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Original Article

Focused Assessment with Sonography in Trauma (FAST)

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ABSTRACT

FAST scan is a protocol of ultrasound used to evaluate patients with free intraperitoneal fluid suffering from blunt trauma to the chest and abdomen. The FAST has become the source of a great deal of attention. **Objectives:** To diagnose free fluid in intraperitoneal, intrathoracic, and pericardial regions in blunt abdominal traumatic patients by using ultrasound. **Methods:** This retrospective cross-sectional study was carried out at Aziz Bhatti Hospital in Gujarat, Pakistan, over three months from Dec 2022 to Feb 2023. A sample size was collected retrospectively with the permission of the relevant authorities. The convenient sampling technique was used. The size of the sample was chosen by looking at previous research. The scan was performed on an Ultrasound Machine (Toshiba Aplio 300) to examine the free fluid. Data were analyzed by SPSS-26. **Results:** The rate of trauma increased in male patients is 37 (67.3%), ranging from 10-70 years of age, rather than in females, which is 18 (32.7%), ranging from 15 to 68 years out of 55. About 50.9% of studies are negative, and 49.1% of the studies are positive. Falls, Vehicle accidents, and blunt Trauma are the most common trauma consequences in patients. **Conclusions:** FAST is a safe, quick, and accurate technique that is helpful in the early assessment of patients with trauma. This use of FAST scan played a vital role in the less use of abdominal CT performed. It is useful in detecting the free fluid in various regions of the body.

INTRODUCTION

The advanced trauma life support (ATLS) training includes a FAST. A recommendation made by an international group of experts for treating trauma patients [1]. Emergency doctors typically perform it to see whether any free fluid is present, since it might be haemoperitoneum [2]. This could enable quick referral to further imaging, such as a computed tomography (CT) scan or surgery [3]. Ultrasound equipment is currently available in most large trauma centers because of the widespread adoption of FAST [4]. In cases of traumatic abdominal injuries, emergency ultrasonography reduces the need for computerized tomographic scans according to a recent Cochrane Review [5]. The FAST test identifies instability that causes pathological disorders such as hemoperitoneum, hemopericardium, hemothorax, and pneumothorax [6]. The FAST examination is a modern and adequate approach employed in emergency treatment. It provides fast and more precise details of the blunt trauma outcomes in the fluid collection in different locations in the body [7]. FAST has been the standard of care and screening tool in several algorithms of both blunt and penetrating trauma in people since the 1990s [8]. Previously, medical practitioners employed diagnostic peritoneal lavage (DPL) to locate hemoperitoneum. Although DPL is an invasive intervention, with a complication rate of 1%, it is also highly sensitive (96% to 99%) and specific (98%) [9]. The sensitivity (95% confidence interval) was 100% (69.2%-100%), and the specificity (55.5%-99.8%) was 90%. Our results indicate that automated detection of free fluid on abdominal ultrasound images could be sensitive and

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specific enough to aid physicians in the interpretation of a Fast [10]. The ultrasonography inspection has, since the 1970s, regularly increased in significance in the prompt evaluation of traumatized patients, and currently, as suggested by ATLS. The examination and treatment of patients have been greatly changed by the use of point-of-care ultrasonography. [11]. In Europe, the use of ultrasonography to detect intraperitoneal fluid was first mentioned in the 1970s [12]. None of the adoptions took until the 1990s to become widely accepted in the US [13]. Some investigations that examined the detection of hemoperitoneum throughout the 1990s reported sensitivities ranging from 69% (11 of 16) to 98% (52 of 53) and specificities from 95% (18 of 19) to 100% (259 of 259) [14]. Several articles on ultrasonography (US) application in trauma emerged in German literature in the 1980s [15]. Trauma is the most common cause of illness and death in Pakistan's emergency and intensive care facilities. While FAST scans are a timely diagnosis of traumatic patients with internal bleeding and injured organs over CT scan. FAST scan is a non-invasive technique. There is limited regional data on how specific sonographic findings correlate with clinical severity among people. This study aims to fill that gap by evaluating the diagnostic value of FAST scan in detecting the fluid in traumatic patients. By analyzing sonological patterns and their association with clinical indications, the study supports more accurate, early diagnosis and better-informed treatment decisions in resource–constrained healthcare.

Trauma remains a leading cause of morbidity and mortality, particularly in emergency settings where rapid diagnosis of internal bleeding is critical. Although FAST (Focused Assessment with Sonography for Trauma) is widely used as a quick, non-invasive diagnostic tool, there is limited regional evidence regarding its diagnostic value and correlation with clinical findings in trauma patients. Existing studies primarily focus on sensitivity and specificity without adequately exploring local sonographic patterns and their clinical implications. . This study aims to assess the diversity of FAST assessments conducted by clinicians and how that affected the utilization of abdominal computed tomography in infants with severe core injuries who were hemodynamically stable [16]. Children with BTT may or may not receive the FAST [17]. FAST's goal is to locate free fluid, which is always blood in severe trauma patients in three different possible body areas, like the pericardial, pleural, and peritoneal spaces. The purpose of focused assessment is to identify the hemoperitoneum in a patient with suspected intra-abdominal injury.

METHODS

This retrospective study was conducted at Aziz Bhatti Hospital, Gujarat, Pakistan. The size of the sample was taken from a previous study [18]. A total of 55 traumatic patients diagnosed were included in this retrospective study conducted at the Gujarat Radiology Department, Pakistan, over three months (December 2022 to February 2023). The sample size was derived from reviewing methodologies from previously published studies. SPSS version 26 was used to analyze the association between the traits and traumatic injuries and internal bleeding of patients. Before enrolling participants, we observed 55 patients with positive and negative FAST scans for free fluid [19]. The convenient sampling approach was utilized to collect data with the permission and subsequent ethical guidelines illustrated by the university research community. The sample size was calculated by the open Epi software. The inclusion criteria were patients of all genders, presented to the emergency department with trauma and suspected internal bleeding. Nontraumatic patients, pregnant women, and those with insufficient clinical records were excluded from the study. All FAST scans were performed independently by two experienced radiologists and skilled sonologists who were blinded to the clinical history of the patients. Discrepancies in interpretations were resolved by consensus. Real-time B-mode imaging is employed in the FAST assessment [20]. The ultrasound machine utilized in carrying out the examination was (Toshiba Aplio 300, curvilinear probe whose frequency range is 2- 5 MHz. SPSS version 26.0 was applied to analyze the data. Descriptive statistics were employed to sum up demographic data, clinical symptoms and results.

RESULTS

The highest frequency of trauma was in male patients, who were 37 (67.3%), with an age group ranging from 10 to 70 years and the rest of the blunt trauma was found in the female, who were 18 (32.7%), with an age group ranging from 15 to 68 years. The commonest fluid accumulation found in various organs or areas of the body of the traumatic patient is Pelvic Ascites 10 (18.2%), Hepatorenal Ascites 2 (3.6%), Abd-pelvic Ascites 11 (20.0%), and Spleenorenal Ascites 4 (7.3%). It also included several patients having no fluid accumulation, 28 (50.9%). There are around 50.9% of studies negative, meaning there is no fluid buildup in various bodily parts. On the other hand, 49.1% of studies are positive. The most occurring trauma causes were fall history 15 (27.3%), Road traffic accidents 23(41.8%), and blunt Trauma 17(30.9%)(Table 1).

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Table 1: Gender, Findings of the Scan and History of the Patient

Variables		Frequency (%)
Gender	Male	37 (67.3%)
	Female	18 (32.7%)
	Total	55 (100%)
Findings of the Scan	Pelvic Ascites	10 (18.2%)
	Hepatorenal Ascites	2 (3.6%)
	Abd-Pelvic Ascites	11 (20.0%)
	Spleenorenal Ascites	4 (7.3%)
	Unremarkable	28 (50.9%)
	Total	55 (100.0%)
History	Fall	15 (27.3%)
	Accident	23 (41.8%)
	Blunt Trauma	17 (30.9%)
	Total	55 (100.0%)

DISCUSSION

FAST scan has been the accepted sonographic assessment for trauma victims for approximately 20 years [21]. It has transformed the first care of trauma patients by enabling the early diagnosis of hemoperitoneum and hemopericardium [22]. This scan is quickly taking over the assessment of blunt abdominal injuries [23]. The fundamental FAST scan approach was characterized as the real-time examination of the four thoracic zones (four Ps): pericardial, perisplenic, perihepatic (Morison pouch), and pelvic (Douglas pouch) [24]. The investigation entailed putting the probe in the right upper quadrant of the patient to detect the liver, kidney, and diaphragm, and also checking for blood in the Morison's pouch [25]. Several articles on the application of ultrasonography (US) in traumatology were published in German literature throughout the 1980s [15]. American use then extended to other countries in Europe, including Norway and England, as well as internationally [19]. After blunt trauma, pneumothorax (PTXs) are the most frequent major intra-thoracic injuries. They are a significant cause of avoidable mortality for whom very easy procedures may be life-saving. At least one in five serious blunt trauma patients who are discovered alive have PTXs [26]. Trauma sonography might be used to diagnose problems in space because it was successfully conducted during experimental weightlessness [27]. A positive FAST exam should trigger an exploratory laparotomy due to the increased likelihood of intra-abdominal damage [28]. If the initial FAST exam is ineffective in diagnosing penetrating trauma, additional diagnostic procedures such as LWE, CT, DPL, or laparotomy should be performed [29]. The fluid collection is mostly seen at the sites of the Morison pouch, splenic area, xiphoid area, and a pouch of doglus [30]. FAST has good sensitivity and specificity when screening for free fluid in the abdominal, pleural, and pericardial cavities. For the quick diagnosis of pneumothorax, an expanded FAST scan was created more recently [8]. It is believed that ultrasonography is a trustworthy way to find hemoperitoneum and provides a useful non-invasive way to look at blunt abdominal injuries. The hepatorenal pouch provides the best view of free intraperitoneal fluid [31]. Abdominal computed tomography (CT) was performed after targeted abdominal sonography for trauma-indicated fluid in the splenorenal recess that was problematic for intra-abdominal damage [32]. Recognizing the damaged organ enables a well-planned procedure [33]. On ultrasound, free fluid localization within the context of acute abdominal trauma, and even if additional areas collect fluid on a therapeutically meaningful basis, has been the subject of less investigation. Current FAST scanning techniques indeed have certain limits, especially when it comes to closed renal damage, pelvic fractures, and duodenal injuries [34].

The study is limited by its small sample size, retrospective design, and use of convenience sampling, which may affect the generalizability and reliability of the findings. Additionally, being a single-center study, the results may not represent broader clinical settings. The lack of comparison with gold-standard imaging techniques such as CT scan may also limit diagnostic validation. Future research should involve larger, multi-center prospective studies with standardized protocols and comparative analysis to enhance the accuracy, reliability, and clinical applicability of FAST in trauma care.

CONCLUSIONS

It was concluded that FAST is an easy, rapid, and very helpful diagnostic technique for traumatic patient's treatment and diagnosis. This ultrasound strategy was created to check for hemoperitoneum and hemopericardium. A convenient ultrasound approach called FAST was developed to treat common life-threatening wounds in traumatized individuals. In our sample, we discovered that the absence of a significant cause of damage, hypotension, or an urgent need for intubation disqualified this diagnosis. Adult trauma patients with positive FAST results usually have free fluid in the LUQ.

Authors' Contribution

Conceptualization: AAA
Methodology: MA, AAA
Formal analysis: TAA
Writing and Drafting: UTK, MA
Review and Editing: MA, AAA, TAA, UTK, MA

All authors approved the final manuscript and take responsibility for the integrity of the work.

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Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Savatmongkorngul S, Wongwaisayawan S, Kaewlai R. Focused assessment with sonography for trauma: current perspectives. Open Access Emergency Medicine. 2017 Jul: 57-62. doi: 10.2147/OAEM.S120145.

[2] Gamberini L, Scquizzato T, Tartaglione M, Chiarini V, Mazzoli CA, Allegri D *et al.* Diagnostic Accuracy for Hemoperitoneum, Influence on Prehospital Times and Time-to-Definitive Treatment of Prehospital FAST: A Systematic Review and Individual Participant Data Meta-Analysis. Injury. 2023 Jun; 54(6): 1421-31. doi: 10.1016/j.injury.2023.03.024.

[3] Hussain S, Mubeen I, Ullah N, Shah SS, Khan BA, Zahoor M *et al.* Modern Diagnostic Imaging Technique Applications and Risk Factors in the Medical Field: A Review. Biomed Research International.2022; 2022(1): 5164970. doi: 10.1155/2022/5164970.

[4] Smith J. Focused Assessment with Sonography in Trauma (FAST): Should Its Role Be Reconsidered? Postgraduate Medical Journal. 2010 May; 86(1015): 285-91. doi: 10.1136/pgmj.2008.076711.

[5] Khadka DB, Sharma A, Bhatta A, Maharjan P, Sharma S. Role of Computed Tomography in Blunt Abdominal Trauma. Journal of Nepalgunj Medical College. 2021; 19(1): 55-8. doi: 10.3126/jngmc.v19i1.40232.

[6] Erasu VP, Marathe P. Focused Assessment with Sonography in Trauma (FAST) Exam. In A Practical Guide to Point of Care Ultrasound (POCUS). Singapore: Springer Nature Singapore.2022Sep: 149-169. doi: 10.1007/978-981-16-7687-1_7.

[7] Bašković M, Keretić D, Lacković M, Borić Krakar M, Pogorelić Z. The Diagnosis and Management of Pediatric Blunt Abdominal Trauma—A Comprehensive Review. Diagnostics.2024Oct;14 (20): 2257. doi: 10.3390/diagnostics14202257.

[8] Lein F. Abdominal/Thoracic Focused Assessment with Sonography for Trauma-Leitlinie für Ultraschalluntersuchungen beim Kleintier in der Zentralen Notambulanz der Veterinärmedizinischen Universität Wien. 2022.

[9] Bloom BA and Gibbons RC. Focused Assessment with Sonography for Trauma (FAST). Stat Pearls. Treasure Island (FL): Stat Pearls Publishing. 2019 Sep.

[10] Lin KT, Lin ZY, Huang CC, Yu SY, Huang JL, Lin JH *et al.* Prehospital Ultrasound Scanning for Abdominal Free Fluid Detection in Trauma Patients: A Systematic Review and Meta-Analysis.BioMed Central Emergency Medicine.2024Jan;24(1):7.doi:10.1186/s12873-023-00919-2.

[11] Dietrich CF, Goudie A, Chiorean L, Cui XW, Gilja OH, Dong Y *et al.* Point of Care Ultrasound: A WFUMB Position Paper. Ultrasound in Medicine and Biology. 2017 Jan; 43(1): 49-58. doi: 10.1016/j.ultrasmedbio.2016.06.021.

[12] Savoia P, Jayanthi SK, Chammas MC. Focused Assessment with Sonography for Trauma (FAST). Journal of Medical Ultrasound.2023 Apr;31(2):101-6. doi: 10.4103/jmu.jmu_12_23.

[13] Long MK, Vohra MK, Bonnette A, Parra PD, Miller SK, Ayub E *et al.* Focused Assessment with Sonography for Trauma in Predicting Early Surgical Intervention in Hemodynamically Unstable Children with Blunt Abdominal Trauma. Journal of the American College of Emergency Physicians Open.2022Feb;3(1): e12650. doi: 10.1002/emp2.12650.

[14] Richards JR and McGahan JP. Focused Assessment with Sonography in Trauma (FAST) in 2017: What Radiologists Can Learn. Radiology.2017Apr;283(1): 30-48. doi: 10.1148/radiol.2017160107.

[15] Scalea TM, Rodriguez A, Chiu WC, Brenneman FD, Fallon WF, Kato K *et al.* Focused Assessment with Sonography for Trauma (FAST): Results from an International Consensus Conference. Journal of Trauma and Acute Care Surgery. 1999 Mar; 46(3): 466-72. doi: 10.1097/00005373-199903000-00022.

[16] Stukus K, Wurtz M, Scherzer D. Trauma Injuries. In Pediatric Rotations: A Quick Guide for Medical Students. Cham: Springer International Publishing. 2024 Jul: 473-487. doi: 10.1007/978-3-031-59873-9_36.

[17] Muljadi R, Koesbandono, Octavius GS. A Systematic Review and Meta-Analysis of Diagnostic Test Accuracy of Chest Ultrasound in Diagnosing Pediatric Pulmonary Tuberculosis. Pediatric Pulmonology. 2024 Oct; 59(10): 2381-91. doi: 10.1002/ppul.27044.

[18] Lakens D. Sample Size Justification. Collabra: Psychology. 2022 Mar; 8(1): 33267. doi: 10.1525/collabra.33267.

[19] Bhoi S, Sinha TP, Ramchandani R, Kurrey L, Galwankar S. To Determine the Accuracy of Focused Assessment with Sonography for Trauma Done by Nonradiologists and Its Comparative Analysis with Radiologists in Emergency Department of a Level 1 Trauma Center of India. Journal of Emergencies, Trauma, and Shock. 2013 Jan; 6(1): 42-6. doi: 10.4103/0974-2700.106324.

[20] Ma X, Shen E, Yuan J, Gong L, Kong W, Jin Z *et al.* Volumetric B-mode ultrasound and Doppler Imaging: Automatic Tracking with One Single Camera.

DOI: https://doi.org/10.54393/pbmj.v8i5.1252

Ultrasonic Imaging. 2024 Mar; 46(2): 90-101. doi: 10.1177/01617346231213385.

[21] Rozycki GS, Ochsner MG, Jaffin JH, Champion HR. Prospective Evaluation of Surgeons' Use of Ultrasound in the Evaluation of Trauma Patients. In 50 Landmark Papers Every Trauma Surgeon Should Know. 2019 Jul: 89-92.

[22] Rozycki GS, Ochsner MG, Feliciano DV, Thomas B, Boulanger BR, Davis FE *et al.* Early Detection of Hemoperitoneum by Ultrasound Examination of the Right Upper Quadrant: A Multicenter Study. Journal of Trauma and Acute Care Surgery. 1998 Nov; 45(5) :878-83. doi: 10.1097/00005373-199811000-00006.

[23] Nayak SR, Yeola MP, Nayak SR, Kamath K, Raghuwanshi PS. Role of Focused Assessment with Sonography for Trauma in the Assessment of Blunt Abdominal Trauma–A Review. Journal of Evolution of Medical and Dental Sciences. 2021 Jan; 10(1): 45-51. doi: 10.14260/jemds/2021/9.

[24] Bouarroudj N, Cano PC, bin Mohd Fathil S, Hemamid H. POCUS in Critical Care, Anesthesia and Emergency Medicine. Springer. 2024. doi: 10.1007/978-3-031-43721-2.

[25] Delbridge MS and Al-Jundi W. Pocketbook of Surgery-E-Book: Pocketbook of Surgery-E-Book. Elsevier Health Sciences. 2024 May.

[26] Kirkpatrick AW, Sirois M, Laupland KB, Liu D, Rowan K, Ball CG *et al.* Hand-Held Thoracic Sonography for Detecting Post-Traumatic Pneumothoraces: The Extended Focused Assessment with Sonography for Trauma (EFAST). Journal of Trauma and Acute Care Surgery. 2004 Aug; 57(2): 288-95. doi: 10.1097/01.TA.0000133565.88871.E4.

[27] Kirkpatrick AW, Hamilton DR, Nicolaou S, Sargsyan AE, Campbell MR, Feiveson A *et al.* Focused Assessment with Sonography for Trauma in Weightlessness: A Feasibility Study. Journal of the American College of Surgeons. 2003 Jun; 196(6): 833-44. doi: 10.1016/S1072-7515(02)01906-3.

[28] Achatz G, Schwabe K, Brill S, Zischek C, Schmidt R, Friemert B *et al.* Diagnostic Options for Blunt Abdominal Trauma. European Journal of Trauma and Emergency Surgery. 2022 Oct: 1-5.

[29] Gerall CD, Duron VP, Stylianos S. Abdominal and Genitourinary Trauma. In Pediatric Surgery: Diagnosis and Management. Cham: Springer International Publishing. 2023 Jan: 239-259. doi: 10.1007/978-3-030-81488-5_20.

[30] de Haan JB, Sen S, Joo SS, Singleton M, Haskins SC. FAST exam for the anesthesiologist. International Anesthesiology Clinics. 2022 Jul; 60(3): 55-64. doi: 10.1097/AIA.0000000000000363.

[31] Gines PE, Wong FL, Kim W. Diagnosis, Evaluation, and Management of Ascites and Hepatorenal Syndrome. Hepatology. 2021; 74(2): 1014-48. doi: 10.1002/hep.31884.

[32] Harper K and Shah KH. Renal Trauma After Blunt Abdominal Injury. The Journal of Emergency Medicine. 2013 Sep; 45(3): 400-4. doi: 10.1016/j.jemermed.2013.03.043.

[33] Halbfass HJ, Wimmer B, Hauenstein K, Zavisic D. Ultrasonic Diagnosis of Blunt Abdominal Injuries. Fortschritte der Medizin. 1981 Nov; 99(41): 1681-5.

[34] Simpson N, Page P, Taylor DM. Free Fluid Accumulation Following Blunt Abdominal Trauma: Potential for Expansion of the FAST Protocol. Hong Kong Journal of Emergency Medicine. 2009 Apr; 16(2): 70-5. doi: 10.1177/102490790901600202.