



Focused Assessment with Sonography in Trauma (FAST) and Extended Focused Assessment with Sonography in Trauma (e-FAST) – Summary.

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Introduction

Mzantsi Afrika (South Africa) has a high incidence of trauma patients due to motor-vehicle accidents (MVA), pedestrian-vehicle accidents (PVA), and violence-related injuries. These trauma patients present at various emergency departments across hospitals in Mzantsi Afrika either as blunt injuries, penetrating injuries, or a combination of both. In trauma or polytrauma patients that present in the emergency department, it is challenging to make a diagnosis of occult bleeding into the abdomen or thorax on physical examination alone. This challenge necessitates further investigations to be performed in order to assist with a diagnosis of occult bleeding. Computed Tomography (CT) is considered the gold standard for diagnosing occult bleeding in the abdomen in most centres; however, CT does have its challenges. Diagnostic peritoneal lavage (DPL) is invasive and has been largely replaced by FAST in most emergency departments. FAST may identify free fluid in the peritoneum, pleura, and pericardium. In most emergency departments, FAST is an integral part of the initial stabilisation and resuscitation of trauma patients. FAST is recommended as one of the adjuncts to the Primary Survey by the Advanced Trauma Life Support (ATLS) course. The Emergency Medicine Society of South Africa (EMSSA) provided guidelines in 2021 for training and credentialing in emergency point-of-care ultrasound, and FAST is recognised by users who have been trained.

Scope

This summary will cover the following items:

- Definition of FAST and e-FAST.
- Differences between FAST and e-FAST.
- Indications for FAST.
- Diagnostic accuracy.
- Advantages of FAST.
- Disadvantages of FAST.

Definition of FAST and e-FAST

Focused Assessment with Sonography in Trauma (FAST) is a bedside ultrasound tool used to screen for occult bleeding in the abdomen in patients presenting after trauma. ^[1] FAST is regarded as a point-of-care ultrasound (POCUS) screening tool because it is performed in the emergency department (casualty) when the patient arrives in the emergency department. ^[2] Extended-FAST expands the FAST and includes the anterior and lateral pleural spaces in order to find a pneumothorax or pleural effusion. ^[3]

Difference between FAST and e-FAST

FAST is the original examination, which was intended to find free fluid in the abdomen post-trauma. FAST only looks at three views of the abdomen, which are the right upper quadrant, the left upper quadrant, and the pelvis. E-FAST was introduced later and included the examination of the lungs and heart in addition to the traditional FAST.

	FAST	E-FAST
Introduction	1996 - Rozycki	2004 – Kirkpatrick et al.
Areas examined	Abdomen	Abdomen, heart and lungs
Pathologies found	Hemoperitoneum	Hemoperitoneum, Cardiac tamponade Haemothorax Pneumothorax
Probes commonly used	Curvilinear	Curvilinear and phased array probe

Table 1: A comparison of FAST and e-FAST.



Indications ^[4, 5]

- Trauma patients where occult intraabdominal (hemoperitoneum) and intra-thoracic (cardiac tamponade, hemothorax) haemorrhage cannot be excluded by physical examination.
- Identification of peritoneal bleeding in penetrating injuries.
- Identification of pericardial tamponade in penetrating injuries.
- Identification of occult bleeding in blunt abdominal and thoracic trauma.
- Identification of a pneumothorax.
- Aiding in decision making with regards to trauma patients who require definitive surgical intervention.
- Polytrauma patient with hypotension or shock not responding to resuscitation attempts.

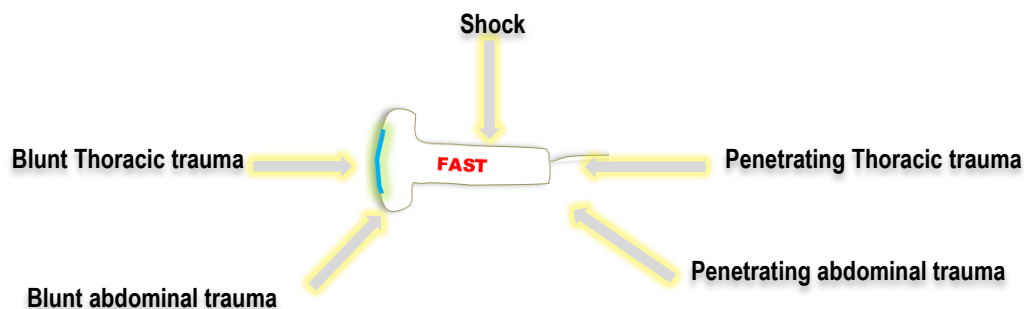


Diagram 1: The major indications for FAST.

Contraindication

- Any emergency medical condition that requires emergency definitive surgical management which would be delayed by the performance of FAST.
- There are no absolute contraindications for FAST.

Diagnostic accuracy

One of the challenges of FAST is the varying diagnostic accuracy noted in different publications. In a study published on the diagnostic accuracy of FAST with regards to abdominal trauma, they concluded that the sensitivity of FAST is between 28% and 76%, the specificity is between 83% and 97%, the positive predictive value is between 87% and 96%, and the negative predictive value is 37 – 94%. [6] In another study, the diagnostic accuracy of FAST was compared to that of computed tomography (CT), and the results were as follows: the sensitivity was 61.3%, the specificity was 96.3%, the positive predictive value was 89.1%, and the negative predictive value was 83.2%. [7] In a study that looked at the Diagnostic accuracy of Extended Focused Abdominal Sonography for Trauma (E-FAST) performed by emergency physicians compared to CT, the results showed a sensitivity of 42.9% and a specificity of 98.4%. [8] One study published by Cambridge University Press advised that e-FAST can be used to rule out intraabdominal free fluid, pneumothorax, and pericardial effusion in a trauma patient but did not advise using e-FAST as a rule-out tool. JSZMC published a study in 2016 on the diagnostic accuracy for diagnosing hemoperitoneum when FAST was performed by surgeons, and the sensitivity was 83.8%, the specificity was 92%, the positive predictive value was 90.5%, and the negative predictive value was 86%. [9] JHMS found these results when CT and FAST were compared in blunt torso trauma: sensitivity of 100%, specificity of 91.67, positive predictive value of 100%, and negative predictive value of 85.42%. [10] Due to these varying results, it is important to remember that FAST is a screening tool with advantages and disadvantages and should always be interpreted in the holistic context of the presenting patient.

Advantages of FAST ^[11,12]

- FAST is Point-of-care ultrasound that is available by the bedside and there is no need to transport the patient from the emergency room.
- Any trained personnel can perform FAST.
- Assist in making early determinations with regards to surgical interventions.
- FAST is a non-invasive procedure as compared to DPL.
- FAST can be performed rapidly.
- FAST is a Primary Survey adjunct.
- FAST is safe for pregnant and paediatric patients.
- Results in reduced CT and DPL examinations performed.
- Reduced radiation.



- Repeated examinations may be performed.
- FAST is cheaper than CT.

Disadvantages of FAST

- Fast is operator-dependent.
- FAST images can be poorly visualized due to bowel gas and subcutaneous air.
- A large body habitus can also distort FAST images.
- Certain injuries such as diaphragmatic, bowel, and pancreatic injuries may be missed by FAST.
- FAST does not assess retroperitoneal organs.
- FAST does not visualize extraluminal air.

Areas examined by FAST and e-FAST

FAST and e-FAST is commonly used to examine these five areas:

1. Perihepatic (hepatorenal fossa)
2. Perisplenic (splenorenal fossa)
3. Peritoneum (Pelvis or pouch of Douglas)
4. Pericardium (pericardial sac)
5. Lungs

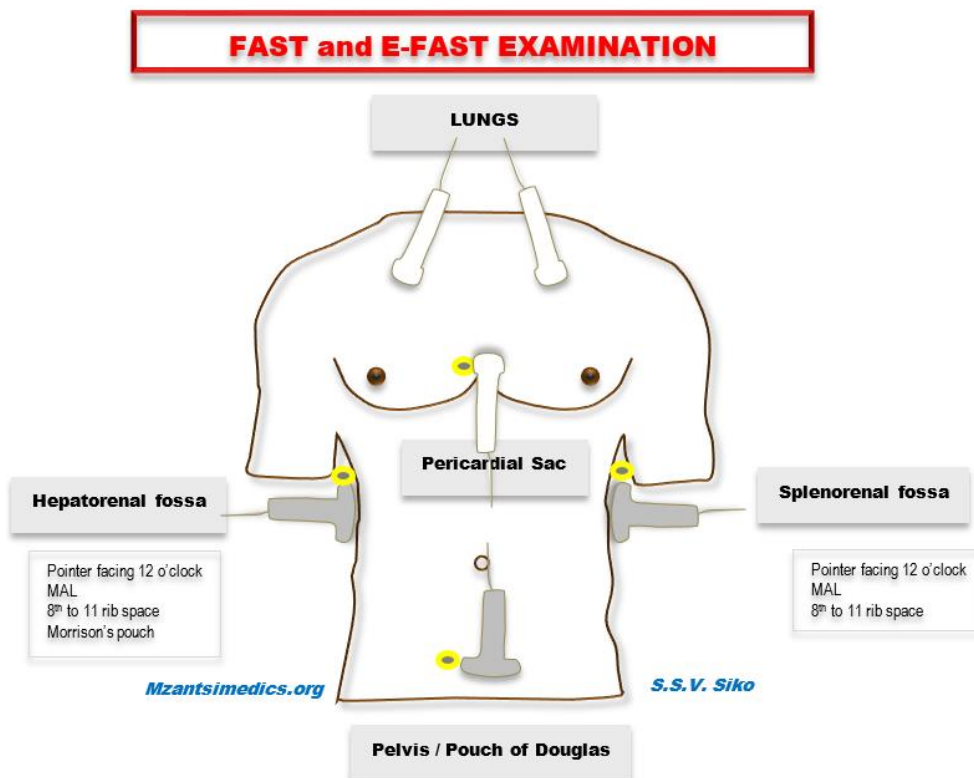


Diagram 2: various anatomical areas examined by FAST/e-FAST.

Ultrasound probes

There are two types of ultrasound probes used for FAST: the curvilinear probe and the phased array probe (sector array probe or cardiac probe). These two probes are both low-frequency probes with frequencies between 1 and 5 MHz. [13,14] The curvilinear probe has a broad footprint and is mainly recommended for abdominal and pelvic examinations. The phased array probe has a narrow base, and in addition to examining the pelvis and abdomen, it is also recommended for thoracic examinations (pericardium and lungs).

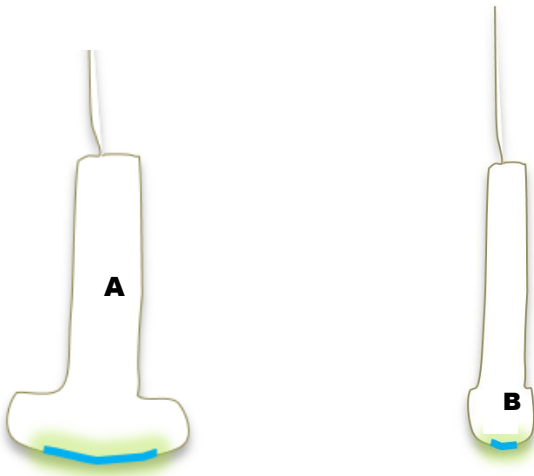


Diagram 3: The two types of ultrasound probes commonly used in FAST. **A** – curvilinear probe and **B** – phased array probe / sector array probe / cardiac probe.

	Curvilinear Probe	Phased Array Probe (Sector array probe / cardiac probe)
Frequency	Low 2-5 MHz	Low 1 – 5 MHz
Footprint / base	Broad	Narrow
Recommended areas for use	Abdomen and pelvis	Abdomen Pelvis Thorax (pericardium and lungs)

Table 2: A comparison of Curvilinear Probe and Phased Array Probe.

FAST and e-FAST training in Mzantsi Afrika

This summary does not cover the training on how to perform a FAST/e-FAST examination. There are various institutions in Mzantsi Afrika that offer such training for different levels of qualifications.

Recommendations

- Medical officers working in emergency departments in Mzantsi Afrika should be trained in FAST, e-FAST, or POCUS, as this skill is increasingly becoming an integral part of trauma patients' resuscitation.
- Emergency care practitioners should be trained in FAST, e-FAST, or POCUS, as this will shorten the time to surgical intervention.
- Other health care practitioners who work in emergency departments should be considered for FAST, e-FAST, or POCUS training.



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