

## **To evaluate the introduction of a focussed assessment with sonography in trauma (FAST) scan into the early assessment of trauma patients.**

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### **Abstract**

**Objectives:** To evaluate the introduction of a focussed assessment with sonography in trauma (FAST) scan into the early assessment of trauma patients.

**Methods:** The setting was multispeciality hospital and critical care centre. All patients aged 16 or over admitted with blunt trauma requiring fluid resuscitation for hypovolemic shock in a prospective observational study. Patients had a FAST scan performed at the end of the primary survey. Results were compared to results of other investigations, laprotomy, and postmortem examination.

**Results:** 50 patients were entered into the study. The sensitivity of FAST scan was 66.66% and specificity was 95%.

**Conclusion:** FAST is highly specific “rule in” technique and is useful in the initial assessment of trauma patients. Emergency physicians can perform FAST after a brief training period.

### **Abbreviations**

FAST - Focussed assessment sonography in trauma, CT - Computed Tomography, DPL- Diagnostic peritoneal Lavage, RTA - Road Traffic Accident, ICU – Intensive Care Unit

### **Introduction**

Ultrasound has been used in the early assessment of abdominal trauma. There is growing interest in ultrasound use by emergency physicians in this country. Emergency physician performed ultrasound is a focussed, limited technique to answer a single question. The purpose of ultrasound in the initial assessment of abdominal trauma is solely to document the presence of free intraperitoneal fluid. In the context of trauma this is assumed to be blood. There is no attempt to visualize specific organ injuries as ultrasound is not accurate in the early assessment of solid organ or hollow viscous injury. Ultrasound has the advantage of being noninvasive, rapidly performed and readily repeatable. Further management is dictated by the clinical condition of the patient. Ultrasound is designed to complement other investigations. Diagnostic peritoneal lavage is very sensitive but not without disadvantages; while CT will remain the gold standard but there is usually some delay in obtaining a scan and transfer out of the department necessitates a hemodynamically normal patient.

In this paper we have evaluated the introduction of the FAST protocol into the initial management of trauma patients in trauma ICU.

### **Methods**

This was a prospective study. A four view FAST scan was performed at the end of the primary survey in all adult patients admitted as a result of blunt trauma to the hospital. Verbal or written consent was sought from patient if possible. The results of the FAST were compared to ultrasound of abdomen, chest, CT, laprotomy or postmortem examination.

### Training of emergency physicians:

A training programme for FAST included two days session of formal training on normal volunteers and on patients with free fluid coming to Radiology Dept.

### Results:

#### Demographics

Over a period of one year from Dec 2015 to Dec 2016 50 patients studied. The age range was 16-80 yrs. The mechanism of injury is classified in Table 1.

Table 1.

Mechanism of injury	No of patients
Assault	03
Fall form Height	05
RTA, driver	10
RTA front seat passanger	04
Motorbike rider	25
RTA pedestrian	02
RTA rear seat passanger	01

#### Abdominal diagnosis

Three of the 50 patients had a positive FAST scan. In all of these patients free fluid was seen in the right upper quadrant. No patients had free fluid on other views without fluid being visible in the right upper quadrant. One patient had a normal initial scan and free fluid was seen in right upper quadrant when this was repeated. The gold standard used was CT in 72% of patients, laprotomy in 5%, and postmortem examination in 2%. There were three disagreements with the gold standard.

One patient with apparent free fluid on ultrasound had a normal abdominal CT scan.

One patient with a normal FAST scan had a ruptured spleen at laprotomy.

One patient with no free fluid on ultrasound had subcapsular hematoma of the liver, avulsion of splenic tip, mesenteric contusion.

Thus the sensitivity of FAST is 66.66 % and specificity is 95%.

### Discussion:

Many trauma patients have injuries that are not apparent on initial physical exam. Patients can present with distracting injuries or altered mental status. Significant bleeding into the peritoneal, pleural or pericardial spaces may occur without obvious warning signs. The purpose of bedside ultrasound in trauma is to rapidly identify free fluid in the peritoneal, pericardial or pleural spaces. Physicians in Germany and Japan began using routine bedside ultrasound for trauma patients in the 1970. <sup>1</sup>

It is well known that ultrasound is not accurate in early assessment of solid organ injury <sup>2</sup>; however the early recognition of free intraperitoneal fluid in these patients is helpful in expediting further management decisions. In previously published studies the sensitivity of FAST ranges from 75% to 100% and specificity from 88% to 100% <sup>3-11</sup>. In practice FAST is readily repeatable and if there is suspicion of intra-abdominal injury a repeat scan is advised.

The protocol called for inclusion of all adult patients admitted to the resuscitation area as a result of blunt abdominal trauma. We knew that this would inevitably mean we were including patients who were at little risk of significant intra-abdominal injury, and the prevalence of intra-abdominal injury in the patients included reflect this. Also there are pearls and pitfalls in the FAST.

- If the initial FAST is negative and clinical suspicion remains high, consider repeat FAST exam after a short time period.
- It is important to visualize as much perihepatic and perisplenic area as possible, not just quick view. Multiple windows may be required to fully evaluate for free fluid.
- Subcutaneous emphysema may obscure visualization of underlying structures.
- Not all abdominal injuries produce free fluid. Bowel injury and solid organ injury without significant bleeding will not be detected by ultrasound.
- Clotted blood can generate various degrees of echogenicity and may be mistaken for normal surrounding soft tissue.
- Lack of pleural sliding may indicate a pneumothorax, mainstem intubation or just poor ventilation.

Though there are many pitfalls in the FAST, it has several benefits.

The benefits of the FAST examination include the following.

- Decrease the time for diagnosis of acute abdominal injury in BAT
- Helps accurately diagnose hemoperitoneum
- Is noninvasive
- Can be integrated into the primary or secondary survey and can be performed quickly, without removing patients from the clinical arena
- Can be repeated for serial examinations
- Is safe in pregnant patients and children
- Leads to fewer DPLs; in the proper clinical setting, can lead to fewer CT scans

An extended version of the standard FAST examination (E-FAST) has been established and offers additional information. In addition to imaging of the abdomen, the E-FAST examination includes views of bilateral hemithoraces to assess for hemothorax and views of bilateral upper anterior chest walls to assess for pneumothorax.

This trial was designed to evaluate the accuracy of the FAST technique performed by emergency physicians. The results did not alter management (unless free fluid was seen in a patient who would otherwise have had

no further investigations.) A larger study would be needed to evaluate the effect on patient management and outcome.

### Conclusions

Emergency physicians, after a short training programme, can use FAST in the early assessment of trauma patients with sufficient specificity. We recommend the use of technique as a rule in procedure to expedite surgical decision making. Emergency physicians should have formalised and accredited training in order to undertake this technique.

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