SSR Institute of International Journal of Life Sciences
ISSN (O): 2581-8740 | ISSN (P): 2581-8732
Babasaheb *et al*., 2026
doi: 10.21276/SSR-IIJLS.2026.12.3.51

Original Article

open access

Diagnostic Accuracy of FAST in Detecting Hemoperitoneum in Blunt Abdominal Trauma: A Prospective Observational Study

Kamble Amarsinh Babasaheb[1], Mohammad Danish Mushtaque Ahmed Shaikh[2], Waqas Alauddin[3]*

[1]Assistant Professor, Department of General Surgery, Rajiv Gandhi Medical College and Chatrapati Shivaji Maharaj Hospital, Kalwa, Thane, Maharashtra, India

[2]Assistant Professor, Department of General Surgery, Dr. N Y Tasgaonkar Institute of Medical Science and Raigad Hospital, Karjat, Maharashtra, India

[3]Associate Professor, Department of Physiology, Dr. N Y Tasgaonkar Institute of Medical Science and Raigad Hospital, Karjat, Maharashtra, India

***Address for Correspondence:** Dr. Waqas Alauddin, Associate Professor, Department of Physiology, Dr. N Y Tasgaonkar, Institute of Medical Science and Raigad Hospital, Karjat, Maharashtra, India
E-mail: dr.waqas7@gmail.com

Received: 04 Jan 2026/ Revised: 08 Mar 2026/ Accepted: 21 Apr 2026

ABSTRACT

Background: Blunt abdominal trauma (BAT) is a significant cause of morbidity and mortality worldwide, particularly following road traffic accidents. Early identification of hemoperitoneum is essential for timely intervention and improved patient outcomes. Focused Assessment Sonography for Trauma (FAST) has emerged as a rapid, bedside diagnostic tool for detecting intra-abdominal free fluid in trauma patients.

Methods: This prospective observational study was conducted at a tertiary care center from June 2018 to September 2019. A total of 300 patients presenting with blunt abdominal trauma were included. FAST examination was performed in all patients using the standard four-view ultrasonographic approach. FAST findings were correlated with clinical examination, operative findings, and subsequent patient management. The sensitivity and predictive utility of FAST in detecting hemoperitoneum were analyzed.

Results: Among the 300 patients evaluated, FAST was positive in 255 patients (85.26%) and negative in 45 patients (14.74%). Exploratory laparotomy was performed in 50 patients based on clinical and radiological findings. FAST accurately detected significant hemoperitoneum in the majority of surgically managed patients and demonstrated good correlation with operative findings. Multiple-window FAST positivity was more frequently associated with significant intra-abdominal organ injury. The sensitivity of FAST for detecting hemoperitoneum was 85.26%.

Conclusion: FAST is a rapid, non-invasive, and reliable bedside diagnostic modality with high sensitivity for detecting hemoperitoneum in blunt abdominal trauma patients. It plays a crucial role in early trauma assessment and facilitates prompt clinical decision-making, particularly in hemodynamically unstable patients.

Key-words: FAST; Hemoperitoneum; Blunt abdominal trauma; Trauma ultrasonography; Diagnostic accuracy; eFAST

INTRODUCTION

Blunt abdominal trauma (BAT) remains a significant cause of morbidity and mortality worldwide and constitutes a major component of trauma-related hospital admissions, particularly in developing countries.

How to cite this article
Babasaheb KA, Ahmed-Shaikh MDM, Alauddin W. Diagnostic Accuracy of FAST in Detecting Hemoperitoneum in Blunt Abdominal Trauma: A Prospective Observational Study. SSR Inst Int J Life Sci., 2026; 12(3): 10044-10050.

Access this article online
https://iijls.com/

Increasing urbanization, rapid motorization, industrialization, and interpersonal violence have contributed substantially to the rising incidence of blunt abdominal injuries.

Road traffic accidents are the leading cause of BAT and account for approximately 75–80% of cases. [1]

The diagnosis of intra-abdominal injury following blunt trauma continues to be a clinical challenge because external signs may be minimal or absent despite severe internal organ damage. Delayed diagnosis and inadequate management are associated with increased morbidity, mortality, prolonged hospitalization, and

doi: 10.21276/SSR-IIJLS.2026.12.3.51

adverse clinical outcomes. Hemoperitoneum secondary to solid organ injury is one of the most important manifestations of BAT and requires early identification for timely intervention. [2]

Over the past few decades, Focused Assessment Sonography for Trauma (FAST) has emerged as an essential bedside imaging modality in the initial evaluation of trauma patients. FAST is a rapid, non-invasive ultrasonographic examination primarily designed to detect free intraperitoneal and pericardial fluid in trauma settings?. It is particularly useful in hemodynamically unstable patients who cannot be immediately shifted for contrast-enhanced computed tomography (CECT). [3]

FAST offers several advantages including rapid bedside application, portability, repeatability, lack of ionizing radiation, and the ability to be performed simultaneously during resuscitation. The standard FAST examination includes four principal views: the right upper quadrant (Morison's pouch), left upper quadrant (perisplenic space), pelvic view (pouch of Douglas), and subxiphoid pericardial view.[3] The examination has demonstrated high sensitivity for detecting intraperitoneal free fluid, particularly in patients with significant hemoperitoneum.[4]

Although CECT remains the gold standard investigation for evaluating hemodynamically stable patients with abdominal trauma, FAST serves as a valuable screening and triaging tool in emergency departments, especially in resource-limited settings where rapid decision-making is crucial. Additionally, FAST reduces the need for invasive procedures such as diagnostic peritoneal lavage and facilitates early surgical consultation and intervention. [5]

In view of the increasing burden of blunt abdominal trauma and the growing role of bedside ultrasonography in emergency care, the present study was undertaken to evaluate the diagnostic accuracy and clinical utility of FAST in detecting hemoperitoneum in patients with blunt abdominal trauma and to correlate FAST findings with operative findings and patient management outcomes.

MATERIALS AND METHODS

Study Design- This prospective observational study was conducted in the Department of General Surgery at a tertiary care teaching hospital over a period of two and a half years, from June 2018 to September 2019. The study was designed to evaluate the diagnostic accuracy and clinical utility of Focused Assessment Sonography for Trauma (FAST) in detecting hemoperitoneum in patients presenting with blunt abdominal trauma.

Study Population- A total of 300 patients presenting to the emergency department with blunt abdominal trauma were included in the study. Patients were evaluated clinically and radiologically as part of the institutional trauma protocol.

Methodology- Patients presenting with suspected blunt abdominal trauma underwent detailed history taking, thorough clinical examination, hemodynamic assessment, and baseline laboratory investigations at the time of admission. Following initial resuscitation according to Advanced Trauma Life Support (ATLS) guidelines, all patients underwent Focused Assessment Sonography for Trauma (FAST) examination as part of the primary trauma evaluation. FAST examination was performed using a standard four-view ultrasonographic approach, which included the right upper quadrant view (Morison's pouch), left upper quadrant view (perisplenic space), pelvic view (pouch of Douglas/rectovesical pouch), and subxiphoid pericardial view. The presence of free intraperitoneal fluid in any of these views was considered a positive FAST examination. FAST findings were subsequently correlated with clinical examination findings, contrast-enhanced computed tomography (CECT) findings whenever indicated, operative findings, and patient management outcomes. Hemodynamically stable patients with equivocal clinical or FAST findings underwent further evaluation with CECT abdomen. Patients with positive FAST findings associated with hemodynamic instability, worsening clinical condition, or evidence of significant intra-abdominal injury were considered for exploratory laparotomy. The diagnostic utility, sensitivity, and predictive value of FAST in detecting hemoperitoneum in blunt abdominal trauma patients were analyzed.

Inclusion Criteria

- Patients presenting with blunt abdominal trauma
- Patients of all age groups and both sexes
- Hemodynamically stable and unstable patients with suspected abdominal injury
- Patients willing to participate in the study

doi: 10.21276/SSR-IIJLS.2026.12.3.51

Exclusion Criteria

- Patients with penetrating abdominal trauma
- Patients with pre-existing ascites
- Patients with isolated head injury without suspicion of abdominal trauma
- Patients unwilling to participate in the study

Statistical Analysis- The collected data were entered into Microsoft Excel and analyzed using appropriate statistical methods. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used for data analysis. Sensitivity and predictive utility of FAST for detecting hemoperitoneum were calculated by correlating FAST findings with operative findings and final clinical diagnosis. The results were presented in the form of tables and charts wherever appropriate.

Ethical Committee Approval- The study was conducted after obtaining approval from the Institutional Ethics Committee of the tertiary care teaching hospital. Written informed consent was obtained from all patients or their legally authorized attendants before inclusion in the study. Patient confidentiality and data privacy were strictly maintained throughout the study in accordance with ethical research guidelines.

RESULTS

A total of 300 patients presenting with blunt abdominal trauma were included in the present study. All patients underwent FAST examination as part of the initial trauma evaluation protocol. FAST findings were correlated with clinical examination, operative findings, and subsequent patient management.

FAST examination was positive in 255 patients (85.26%) and negative in 45 patients (14.74%), as shown in Table 1. The majority of FAST-positive patients demonstrated evidence of hemoperitoneum and associated intra-abdominal organ injury.

Table 1: Distribution of Patients According to FAST Findings

FAST Findings	Number of Patients	Percentage
FAST Positive	255	85.26%
FAST Negative	45	14.74%
Total	300	100%

The sensitivity of FAST in detecting hemoperitoneum in blunt abdominal trauma patients was found to be 85.26%. Among the FAST-positive patients, multiple-window fluid collection was more commonly observed compared to isolated single-window positivity. Multiple-window involvement was associated with a greater likelihood of significant intra-abdominal injury and operative intervention, as summarized in Table 2.

Table 2: Distribution of FAST Positivity According to Number of Windows Involved

FAST Window Involvement	Number of Patients	Percentage
Single Window Positive	43	16.86%
Multiple Window Positive	212	83.14%
Total FAST Positive Cases	255	100%

Patients with multiple FAST window positivity demonstrated a higher incidence of clinically significant hemoperitoneum and intra-abdominal organ injury compared to patients with isolated single-window positivity.

Out of the 300 patients included in the study, 250 patients (83.33%) were managed conservatively, while 50 patients (16.67%) required exploratory laparotomy based on FAST findings, hemodynamic instability, clinical deterioration, and radiological evaluation, as shown in Table 3.

Table 3: Correlation of FAST Findings with Operative Management

Outcome	Number of Patients	Percentage
Conservative Management	250	83.33%
Exploratory Laparotomy	50	16.67%
Negative Laparotomy	5	10% of Operated Cases

FAST demonstrated good correlation with operative findings in surgically managed patients and accurately identified significant hemoperitoneum in the majority of cases requiring operative intervention. Only 5 patients (10% of operated patients) underwent negative laparotomy. The findings of the present study indicate

doi: 10.21276/SSR-IIJLS.2026.12.3.51

that FAST is a valuable bedside diagnostic modality for the early detection of hemoperitoneum in blunt abdominal trauma patients and plays an important role in guiding timely clinical decision-making and management.

DISCUSSION

Blunt abdominal trauma (BAT) continues to be a major cause of morbidity and mortality worldwide, particularly in developing countries where road traffic accidents remain highly prevalent. Early diagnosis of intra-abdominal injury is critical because delayed recognition of hemoperitoneum may significantly worsen patient outcomes. In recent years, Focused Assessment Sonography for Trauma (FAST) has become an integral component of trauma evaluation due to its rapidity, bedside applicability, and non-invasive nature. [6]

In the present study, FAST was positive in 255 out of 300 patients (85.26%), demonstrating high sensitivity for detecting hemoperitoneum in patients with blunt abdominal trauma. These findings are comparable to those reported by a study that demonstrated that FAST is a highly effective bedside screening modality for identifying intraperitoneal fluid in trauma patients. [7] Similarly, another study emphasized the important role of FAST in the initial assessment of trauma patients and recommended its incorporation into standard trauma protocols. [8]

The present study also demonstrated that multiple-window FAST positivity was more commonly associated with significant intra-abdominal organ injury and increased likelihood of operative intervention. Patients demonstrating free fluid in multiple abdominal windows were more likely to require exploratory laparotomy compared to patients with isolated single-window positivity. Similar findings were reported by Branney et al., who observed that increasing amounts and distribution of intraperitoneal fluid were associated with greater severity of injury and higher operative rates. [9]

FAST demonstrated good correlation with operative findings in surgically managed patients. Among the 50 patients who underwent exploratory laparotomy, only 5 patients had negative laparotomy findings, indicating good predictive utility of FAST in identifying clinically significant hemoperitoneum. This finding supports previous studies that have highlighted the usefulness of FAST in guiding early surgical decision-making in trauma settings. [7,8]

One of the major advantages of FAST observed in the present study was its utility in hemodynamically unstable patients. Since FAST can be performed rapidly at the bedside during resuscitation, it provides immediate information regarding the presence of intra-abdominal free fluid without requiring patient transfer. One more study reported that FAST has largely replaced diagnostic peritoneal lavage in many trauma centers because of its non-invasive nature and ease of repetition. [10]

Despite its advantages, FAST have certain limitations. The modality primarily detects free fluid and may fail to identify isolated hollow viscus injuries, mesenteric injuries, diaphragmatic injuries, or retroperitoneal trauma in the absence of significant hemoperitoneum. Additionally, the accuracy of FAST is operator-dependent and may be affected by obesity, bowel gas, or subcutaneous emphysema. Similar limitations have been reported in previous literature. [11]

Although contrast-enhanced computed tomography (CECT) remains the gold standard investigation for hemodynamically stable patients, FAST continues to serve as a valuable initial screening and triaging tool, particularly in emergency departments and resource-limited settings where immediate CT availability may be restricted. [12]

Overall, the findings of the present study reaffirm the important role of FAST in the early diagnosis and management of blunt abdominal trauma patients. Its high sensitivity, bedside applicability, rapid execution, and good correlation with operative findings make it an indispensable component of modern trauma care.

STRENGTHS

The present study had several important strengths. It was conducted prospectively over a considerable study duration, which allowed systematic patient evaluation, organized data collection, and detailed analysis. The inclusion of a relatively large sample size of 300 patients enhanced the reliability and clinical relevance of the findings. Another major strength of the study was the correlation of FAST findings with operative findings and patient outcomes, which improved the overall clinical validity and practical applicability of the results. Furthermore, the study evaluated the utility of FAST in real-time emergency trauma settings, thereby reflecting

doi: 10.21276/SSR-IIJLS.2026.12.3.51

its effectiveness in routine clinical practice. Inclusion of both conservatively managed and surgically treated patients also enabled a comprehensive assessment of the diagnostic accuracy, sensitivity, and predictive utility of FAST in blunt abdominal trauma patients.

LIMITATIONS

Despite its strengths, the present study had certain limitations. Since the study was conducted at a single tertiary care center, the findings may not be fully generalizable to all healthcare settings. The diagnostic accuracy of FAST is operator-dependent, and variations in sonographic expertise may have influenced the results. Additionally, isolated hollow viscus injuries, mesenteric injuries, and retroperitoneal injuries without significant free intraperitoneal fluid could have been missed on FAST examination. Detailed assessment of specificity, positive predictive value, and negative predictive value could not be uniformly performed in all patients. Furthermore, contrast-enhanced computed tomography (CECT), which is considered the gold standard investigation in stable trauma patients, was not feasible in every case, particularly among hemodynamically unstable patients requiring urgent intervention.

CONCLUSIONS

FAST is a rapid, reliable, non-invasive, and readily available bedside diagnostic modality for the evaluation of patients with blunt abdominal trauma. The present study demonstrated that FAST has high sensitivity for detecting hemoperitoneum and shows good correlation with operative findings and clinical outcomes. FAST proved particularly valuable in the early assessment of hemodynamically unstable trauma patients by facilitating prompt diagnosis and timely surgical decision-making. Multiple-window FAST positivity was associated with a higher likelihood of significant intra-abdominal injury and operative intervention. Although FAST has certain limitations in detecting isolated hollow viscus and retroperitoneal injuries, its rapid bedside applicability, repeatability, and utility during resuscitation make it an indispensable component of modern trauma protocols, especially in emergency and resource-limited settings. The findings of the present study support the routine use of FAST as an initial screening and triaging tool in the management of blunt abdominal trauma patients.

ACKNOWLEDGMENTS

The authors express sincere gratitude to the Department of General Surgery, emergency department staff, radiology department, and all healthcare personnel involved in the management of trauma patients during the study period. The authors also thank all study participants and their families for their cooperation and support throughout the study.

CONTRIBUTION OF AUTHORS

Research concept- Kamble Amarsinh Babasaheb**,**
Research design- Kamble Amarsinh Babasaheb**,**
Supervision- Kamble Amarsinh Babasaheb**,** Waqas Alauddin
Materials- Kamble Amarsinh Babasaheb**,**
Data collection- Kamble Amarsinh Babasaheb**,**
Data analysis and interpretation- Kamble Amarsinh Babasaheb**,** Mohammad Danish Mushtaque Ahmed Shaikh
Literature search- Kamble Amarsinh Babasaheb**,** Waqas Alauddin
Writing article- Kamble Amarsinh Babasaheb, Mohammad Danish Mushtaque Ahmed Shaikh**,** Waqas Alauddin
Critical review- Kamble Amarsinh Babasaheb, Mohammad Danish Mushtaque Ahmed Shaikh**,** Waqas Alauddin
Article editing- Kamble Amarsinh Babasaheb, Waqas Alauddin
Final approval- Kamble Amarsinh Babasaheb, Waqas Alauddin

REFERENCES

[1] Butchart A, Mikton C, Dahlberg LL, Krug EG. Global status report on violence prevention 2014. Inj Prev., 2015; 21(3): 213. doi: 10.1136/injuryprev-2015-041640.
[2] Kordzadeh A, Devanesan A, Parkinson T, Rahim K, Panayiotopoulos Y. Subtle mesenteric avulsion in a traumatic abdominal wall hernia: A case report. Int J Surg Case Rep., 2012; 3(9): 417-19. doi: 10.1016/j.ijscr.2012.04.020.
[3] Wang PH, Lin HY, Chang PY, Lien WC. Focused Assessment with Sonography for Trauma. J Med Ultrasound., 2021; 29(3): 151-53. doi: 10.4103/jmu.jmu_128_21.

doi: 10.21276/SSR-IIJLS.2026.12.3.51

[4] Bass GA, Kaplan LJ, Gaarder C, Coimbra R, et al. European society for trauma and emergency surgery member-identified research priorities in emergency surgery: a roadmap for future clinical research opportunities. Eur J Trauma Emerg Surg., 2024; 50(2): 367-82. doi: 10.1007/s00068-023-02441-3.

[5] Soni NJ, Franco R, Velez MI, Schnobrich D, Dancel R, et al. Ultrasound in the diagnosis and management of pleural effusions. J Hosp Med., 2015; 10(12): 811-16. doi: 10.1002/jhm.2434.

[6] Lansier A, Bourillon C, Cuénod CA, Ragot E, Follin A, et al. CT-based diagnostic algorithm to identify bowel and/or mesenteric injury in patients with blunt abdominal trauma. Eur Radiol., 2023; 33(3): 1918-27. doi: 10.1007/s00330-022-09200-9.

[7] Rowell SE, Barbosa RR, Holcomb JB, Fox EE, Barton CA, et al. The focused assessment with sonography in trauma (FAST) in hypotensive injured patients frequently fails to identify the need for laparotomy: a multi-institutional pragmatic study. Trauma Surg Acute Care Open, 2019; 4(1): e000207. doi: 10.1136/tsaco-2018-000207.

[8] Martocchia A, Bentivegna E, Sergi D, Luciani M, Barlattani M, et al. The Point-of-Care Ultrasound (POCUS) by the Handheld Ultrasound Devices (HUDs) in the COVID-19 Scenario: a Review of the Literature. SN Compr Clin Med., 2023; 5(1): 1. doi: 10.1007/s42399-022-01316-9.

[9] Alasasfeh I, Almashakbeh Y, Jwaifel S, AlSheikh F, Mihyar H, et al. Patient satisfaction using handheld ultrasound at emergency department in Jordan University Hospital. Int J Emerg Med., 2024; 17(1): 135. doi: 10.1186/s12245-024-00701-6.

[10] Valentino M, De Luca C, Galloni SS, Branchini M, Modolon C, et al. Contrast-enhanced US evaluation in patients with blunt abdominal trauma. J Ultrasound., 2010; 13(1): 22-27. doi: 10.1016/j.jus.2010.06.002.

[11] Bella FM, Bonfichi A, Esposito C, Zanza C, Bellou A, et al. Extended Focused Assessment with Sonography for Trauma in the Emergency Department: A Comprehensive Review. J Clin Med., 2025; 14(10):3457. doi: 10.3390/jcm14103457.

[12] Vunvulea V, Suciu BA, Cocuz IG, Bacalbașa N, Molnar C, et al. Importance of the neutrophil to lymphocyte ratio as a prognostic factor in patients with spleen trauma: A single center experience. Biomed Rep., 2022; 17(4): 80. doi: 10.3892/br.2022.1563.