strategy, as delays can lead to increased morbidity and mortality[1].

Extended Focused Assessment with Sonography for Trauma (EFAST) has emerged as a widely adopted, non-invasive imaging technique for the initial evaluation of blunt torso injuries. Building on the foundation of the traditional FAST examination, EFAST extends its diagnostic capability to assess pleural and pulmonary structures alongside the peritoneal and pericardial cavities[2]. This technique aims to identify free fluid, indicative of hemorrhage, and other pathological findings within the thoracic and abdominal regions. The portability, rapidity, and bedside applicability of EFAST have positioned it as an indispensable tool in trauma resuscitation protocols, particularly in resource-limited settings[3].

Despite its utility, the diagnostic accuracy of EFAST in detecting injuries compared to computed tomography (CT), the gold standard imaging modality, remains a subject of ongoing research. CT provides detailed cross-sectional images that allow precise localization and characterization of injuries, making it invaluable for comprehensive trauma assessment. However, its limitations, including cost, accessibility, and the time required for patient transport and preparation, restrict its use as a primary imaging tool in many emergency settings.

In the dynamic field of trauma care, time is a critical determinant of patient outcomes. The traditional approach to imaging in trauma often involves multiple modalities, leading to delays in definitive management. EFAST bridges this gap by offering a quick, non-invasive method to detect injuries at the bedside. Its utility extends beyond the identification of free fluid to include pneumothorax, hemothorax, and pulmonary contusions, conditions that are not assessed by the conventional FAST protocol[4].

While the advantages of EFAST are well-documented, there is limited data on its performance in the Indian context, particularly in comparison with CT imaging. Variability in patient demographics, injury patterns, and healthcare infrastructure necessitates region-specific studies to validate the technique's applicability and limitations. Moreover, understanding the correlation between EFAST and CT findings can help refine trauma management protocols, ensuring that patients receive the best possible care without unnecessary delays or expenditures[5].

The current study sought to address the role of EFAST in trauma care. The primary objective was to evaluate its diagnostic accuracy by correlating EFAST findings with those obtained through CT, thereby determining its sensitivity and specificity. This study aimed to bridge existing knowledge gaps and provide evidence-based recommendations for the integration of EFAST into trauma management protocols. In doing so, it contributes to the broader discourse on optimizing trauma care in resource-constrained healthcare systems, aligning with global efforts to improve patient outcomes through innovative and cost-effective strategies.

MATERIALS & METHOD

Study Setting: This study was conducted in the Emergency Department of Government Medical College, Pudukkottai, over a six-month period from January 2022 to June 2022. It was designed as a prospective observational study with a diagnostic accuracy framework to assess the utility of Extended Focused Assessment with Sonography for Trauma (EFAST) in evaluating blunt torso injuries.

Study Participants: Patients presenting with blunt trauma to the chest, abdomen, or both were enrolled in the study. The study included all hemodynamically stable trauma patients, irrespective of age, presenting with suspected blunt chest or abdominal injuries. The inclusion

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

extended to pediatric patients, allowing for a comprehensive understanding of EFAST applicability across age groups.

Exclusion criteria ensured that the study focused on blunt injuries, avoiding confounding factors. Hemodynamically unstable patients were excluded due to the inability to perform thorough imaging. Patients with penetrating injuries were omitted as these often require immediate surgical intervention, bypassing imaging assessments like EFAST. Pregnant women were excluded to avoid potential risks associated with imaging modalities. Similarly, patients with known allergies to contrast materials were not included, given the dependency on contrast-enhanced CT for comparison.

Sample Size and Sampling Technique: The required sample size was calculated based on the formula: $N = (Z^2pq)/d^2$ where Z is the standard score corresponding to 95% significance level (1.96), P is the prevalence of blunt torso injuries (considered to be 15%), and d is the absolute precision (5%). Considering a 10% attrition rate, the final sample size was 190. Patients were recruited using a purposive sampling technique, targeting all eligible individuals presenting during the study period.

Study Tools: Data collection involved multiple parameters to comprehensively evaluate the participants: Demographic variables which include age, gender, and occupation, clinical data which include initial presentation, general examination findings, vital parameters (e.g., blood pressure, respiratory rate), and systemic examination of the chest and abdomen. Basic laboratory tests including hemoglobin, urea, and creatinine levels. Radiological investigations encompassed EFAST, non-contrast computed tomography (NCCT) of the chest, and contrast-enhanced computed tomography (CECT) were also performed. Management strategies, including conservative approaches (e.g., observation, supportive care) or operative interventions (e.g., tube thoracostomy for blunt chest trauma, laparotomy for blunt abdominal injuries) were documented.

Study Methodology: All trauma patients presenting to the emergency department with suspected blunt chest or abdominal injuries were evaluated following the principles of Advanced Trauma Life Support (ATLS). Simultaneously, their hemodynamic status was assessed. Vital signs, including blood pressure, respiratory rate, and Glasgow Coma Scale (GCS) scores, were recorded. The Revised Trauma Score (RTS) was calculated using systolic blood pressure, respiratory rate, and GCS, with scores ranging from 10 to 12 indicating hemodynamic stability, qualifying the patient for inclusion in the study.

Baseline blood investigations, including renal function tests (urea and creatinine), were performed. Each patient underwent EFAST conducted by a trained radiologist or senior resident using a MINDRAY portable ultrasound system equipped with a 3.5 MHz convex abdominal probe and a 10 MHz linear probe. EFAST focused on detecting free fluid in the peritoneal, pleural, and pericardial cavities, along with signs of pneumothorax or hemothorax.

Patients with findings indicative of blunt chest or abdominal trauma on EFAST were subjected to further imaging with NCCT and CECT, performed within six hours of arrival. The CT findings served as the gold standard for diagnosing injuries. Therapeutic decisions—whether conservative or surgical—were guided by the combined findings of clinical evaluation, EFAST, and CT imaging.

Ethical Issues: The study received prior ethical approval from the Institutional Ethics Committee of Government Medical College, Pudukkottai. Written informed consent was obtained from all participants or their guardians in the case of minors. The confidentiality of patient data was strictly maintained, and no interventions deviated from standard trauma care protocols.

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

Statistical Analysis: Data entry was performed using Microsoft Excel, and statistical analysis was conducted with SPSS software version 25. Frequencies and proportions were calculated for categorical variables, while means, ranges, and standard deviations were computed for continuous variables. Differences in proportions were analyzed using the Chi-square test, and differences in means were evaluated using the student's t-test. A p-value of less than 0.05 was considered statistically significant. The correlation between EFAST and CT findings was assessed to determine sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). Additionally, clinical outcomes of patients were analyzed to evaluate the real-world utility of EFAST in trauma management.

RESULTS

A total of 190 participants were included in the study. The majority (43.7%) were aged between 18 and 40 years, while 33.7% were in the 41–60 age group. Patients under 18 years constituted 8.4%, and those above 60 years comprised 14.2%. Males were predominant, accounting for 68.4% of the sample, while females made up 31.6%. Regarding occupation, semi-skilled workers formed the largest group (38.4%), followed by students (19.5%), unemployed individuals (16.8%), and semi-professionals (16.3%). Skilled workers accounted for the smallest proportion at 8.9%. Road traffic accidents were the leading mode of injury (71.6%), followed by assaults (17.9%), accidental falls (5.8%), and sports-related injuries (4.7%). Most patients (98.9%) arrived more than one hour after the injury. Initial presentations included chest pain (45.8%), abdominal distension (33.2%), and breathlessness (21.0%) (Table 1).

Table 1: Baseline characteristics of the study participants.

Variables		**Number**	**Percentage**
Age in years	<18	16	8.4
	18 – 40	83	43.7
	41 – 60	64	33.7
	>60	27	14.2
Sex	Male	130	68.4
	Female	60	31.6
Occupation	Students	37	19.5
	Unemployed	32	16.8
	Semi-skilled	73	38.4
	Skilled worker	17	8.9
	Semi Professional	31	16.3
Mode of injury	Road Traffic Accidents	136	71.6
	Assault	34	17.9
	Accidental fall from height	11	5.8
	Sports (Bull gore injury)	9	4.7
Time of arrival	≤1 hr	2	1.1
	>1 hr	188	98.9
Initial presentation	Chest pain	87	45.8
	Abdominal distension	63	33.2
	Breathlessness	40	21.0

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

Vital assessment revealed that 98.4% of patients had a Glasgow Coma Scale (GCS) score between 13 and 15, while only 1.6% had scores between 9 and 12. All participants maintained systolic blood pressure (SBP) above 90 mmHg and respiratory rates between 10 and 29 breaths per minute. Hemoglobin levels ranged from 8.6 g/dL to 14.3 g/dL, with a mean of 11.46 ± 1.15 g/dL. Blood urea levels had a minimum of 20 mg/dL and a maximum of 51 mg/dL, with a mean of 33.57 ± 5.12 mg/dL. Serum creatinine levels varied between 0.5 mg/dL and 2.1 mg/dL, with a mean of 1.01 ± 0.17 mg/dL.

On chest examination, 64.7% of patients exhibited chest tenderness, followed by 19.5% with absent or diminished breath sounds, 6.3% with paradoxical chest wall movement, and 5.3% with abrasions. In abdominal examinations, 31.1% had tenderness, while abrasions (7.4%), guarding (5.3%), and absent bowel sounds (3.7%) were less common (Table 2).

Table 2: Chest and abdominal examination findings.

Variables		**Number**	**Percentage**
Chest examination	Abrasion	10	5.3
	Paradoxical movement	12	6.3
	Chest Tenderness	123	64.7
	Absent / Diminished BS	37	19.5
Abdominal examination	Abrasion	14	7.4
	Tenderness	59	31.1
	Guarding	10	5.3
	Absent bowel sounds	7	3.7

EFAST scans detected free fluid in the abdomen in 6.8% of patients in the right upper quadrant (RUQ), 3.2% in the left upper quadrant (LUQ), and 3.7% in the suprapubic region. In the chest, EFAST identified 6.3% of cases in the RUQ and 5.3% in the LUQ. Lung sliding and seashore signs were preserved in 95.8% of right-sided and 93.2% of left-sided examinations.

CT scans revealed that liver injuries were the most common abdominal finding (12.9%), followed by spleen injuries (3.2%), bowel or mesenteric injuries (3.2%), and renal injuries (1.6%). In the chest, pneumothorax was observed in 17.3% of patients, hemothorax in 15.0%, rib fractures in 7.9%, and lung contusions in 1.6% (Table 3).

Table 3: Extended FAST (EFAST) and CT scan findings.

Variables			**Number**	**Percentage**
EFAST scan	Abdomen	RUQ	13	6.8
		LUQ	6	3.2
		Suprapubic	7	3.7
	Chest	RUQ	12	6.3
		LUQ	10	5.3
		Lung sliding sign (Right)	182	95.8
		Seashore sign (Right)	182	95.8
		Lung sliding sign (Left)	177	93.2
		Seashore sign (Left)	177	93.2
CT scan	Abdomen	Liver injury	8	12.9
		Spleen injury	2	3.2
		Renal injury	1	1.6

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

		Bowel/mesenteric	2	3.2
	Chest	Hemothorax	19	15.0
		Pneumothorax	22	17.3
		Rib fracture	10	7.9
		Lung contusion	2	1.6

For abdominal injuries, EFAST demonstrated a sensitivity of 92.3%, specificity of 98.1%, positive predictive value (PPV) of 92.3%, negative predictive value (NPV) of 98.1%, and an overall accuracy of 96.9%. For chest injuries, EFAST achieved 100% sensitivity, 97.3% specificity, 86.4% PPV, 100% NPV, and an accuracy of 97.7% (Table 4).

Table 4: Diagnostic parameters of EFAST vs CT in detecting abdominal and chest injuries.

Variables	**Diagnostic parameters**	**Statistics**
Abdominal injuries	Sensitivity	92.3
	Specificity	98.1
	PPV	92.3
	NPV	98.1
	Accuracy	96.9
Chest injuries	Sensitivity	100
	Specificity	97.3
	PPV	86.4
	NPV	100
	Accuracy	97.7

DISCUSSION

This study was conducted to evaluate the diagnostic accuracy of the Extended Focused Assessment with Sonography for Trauma (EFAST) in detecting blunt chest and abdominal injuries by comparing its findings with computed tomography (CT), which is considered the gold standard. The study assessed the clinical utility of EFAST in identifying free fluid in the peritoneal, pleural, and pericardial cavities, along with radiological signs in the lungs.

The baseline characteristics of the study participants provided a diverse representation of blunt torso trauma cases, reflective of a typical emergency department setting. The majority of participants were aged between 18 and 40 years, highlighting that this demographic is at the highest risk of trauma, likely due to increased outdoor activity and occupational exposure. Males accounted for 68.4% of the cases, aligning with global data that shows males are more prone to trauma-related injuries, particularly due to higher involvement in high-risk activities such as road travel and manual labor. Road traffic accidents (71.6%) were the predominant cause of blunt torso injuries, highlighting the continuing challenge of vehicular accidents as a public health issue in India[6].

Notably, 98.9% of patients presented to the emergency department more than an hour after the injury. This delay in presentation could reflect logistical challenges, lack of immediate access to medical facilities, or delayed recognition of the severity of injuries. Initial symptoms of chest pain, abdominal distension, and breathlessness emphasize the non-specific presentation of blunt torso trauma, necessitating prompt and accurate diagnostic modalities to avoid missed injuries[7].

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

The diagnostic parameters of EFAST for abdominal and chest injuries demonstrated its high accuracy in detecting traumatic findings. For abdominal injuries, EFAST showed a sensitivity of 92.3%, specificity of 98.1%, and an overall accuracy of 96.9%. The high specificity indicates that EFAST is highly effective in ruling out abdominal injuries when findings are negative, which is particularly useful in resource-limited settings where unnecessary advanced imaging can be avoided. Similarly, for chest injuries, EFAST achieved a sensitivity of 100% and an accuracy of 97.7%. The perfect sensitivity for chest injuries ensures that no case of pneumothorax, hemothorax, or other critical conditions is missed, making it an indispensable tool for rapid assessment[8].

The positive predictive value (PPV) of 86.4% for chest injuries, though slightly lower than other parameters, highlights some limitations in differentiating specific findings such as pneumothorax versus lung contusions. However, the negative predictive value (NPV) of 100% for chest injuries ensures that a negative EFAST finding reliably excludes major thoracic trauma, allowing for more efficient allocation of resources and timely management[9].

The findings of this study also reflect the increasing preference for ultrasound-based diagnostics in emergency care. Ultrasound offers distinct advantages, including rapid assessment, portability, non-invasiveness, and avoidance of radiation exposure. These factors are particularly relevant in resource-limited settings like India, where access to CT may be restricted[10].

The high diagnostic accuracy of EFAST emphasizes its utility in guiding initial management decisions in trauma patients. For instance, the early identification of free fluid in the peritoneal cavity or pneumothorax can facilitate prompt surgical or interventional measures, potentially improving outcomes. Moreover, the role of EFAST in hemodynamically stable patients cannot be overstated[11]. Although CT remains the gold standard for diagnosing torso injuries, its use is often delayed by logistical and time constraints. EFAST serves as a bridge, providing critical diagnostic information that can stabilize patients until definitive imaging is performed[12].

One of the key strengths of this study lies in its robust methodology, including a well-defined sample size and stringent inclusion and exclusion criteria. The use of CT as the gold standard for comparison enhances the validity of the findings. Additionally, the study's prospective design ensures real-time data collection and minimizes recall bias. However, certain limitations should be acknowledged. The study excluded hemodynamically unstable patients, who often present the greatest diagnostic challenge. While this exclusion was necessary to ensure patient safety, it limits the generalizability of the findings to this critical subgroup. Additionally, the reliance on operator expertise for EFAST examinations introduces potential variability in diagnostic accuracy.

The findings of this study support the routine use of EFAST as a first-line diagnostic tool in the management of blunt torso trauma. To maximize its utility, standardized training programs should be implemented for emergency department staff to ensure consistent and accurate application. Additionally, integrating EFAST into trauma protocols and triage systems can streamline patient management, reduce unnecessary imaging, and improve resource utilization.

CONCLUSION

This study highlights the critical role of EFAST in the diagnostic evaluation of blunt torso trauma. Its high sensitivity, specificity, and diagnostic accuracy, combined with its non-invasive and rapid nature, make it an essential tool in trauma care. While CT remains the gold standard, EFAST serves as a reliable adjunct, particularly in resource-limited settings. By facilitating early diagnosis and timely intervention, EFAST has the potential to improve patient outcomes and streamline trauma management workflows.

ISSN: 0975-3583, 0976-2833 VOL16, ISSUE 1, 2025

REFERENCES

1. Savatmongkorngul S, Wongwaisayawan S, Kaewlai R. Focused assessment with sonography for trauma: current perspectives. Open Access Emergency Medicine. 2017; 9:57-62.
2. Scalea T, Rodriguez A, Chiu W, Brenneman F, Fallon W, Kato K et al. Focused Assessment with Sonography for Trauma (FAST). The Journal of Trauma: Injury, Infection, and Critical Care. 1999;46(3):466-472.
3. Trauma Ultrasound Examination Versus Chest Radiography in the Detection of Hemothorax. Journal of Diagnostic Medical Sonography. 1997;13(3):163-163.
4. Donmez H, Tokmak T, Yildirim A, Buyukoglan H, Ozturk M, Yaşar Ayaz Ü et al. Should bedside sonography be used first to diagnose pneumothorax secondary to blunt trauma?. Journal of Clinical Ultrasound. 2012;40(3):142-146.
5. Orso D, Paoli I, Piani T, Cilenti F, Cristiani L, Guglielmo N. Accuracy of Ultrasonographic Measurements of Inferior Vena Cava to Determine Fluid Responsiveness: A Systematic Review and Meta-Analysis. Journal of Intensive Care Medicine. 2018;35(4):354-363.
6. Legrand A, Jeanjean P, Delanghe F, Peltier J, Lecat B, Dupont H. Estimation of optic nerve sheath diameter on an initial brain computed tomography scan can contribute prognostic information in traumatic brain injury patients. Critical Care. 2013;17(2):R61.
7. Frongillo E, Rea G, Tinti M, Sperandeo M. Limitations of Focused Assessment with Sonography in Trauma (FAST) Protocols in Transthoracic US. Radiology. 2017;285(2):693-694.
8. Brenner D, Hall E. Computed Tomography — An Increasing Source of Radiation Exposure. New England Journal of Medicine. 2007;357(22):2277-2284.
9. Tunuka C, Wangoda R, Bugeza S, Galukande M. Emergency Sonography Aids Diagnostic Accuracy of Torso Injuries: A Study in a Resource Limited Setting. Emergency Medicine International. 2014;2014:1-6.
10. Mohanty R, George R, Abhilash K. Thoraco-abdominal injuries among patients presenting with trauma. Current Medical Issues. 2020;18(4):270.
11. Agrawal C, Jindal R, Mukherjee S. A Clinical Study of Blunt Trauma Abdomen with Respect to Management and Outcome in a Tertiary Care Hospital. 2022.
12. Ollerton J, Sugrue M, Balogh Z, D??Amours S, Giles A, Wyllie P. Prospective Study to Evaluate the Influence of FAST on Trauma Patient Management. The Journal of Trauma: Injury, Infection, and Critical Care. 2006;60(4):785-791.