Journal of Surgery
Osterwalder J and Hoffman B. J Surg 10: 11527
www.doi.org/10.29011/2575-9760.11527
www.gavinpublishers.com
Opinion

# Abdominal FAST in Adults with Blunt Trauma - Time for a Two-Stage Concept

**Osterwalder J[1*], Hoffman B[2]**

[1]University of Geneva, Geneva, Switzerland

[2]Harvard Medica School, 25 Shattuck Street, Boston, MA 02115, USA

***Corresponding author:** Joseph Osterwalder, University of Geneva, Geneva, Switzerland

**Citation**: Osterwalder J, Hoffman B, (2025) Abdominal FAST in Adults with Blunt Trauma- Time for a Two-Stage Concept. J Surg 10:11527 DOI: 10.29011/2575-9760.011527

**Received Date:** 19 December 2025; **Accepted Date:** 24 December 2025; **Published Date:** 26 December 2025

**Abstract**

Despite substantial advances in ultrasound technology and diagnostics, the development of FAST (Focused Assessment with Sonography for Trauma) has seen little change since the introduction of the extended version, eFAST, in 2004. The abdominal component (aFAST) remains highly reliable for quickly detecting large amounts of free fluid-primarily blood-in the abdominal cavity. For hemodynamically unstable patients, it enables rapid triage and supports immediate surgical decision-making for hemorrhage control. However, its limited sensitivity for intra-abdominal injuries makes its role in stable patients controversial. Critics emphasize that absence of free fluid on aFAST does not exclude injury, with CT regarded as the definitive diagnostic tool. Since any positive aFAST requires CT to characterize the injury, ultrasound alone has limited stand-alone value. Given this, we propose a two-stage approach:

1. Use aFAST in its original, time-limited form in unstable patients to direct them rapidly to the operating room.

2. Apply CAST (Complete Abdominal Sonography for Trauma) in stable patients to enable more comprehensive diagnostics and guide further management. CAST and combining CAST with structured clinical risk assessment allows for more selective CT use and reduces unnecessary imaging.

**Keywords:** Abdominal Injury; FAST Exam; CAST; Two-Stage Approach

## Introduction

Before FAST was formally standardized and disseminated - especially from the USA - focused trauma sonography had already been practiced in Europe since the 1970s [1]. Early cohort studies from the 1980s examined patients systematically [2,3]. The term FAST first appeared in 1996 [4], referring to focused abdominal sonography for trauma patients. The method involves searching for free fluid in the Right Upper Quadrant (RUQ) between the liver and kidney (Morrison's pouch), in the Left Upper Quadrant (LUQ) around and between spleen and kidney, and in the suprapubic region-recto-uterine pouch in women, recto-vesical pouch in men. Inclusion of pericardial and pleural assessments led the FAST Consensus Conference Committee in 1997 to rename the exam Focused Assessment with Sonography in Trauma [5]. In 2004, pneumothorax assessment was added, producing the extended FAST (eFAST) [6]. The further development of FAST/eFAST has since stalled. However, that same year, FAST appeared in the 7th edition of the ATLS Student Course Manual of the American College of Surgeons, and in the 9th edition (2012) eFAST was adopted internationally as part of the standard initial assessment of severely injured patients in the primary survey. In the 10th edition [7], its role was further expanded. Today, eFAST is a central ATLS primary survey adjunct for rapidly identifying major peritoneal and pericardial hemorrhage, as well as pneumothorax and hemothorax.

## Current Status of Abdominal FAST (aFAST)

Within ATLS protocols, aFAST remains standard for acute trauma care [7,8], despite a 2015 Cochrane review concluding otherwise [9]. Two pathways are currently recognized:

• Unstable patients: Priority is rapid identification of significant free intraperitoneal fluid to expedite urgent laparotomy. This can be achieved within 1–2 minutes, in parallel with initial stabilization. If findings are negative or minimal, the search for other causesof shock continues immediately.

• Stable patients: The key decision is whether an abdominal CT scan is necessary or can be avoided. Additional diagnostic support alongside aFAST may include clinical monitoring, repeat aFAST (abdominal Focused Assessment with Sonography for Trauma), or Contrast-Enhanced Ultrasound (CEUS) [7,8].

**Are the current Approaches for unstable and stable patients still up to date?**

It is high time to critically re-evaluate the two approaches that have remained essentially unchanged for about three decades. Rapid triage of hemodynamically unstable patients, using ultrasound to confirm significant free intraperitoneal fluid as an indication for immediate laparotomy, is evidence-based [10,11] and continues to be a valid strategy. However, with modern ultrasound technology and newly established diagnostic options in trauma sonography, we believe that even in unstable patients with a negative aFAST, it is worth taking a brief additional look for other causes of shock - performed in parallel with ongoing resuscitation. Although originally designed solely for unstable patients to detect life-threatening bleeding into the peritoneal cavity, in daily practice the 1- to 2-minute aFAST is often promoted and performed in all stable trauma patients suspected of having intra-abdominal injury. Given that aFAST has only poor to moderate sensitivity for detecting direct intra-abdominal injuries - particularly in hemodynamically stable patients [9,12] - a negative result cannot reliably exclude injury to solid organs, the gastrointestinal tract, peritoneum, or retroperitoneum.

Because aFAST is insufficient for ruling out such injuries (low sensitivity but high specificity), several authors argue that a follow-up CT scan should be performed in every case [9,12,13]. Even when aFAST is positive and reveals blood in the peritoneal cavity, it cannot tell us the type, location, or severity of the underlying injuries-information only CT can provide. For this reason, some authors consider aFAST in stable patients to be an unnecessary, time-consuming, and costly intermediate step [13]. This view is widespread [14] and often leads to friction in clinical practice - a reality largely overlooked in literature. Yet, there are also well-documented opposing opinions supported by studies [15-17]. In stable patients, there is no strict time limit. Advances in technology and expanding indications make it possible to extend the examination beyond the sole search for free intraperitoneal fluid. This can markedly improve sensitivity for detecting intra-abdominal injuries - a potential we should be exploiting.

Technological developments such as high-resolution imaging, more powerful color Doppler techniques [18], CEUS [19], and the many studies on abdominal ultrasound published over the last 30 years [20] enable new and broader ultrasound applications in both stable and unstable patients. These changes have had surprisingly little impact on aFAST itself or on the accepted indications for where and how focused ultrasound can be applied in suspected abdominal trauma. Finally, ultrasound - and aFAST in particular - depend heavily on the operator's training and experience [21,22]. With the rapid, uncontrolled spread of point-of-care ultrasound and the availability of inexpensive portable and handheld devices, we can expect uncontrolled growth and inappropriate use [22]. This increases the risk of errors, partly because the huge demand for training has not kept pace with the expansion of use, some practitioners overestimate their skills, and inappropriate indications are made [22-24]. Considering the current situation, both a strong educational foundation and clear, evidence-based indications are essential. Against this backdrop, we present a new two-stage concept that reflects the advances of the past 30 years in ultrasound diagnostics and follows an established two-step framework: focused ultrasound and complete ultrasound.

**Two-Stage Concept**

**Stage 1 – Unstable Patient**

The focus is on three key questions:

- **Is there an intra-abdominl hemorrhage requiring immediate surgical control?**

This approach reflects the original aFAST concept. The detection of a large amount of free fluid in the peritoneal cavity via the three standard ultrasound windows (RUQ, LUQ, and suprapubic) is considered, in the appropriate clinical context, an indicator of bleeding and constitutes an indication for immediate laparotomy.

- **Is there a large retroperitoneal hematoma**, for example in the setting of vascular, renal, or pelvic injury? Currently, there are no prospective studies confirming the diagnostic value of aFAST in this context-except for the rapid diagnosis of an unstable pelvic ring fracture, which can lead to substantial hemorrhage [25].

- **Is there a major hemorrhage outside the abdomen -** such as in the pleural space, a pericardial tamponade, a tension pneumothorax, or a large hematoma in the extremities? These questions can be addressed with eFAST [5]. In addition, simple extremity ultrasound can be used to detect a large fracture-associated hematoma, although no studies to date have specifically examined this application within the eFAST framework.

**Stage 2 - Stable Patient**

The focus is on avoiding unnecessary or insufficient diagnostics. The key question is:

**AbdominalCT - yes or no?**

The aFAST is not designed to directly detect intra-abdominal injuries. Although CT is considered the gold standard in the diagnosis of such injuries, its diagnostic yield in hemodynamically stable patients with blunt abdominal trauma is low [26]. This is primarily due to vague indications that are often based solely on clinical judgment and fear of missing an injury. Clinical experience shows that only a small proportion of these patients present with significant intra-abdominal injuries on CT, while many undergo unnecessary imaging. This low yield is problematic, as CT scans are not only costly and time-consuming, but also carry potential risks such as contrast-related allergic reactions and increased radiation exposure. To date, validated clinical decision rules that could help reduce unnecessary CT imaging are lacking [26]. In this challenging context, the potential role of extended bedside ultrasound beyond the aFAST is increasingly coming into focus.

**– CT yes**

A CT scan is indicated whenever the not yet widely practiced Complete Abdominal Sonography in Trauma - abbreviated CAST - reveals direct or indirect evidence of injury.

CAST comprises eight structured examination components:

- The three FAST standard regions for detecting intraperitoneal fluid - RUQ, LUQ, and suprapubic.
- Extension with four additional acoustic windows: anterior inferior margin of the right hepatic lobe [27], subdiaphragmatic [28], paracolic gutter [29], and between the bowel loops [30], aimed at the detection of small amounts of intraperitoneal fluid.
- Assessment of the retroperitoneum [31] - in our opinion, a targeted evaluation is feasible, although sufficient prospective studies in trauma are lacking.
- Direct signs of injury in solid organs in B-mode - this approach has shown low sensitivity but high specificity in a few older studies [5] and in one more recent study [32]. However, there are no studies using equipment capable of substantially higher resolution than previously standard.
- Additionally, advanced color Doppler techniques (microvascular flow, B-flow) should improve detection of lacerations, ruptures, and hematomas-though these also lack prospective validation.
- CEUS-has been proven to markedly improve the detection of parenchymal organ injuries [20,33].
- Search for free intraperitoneal air [34].
- Repeat CAST examination [30].
- Thus, abdominal CT may be warranted in hemodynamically stable patients if at least one of the eight CAST criteria is fulfilled**:**
- A-FAST with fluid in the RUQ, LUQ, or suprapubic region
- Four additional, more sensitive ultrasound windows with fluid:
  - at the anterior inferior margin of the right liver lobe
  - subdiaphragmatic
  - in the paracolic gutter
  - between the bowel loops
- Fluid/hematoma in the retroperitoneum
- Direct signs of injury in B-mode in the liver, spleen, kidneys, and adrenal glands (pancreas is difficult)
- Direct signs of injury with high-sensitivity color Doppler-defects in the liver, spleen, kidneys, and adrenal glands (pancreas is difficult)
- Direct signs of injury using CEUS with defects or evidence of active bleeding with flow phenomena
- Indirect sign of hollow-organ perforation with free air in the peritoneal cavity
- Repeated exam positive

There is also good evidence that false-negative a FAST results occur more frequently in certain concomitant injuries, especially: concomitant traumatic brain injury [35], fractures of the lumbar spine and pelvis [36-38], microhematuria, and rib fractures overlying the abdominal area [38]. Such clinical constellations may indicate a higher risk of abdominal injuries missed by aFAST. In these situations, targeted CT imaging should be considered early to identify potentially relevant findings. Since no validated scoring system systematically accounts for risk factors associated with false-negative aFAST results, we propose the use of currently available indication criteria for abdominal CT in hemodynamically stable patients, which include known predictors of false-negative a FAST findings:

- Concomitant traumatic brain injury
- Fractures of the lumbar spine and pelvis
- Microhematuria
- Rib fractures over the abdomen

**– CT no**

A CT scan is not necessary if CEUS is positive and the identified organ injuries fully explain the clinical situation.

A repeatedly negative CAST, combined with an unremarkable clinical observation over 12 to 24 hours, is likely a reliable predictor for the absence of significant abdominal injury [39,40]. In cases of low clinical suspicion, a shorter observation period may be sufficient, provided the initial assessment and vital parameters remain stable.

This is supported by a large retrospective study showing that ultrasound screening of seven abdominal regions-the three FAST regions plus retroperitoneum, liver, spleen, and kidneys - is equivalent to CT in terms of mortality and false-negative rates [41].

In stable patients, criteria recommending against abdominal CT are based on predictors that suggest a high probability of a scan without additional or negative findings, meaning:

- Positive CEUS of isolated intra-parenchymal injury and injury fully explains the clinical presentation.
- Negative CAST on serial exams and unremarkable clinical follow-up (6 - 12 hours).

## Conclusions

Stage 1: In hemodynamically unstable patients initiate aFAST, extending the examination to eFAST, retroperitoneal, and extremity ultrasound as needed, to support urgent surgical decisions.

Stage 2: In stable patients, apply CAST to broaden the diagnostic scope by integrating advanced modalities such as novel Doppler technologies and Contrast-Enhanced Ultrasound (CEUS). Decisions regarding the need for CT imaging should be guided by these tools, as well as by available predictors of a negative aFAST. This approach maximizes injury detection while minimizing unnecessary radiation exposure and imaging resource use.

## References

1. Hamelmann R, NitschekJ (1971) Intraperitoneal bleeding after blunt abdominal trauma. Chirurg 42: 433-437.
2. Hoffmann R, Nerlich M, Muggia-Sullam M, Pohlemann T, Wippermann B, et al. (1992) Blunt abdominal trauma in cases of multiple trauma evaluated by ultrasonography: a prospective analysis of 291 patients. J Trauma 32: 452-458.
3. Röthlin M, Näf R, Amgwerd M, Candinas D, Frick T, et al. (1993) Ultrasound in blunt abdominal and thoracic trauma. J Trauma 34: 488-495.
4. Rocycki GS, Shackford SR (1996) Ultrasound, what every trauma surgeon should know. J Trauma 40: 1-4.
5. Jehle D, Heller MB (2003) Ultrasonography in Trauma. The FAST exam. ACEP 5: 682-683.
6. Kirkpatrick AW, Sirois M, Laupland KB, Liu D, Rowan K, et al. (2004) Hand-held thoracic sonography for detecting post-traumatic pneumothoraces: the extended focused assessment with sonography for trauma (EFAST). J Trauma 57: 288-295.
7. American College of Surgeons. Advanced Trauma Life Support Student Course Manual. 10th ed. Chicago: American College of Surgeons; 2008.
8. Richards JR, McGahan JP (2017) Focused assessment with sonography in trauma (FAST) in 2017: what radiologists can learn. Radiology 283: 30-48.
9. Stengel D, Rademacher G, Ekkernkamp A, Güthoff C, Mutze S (2015) Emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma. Cochrane Database Syst Rev : CD004446.
10. Melniker A (2009) The value of focused assessment with sonography in trauma examination for the need for operative intervention in blunt torso trauma: a rebuttal to “emergency ultrasound-based algorithms for diagnosing blunt abdominal trauma (review)”, from the Cochrane Collaboration. Crit Ultrasound J 1: 73-84.
11. Melniker LA, Leibner E, McKenney MG, Lopez P, Briggs WM, et al. (2006) Randomized controlled trial of point-of-care, limited ultrasonography for trauma in the emergency department: the first sonography outcomes assessment program trial. Ann Emerg Med 48: 227-235.
12. Nethertin S, Mikenkoviv V, Taylor M, Philipp M, Davis PJ (2019) Diagnostic accuracy of eFAST in the trauma patient: a systematic review and meta-analysis. CJEM 21: 727-738.
13. Natarajan B, Gupta PK, Cemaj S, Sorenson M, Hatzoudis GI, et al. (2010) FAST-scan: Is it worth doing in hemodynamically stable patients? Surgery 148: 695-700.
14. Moussa M, Stausmire JM (2018) Do emergency physicians rely on point-of-care ultrasound for clinical decision making without additional confirmatory testing? J Clin Ultrasound 46: 437-441.
15. Boulanger BR, McLellan BA, Brenneman FD, Ochoa J, Kirkpatrick AW (1999) Prospective evidence of the superiority of a sonography-based algorithm in the assessment of blunt abdominal injury. J Trauma 47: 632-637.
16. Rose JS, Levitt MA, Porter J, Hutson A, Greenholtz J, et al. (2001) Does the presence of ultrasound really affect computed tomographic scan use? A prospective randomized trial of ultrasound in trauma. J Trauma 51: 545-550.
17. Carter JW, Falco MH, Chopko MS, Flynn WJ Jr, Wiles CE 3rd, et al. (2015) Do we really rely on FAST for decision-making in the management of blunt abdominal trauma? Injury 46: 817-821.
18. Aziz MU, Eisenbrey JR, Deganello A, Zahid M, Sharbidre K, et al. (2022) Microvascular flow imaging: a state-of-the-art review of clinical use and promise. Radiology 305: 250-264.
19. Sutarjono B, Kessel M, Alexander D, Grewal E (2023) Is it time to re-think FAST? A systematic review and meta-analysis of contrast-enhanced ultrasound (CEUS) and conventional ultrasound for initial assessment of abdominal trauma. BMC Emerg Med 23: 8.

**20.** Osterwalder J, Mathis G, Hoffmann B (2019) New perspectives for modern trauma management – lessons learned from 25 years FAST and 15 years E-FAST. Ultraschall Med 40: 560-583.

**21.** Arhami Dolatabadi A, Amini A, Hatamabadi H, Mohammadi P, Faghihi-Kashani S, et al. (2014) Comparison of the accuracy and reproducibility of focused abdominal sonography for trauma performed by emergency medicine and radiology residents. Ultrasound Med Biol 40: 1476-1482.

**22.** Tolsgaard MG, Todsen T, Sorensen JL (2013) International multispecialty consensus on how to evaluate ultrasound competence: a Delphi consensus survey. PLoS One 8: e57687.

**23.** Castro G. Top 10 health technology hazards for 2020. The Joint Commission. 2020. Available from:

**24.** Osterwalder J, Tabakovic S, Jenssen C, Dietrich CF, Connolly J, et al. (2023) Emergency point-of-care ultrasound stewardship – a joint position paper by EuSEM and EFSUMB and endorsed by IFEM and WFUMB. Ultraschall Med 44: 379-388.

**25.** Ianniello S, Conte P, Di Serafino M, Miele V, Trinci M, et al. (2020) Diagnostic accuracy of pubic symphysis ultrasound in the detection of unstable pelvis in polytrauma patients during e-FAST: the value of FAST-PLUS protocol. A preliminary experience. J Ultrasound 24: 423-428.

**26.** Sharples A, Brohi (2016) Injury. Can clinical prediction tools predict the need for computed tomography in blunt abdominal? A systematic review. Aug 47: 1811-1818.

**27.** Lobo V, Hunter-Behrend M, Cullnan E, Higbee R, Philips C (2017) Caudal edge of the liver in the right upper quadrant (RUQ) view is the most sensitive area for free fluid on the FAST exam. West J Emerg Med 18: 270-280.

**28.** Srinualnad N, Dixon AK (1999) Right anterior subphrenic space: an important site for the detection of intraperitoneal fluid on abdominal CT. Abdom Imaging 24: 614-617.

**29.** O'Brien KM, Stolz LA, Adhikari S (2014) LUQ view and the FAST exam: helpful or a hindrance in the adult trauma patient? Crit Ultrasound J 6(Suppl 1): A3J.

**30.** Kanafi AR, Giti M, Gharavi MH, Alizadeh R, Pourghorban R (2014) Diagnostic accuracy of secondary ultrasound exam in blunt abdominal trauma. Iran J Radiol 11: e21010.

**31.** Hur'iev SO, Novikova MM, Kushnir VA (2009) The role of ultrasonography in complex diagnosis of retroperitoneal hematomas in the injured persons with multiple trauma. Klin Khir : 35-8.

**32.** Hekimoğlu A, Ergun O, Özkan S, Arslan ED, Hekimoğlu B (2019) Comparison of ultrasound and physical examination with computerized tomography in patients with blunt abdominal trauma. Ulus Travma Acil Cerrahi Derg 25 : 369-377.

**33.** Sessa B, Trinci M, Ianniello S (2015) Blunt abdominal trauma: role of contrast-enhanced ultrasound (CEUS) in the detection and staging of abdominal lesions compared to US and CE-MDCT. Radiol Med 120: 180-189.

**34.** Hoffmann B, Nürnberg D, Westergaard MC (2012) Focus on abnormal air: diagnostic ultrasonography for the acute abdomen. Eur J Emerg Med19: 284-291.

**35.** Laselle BT, Byyny RL, Haukoos JS, Krzyzaniak SM, Brooks J, et al. (2012) False-negative FAST examination: associations with injury characteristics and patient outcomes. Ann Emerg Med 60: 326-34.e3.

**36.** Ballard RB, Rozycki GS, Newman PG, Cubillos JE, Salomone JP, et al. (1999) An algorithm to reduce the incidence of false-negative FAST examinations in patients at high risk for occult injury. J Am Coll Surg 189: 145-150.

**37.** Hoffman L, Pierce D, Puumala S (2009) Clinical predictors of injuries not identified by focused abdominal sonogram for trauma (FAST) examinations. J Emerg Med 36: 271-279.

**38.** Sirlin CB, Brown MA, Deutsch R (2003) Screening US for blunt abdominal trauma: objective predictors of false-negative findings and missed injuries. Radiology 229: 766-774.

**39.** Abd-erRazik MA, Abdel Hamid MA, El-Shinawi M, Hirshon JM, El-Hariri HM, et al. (2023) Combination of focused assessment with sonography for trauma (FAST) scan and detection of hematuria to exclude intra-abdominal injuries following blunt abdominal trauma. Cureus 15: e34736.

**40.** Sirlin CB, Brown MA, Andrade-Barreto OA, Deutsch R, Fortlage DA, et al. (2004) Blunt abdominal trauma: clinical value of negative screening US scans. Radiology 230: 661-668.

**41.** Dehqanzada ZA, Meisinger Q, Doucet J (2015) Complete ultrasonography of trauma in screening blunt abdominal trauma patients is equivalent to computed tomographic scanning while reducing radiation exposure and cost. J Trauma Acute Care Surg 79: 199-205.