Points & Pearls

• The focused assessment with sonography for trauma (FAST) examination assesses for fluid in the pericardium (hemopericardium) or abdomen (hemoperitoneum).
• The 4 traditional FAST views are a subxiphoid view of the heart and pericardium, right and left upper quadrant windows, and the pelvis.
• More recently, the extended FAST (eFAST) examination has entered into clinical practice with the addition of bilateral thoracic views to assess for pneumothoraces and hemothoraces.
• A negative FAST result does not exclude injury. Ultrasound is user dependent; therefore, clinicians should be cautious in the interpretation of a negative FAST result. Sensitivities of the abdominal and suprapubic views in FAST vary widely, with ranges of 22% to 98% reported in recent literature (Richards 2017, Carter 2015).
• Pericardial view sensitivity approaches 100% in penetrating thoracic trauma (Matsushima 2017, Ball 2009, Rozycki 1999), but cardiac injury can be missed if there is a concomitant pericardial laceration allowing decompression into the left chest (Ball 2009).
• If clinical suspicion for injury persists despite a negative FAST result, the FAST examination should be repeated, additional investigations should be performed, or intervention should be pursued, depending on the patient’s clinical condition.

Advice

• Most clinicians use the low-frequency phased array ultrasonic probe (cardiac probe) to obtain all windows in the FAST examination.
• Pericardial: Place the probe in the subxiphoid area and orient it toward the patient’s left shoulder. Apply downward pressure to look under the costal margin and toward the heart. The heart and pericardium will come into view, allowing inspection for hemopericardium and ultrasound findings of cardiac tamponade.
• Right upper quadrant: Place the probe in the right anterior to midaxillary line (between the eleventh and twelfth ribs). Visualization of the hepatorenal recess (Morison pouch) allows assessment for hemoperitoneum in the right upper quadrant. Blood is most likely to accumulate here if hemoperitoneum is present.
• Left upper quadrant: Apply the transducer firmly onto the skin in the left posterior axillary line (between the ninth and tenth ribs) to visualize the splenorenal and subphrenic spaces.
• In practice, it is important to remember that the right and left upper quadrant views are often more posterior than anticipated. It can
be helpful to bring the probe all the way down to the stretcher in order to best visualize these windows.

- **Suprapubic:** Place the transducer superior to the pubic symphysis and fan the probe inferiorly to visualize the bladder.

### Critical Actions

Critical Actions can be useful to repeat the FAST examination while preparing to perform diagnostic peritoneal aspiration, in order to quickly reassess unstable patients with blunt abdominal trauma who have an initial negative FAST result. Intra-abdominal hemorrhage may not be significant enough on initial presentation to give a positive FAST result.

Clinicians should be cautious if the pericardial FAST examination is negative in a patient with penetrating thoracic trauma, especially if the patient is unstable. Cardiac injuries can decompress through the injured pericardium, most commonly into the left hemithorax, resulting in a negative pericardial FAST result (Ball 2009). Unstable patients with this mechanism of injury and a negative FAST finding should undergo a chest x-ray. If the x-ray reveals a hemothorax, a chest tube must be placed. Ongoing or high-volume chest tube output in this clinical context may be from cardiac injury.

### Evidence Appraisal

The original study conducted by Rozycki et al in 1993 utilized the FAST examination in patients aged ≥ 16 years who had blunt or penetrating trauma (n = 476). When compared to the gold standards of computed tomography scan, diagnostic peritoneal lavage, and/or operative findings, FAST had a sensitivity of 79% and a specificity of 96%. FAST

### Next Steps

**FAST examination results alone should not determine the decision to operate.** However, a FAST examination can be a helpful adjunct for clinical decision-making, particularly in an unstable blunt trauma patient, in order to rapidly assess the chest and abdomen for potential causes of hypotension.

### Suggested Management

The clinician must consider additional clinical information, including hemodynamic stability and clinical suspicion for injury.

#### Pericardial FAST (penetrating thoracic trauma)

- **Positive:** Emergent surgical intervention is recommended. A median sternotomy is preferred if the patient is stable; otherwise, use a left anterolateral thoracotomy.
- **Equivocal:** Pericardial window or formal TTE is recommended.
- **Negative:** Close clinical monitoring or discharge are recommended, according to the clinical suspicion for injury.

#### Abdominal FAST (blunt abdominal trauma)

- **Positive:** In the unstable patient, emergent exploratory laparotomy is recommended. In the stable patient, cross-sectional imaging (CT scan) is recommended.
- **Equivocal:** In the unstable patient, DPA is recommended. In the stable patient, cross-sectional imaging (CT scan) is recommended.
- **Negative:** In the unstable patient, DPA is recommended if there is clinical suspicion for intra-abdominal bleeding. In the stable patient, CT scan, close clinical monitoring, or discharge are recommended, according to the clinical suspicion for injury.

Abbreviations: CT, computed tomography; DPA, diagnostic peritoneal aspiration; TTE, transthoracic echocardiography.
was further validated in a larger study (n = 1540) by the same group in 1998. The validation study showed that FAST is most sensitive and specific in patients with penetrating precordial wounds (100% sensitivity, 99% specificity) and in hypotensive patients with blunt abdominal trauma (100% sensitivity, 100% specificity). Rozycki et al (1998) concluded that the accuracy of FAST in these clinical scenarios justified surgical intervention on the basis of the FAST examination findings in these trauma patients. With the application of FAST outside of study protocols by nonexperts and nonradiologists, the contemporary diagnostic yield of FAST ranges more broadly. Recent studies indicate a sensitivity of 22% to 98% for FAST in the detection of hemoperitoneum (Richards 2017, Carter 2015).

More recently, thoracic views have been added to the FAST examination, which is then termed eFAST. These windows assess the chest bilaterally for pneumothoraces and hemothoraces. In some series, the reported sensitivities of eFAST (86%-100%) are superior to the sensitivities of chest x-ray (27%-83%) in the detection of pneumothoraces (Governatori 2015, Nandipati 2011, Wilkerson 2010).

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Calculator Creator
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References

Original/Primary Reference

Validation References

Other References
  DOI: https://doi.org/10.1148/radiol.2017160107
  DOI: https://doi.org/10.1097/TA.0b012e3181b1f850
  DOI: https://doi.org/10.1016/j.injury.2010.01.105
  DOI: https://doi.org/10.11152/mu.2013.2066.174.evp
  DOI: https://doi.org/10.1111/j.1553-2712.2009.00628.x
  DOI: https://doi.org/10.1007/s00268-017-4162-9
  DOI: https://doi.org/10.1016/j.injury.2014.11.023

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