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*Review*

# Focused Assessment with Sonography for Trauma (FAST) in the Early Diagnosis of Visceral Injuries in Trauma Patients: A Narrative Review

**Luís Fernando Rosati Rocha [1, 2, *], Ana Paula Miranda Rosati [3], Ana Luiza Miranda Rosati [4], Luís Eduardo Miranda Rosati Rocha [5], Rodrigo Stenio Moll de Souza [5], Bernardo Moll [6], Filipe Moll de Souza Rocha [5]**

1 Dr. Ernesto Che Guevara Municipal Hospital, Maricá, Rio de Janeiro, Brazil.
2 Department of General Surgery, Fluminense Federal University (UFF), Rio de Janeiro, Brazil.
3 Department of Radiology, Fluminense Federal University (UFF), Rio de Janeiro, Brazil.
4 Pardini Institute, Rio de Janeiro, Brazil.
5 Faculty of Medicine IDOMED, Rio de Janeiro, Brazil.
6 Faculty of Medicine, University of Bari Aldo Moro, Bari, Italy.

* Correspondence: lfrosati@yahoo.com.br.

**Abstract:** Focused Assessment with Sonography for Trauma (FAST) has become a cornerstone of early trauma evaluation due to its rapid execution, bedside availability, and noninvasive nature. Its primary role is the detection of free fluid, serving as an indirect marker of significant intra-abdominal injury. However, the accuracy of FAST for diagnosing specific visceral injuries remains variable, particularly when distinguishing solid organ from hollow viscus lesions. This narrative review analyzes current evidence regarding the role of FAST in the early diagnosis of visceral injuries in trauma patients. A structured literature search was conducted in PubMed, SciELO, and Scopus databases. The diagnostic performance of FAST, its clinical applicability in hemodynamically unstable and stable patients, and its limitations in comparison with computed tomography are discussed. The findings indicate that FAST is highly specific for detecting hemoperitoneum and is particularly valuable in unstable patients, where it facilitates rapid surgical decision-making. Nevertheless, its limited sensitivity for isolated visceral and hollow viscus injuries underscores the need for integration with clinical assessment and advanced imaging.

**Keywords:** Trauma; FAST; Visceral injury; Abdominal Trauma; Ultrasound.

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## 1. Introduction

Trauma remains a leading cause of morbidity and mortality worldwide, particularly among young and economically active populations. Despite advances in prehospital care, damage control surgery, and critical care, hemorrhage continues to be the primary cause of preventable death in trauma patients during the early post-injury period. Rapid identification of internal bleeding and associated visceral injuries is therefore a cornerstone of modern trauma management and directly influences survival outcomes [1, 2]. Abdominal trauma, whether blunt or penetrating, poses a significant diagnostic challenge in the acute setting. Clinical examination alone is often unreliable due to altered mental status, intoxication, distracting injuries, or concomitant shock. Consequently, imaging modalities have assumed a central role in the early evaluation of trauma patients, particularly for the detection of intra-abdominal injuries involving solid organs and hollow viscera.

Computed tomography (CT) is widely regarded as the gold standard for diagnosing abdominal visceral injuries. However, CT requires patient stability and safe transport,

which may not be feasible in hemodynamically unstable patients or in resource-limited settings. These limitations highlight the need for rapid bedside diagnostic tools [3, 4]. Focused Assessment with Sonography for Trauma (FAST) was developed to address this gap, providing a rapid, noninvasive, and repeatable bedside ultrasound examination aimed at detecting free fluid [5].

The present narrative review evaluates the role of FAST in the early diagnosis of visceral injuries in trauma patients, focusing on its diagnostic performance, clinical applicability, and limitations.

## 2. Materials and Methods

Study selection was based on relevance to clinical decision-making, diagnostic performance of FAST, and applicability to emergency and surgical trauma care. Given the narrative design, no formal risk-of-bias assessment was performed; however, methodological rigor and clinical relevance were considered during synthesis. Inclusion criteria comprised original studies, cohort studies, systematic reviews, meta-analyses, and consensus statements addressing adult blunt or penetrating trauma. Pediatric-only studies, case reports, editorials, and articles without full-text availability were excluded.

The search terms were combined using Boolean operators and included: "FAST", "focused assessment with sonography for trauma", "abdominal trauma", "visceral injury", "solid organ injury", and "hollow viscus injury". Reference lists of relevant articles were manually screened to identify additional studies. A narrative review of the literature was conducted to evaluate the role of Focused Assessment with Sonography for Trauma (FAST) in the early diagnosis of visceral injuries. The search strategy included PubMed, SciELO, and Scopus databases, covering publications from January 1996 to March 2024.

## 3. Discussion

### 3.1 Operator Dependence and Emerging Techniques

FAST performance depends directly on operator experience, quality of training, and adherence to standardized protocols. In selected situations, serial examinations may increase sensitivity, particularly when the initial assessment is inconclusive. Multicenter studies indicate that diagnostic accuracy also varies according to the clinical setting and mechanism of injury [7,8]. In parallel, emerging techniques such as contrast-enhanced ultrasonography have shown potential to improve the detection of parenchymal injuries; however, their routine use still requires further validation.

### 3.2 FAST versus Computed Tomography

Computed tomography remains the gold standard for comprehensive evaluation of abdominal trauma. While FAST offers speed, portability, and immediate bedside applicability, CT provides higher sensitivity, allows better characterization of injury extent, and plays a decisive role in guiding nonoperative management. Therefore, rather than competing modalities, FAST and CT should be regarded as complementary tools within contemporary trauma care algorithms.

### 3.3 Limitations in Hollow Viscus and Mesenteric Trauma

Hollow viscus and mesenteric injuries represent a well-recognized limitation of FAST. In such cases, intraperitoneal fluid accumulation may be minimal or delayed, increasing the likelihood of false-negative results [9]. For this reason, FAST should not be used to rule out visceral injury, particularly in hemodynamically stable patients with persistent clinical suspicion.

### 3.4 FAST and Solid Organ Injuries

Conversely, FAST performs better in the indirect identification of solid organ injuries, particularly involving the liver and spleen, where bleeding typically produces de-

tectable free fluid. Several studies show that a positive FAST in blunt abdominal trauma is strongly associated with high-grade solid organ injury and a higher probability of requiring therapeutic laparotomy [8].

### 3.5 FAST in the Hemodynamically Unstable Patient

In hemodynamically unstable trauma patients, FAST plays a central role in the initial assessment. Detection of free fluid reliably suggests clinically significant hemoperitoneum and correlates with the need for urgent hemorrhage control, whether surgical or interventional [7]. In this context, the examination functions primarily as a rapid triage tool, guiding immediate damage-control decisions rather than providing definitive anatomic diagnosis.

## 4. Conclusion

FAST and computed tomography should be integrated into structured trauma algorithms, leveraging the speed of bedside ultrasound and the anatomical precision of CT. The appropriate use of FAST, guided by physiological status and mechanism of injury, optimizes patient outcomes and resource utilization. Nevertheless, the limitations of FAST, particularly in isolated solid organ injuries without hemoperitoneum and in hollow viscus trauma, must be clearly acknowledged. A negative FAST examination does not exclude visceral injury and should never delay further diagnostic evaluation when clinical suspicion persists. Conversely, a positive FAST examination reliably identifies patients at high risk for clinically significant visceral injury and should prompt expedited operative or interventional management. FAST remains a cornerstone of early trauma assessment and a critical decision-support tool, particularly in hemodynamically unstable patients with suspected abdominal hemorrhage.

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