



Evaluation of Focused Abdominal Sonography for Trauma (Fast) in Blunt Abdominal Trauma (Bat)

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ABSTRACT

BACKGROUND: Focused Abdominal Sonography for Trauma (FAST) is widely applied in the initial management of Blunt Abdominal Trauma (BAT) patients, Being non invasive, repeatable and without risk of irradiation, make it attractive tool in evaluation of trauma patients.

OBJECTIVE: Evaluation of FAST sensitivity and specificity in detection of hemoperitoneum in blunt abdominal trauma victims.

METHODS: A Prospective randomized study was conducted in Smt SCL General Hospital on 100 patients who presented with BAT and underwent FAST scan. The presence of intra-peritoneal free fluid was interpreted as positive.

RESULTS: A hundred (100) patients included in the study, the sensitivity of FAST was 87 % and specificity was 97 % in blunt abdominal trauma.

CONCLUSION: FAST is highly sensitive and specific in detection of hemoperitoneum after blunt abdominal trauma. Its high specificity make it suitable as "rule in" test in blunt abdominal injury. In unstable patients FAST may help in triaging and identifying those requiring laparotomy. Negative FAST scans do not exclude abdominal injury.

KEYWORDS : Abdominal trauma, Ultrasound, Focused abdominal Sonography for trauma.

INTRODUCTION

Abdominal trauma is one of the most common causes among injuries caused mainly due to road traffic accidents. The rapid increase in motor vehicles and its aftermath has caused rapid increase in number of victims to blunt abdominal trauma. Motor vehicle accidents account for 75 to 80 % of blunt abdominal trauma. Blunt injury of abdomen is also a result of fall from height, assault with blunt objects, sports injuries, industrial mishaps, bomb blasts and fall from riding bicycle, etc. Blunt abdominal trauma is usually not obvious. Hence, often missed, unless, repeatedly looked for. Due to the inadequate treatment of the abdominal injuries, most of the cases are fatal. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains at large. The reason for this could be due to the interval between trauma and hospitalization, delay in diagnosis, inadequate and lack of appropriate surgical treatment, post-operative complications and associated trauma especially to spine, head, thorax and extremities.

The term 'focused abdominal Sonography for trauma'(FAST) scan has been used since the early 1990s. In this examination limited, focused views done to detect intraperitoneal fluid. The term 'Focused Assessment with Sonography for Trauma' (FAST) was coined by Rozycki et al in 1996. In this FAST scan, both intraperitoneal free fluid and pericardial fluid collection are searched. FAST is routinely used in the initial evaluation of blunt abdominal trauma patients. In certain circumstance the problem of multiple injured patients with equivocal clinical findings has been expanded with limited availability of CT or formal ultrasound in emergency condition, hence the need for FAST appeared. In this paper we intended to evaluate the FAST as a part of initial management of blunt abdominal traumatic patients. [1,2,7]

Focused Abdominal Sonography for Trauma(FAST) [1,2,3,5,6]

Focused Abdominal Sonography in Trauma (FAST) has rapidly become an accepted method of injury assessment in blunt abdominal trauma. Many trauma management guidelines have adopted FAST as a pivotal axis in the decision-making algorithm. It is the current gold standard for the detection of intra-abdominal bleeding in the unstable hypotensive patient with blunt abdominal trauma.

"The most important preoperative objective in the management of the patient with abdominal trauma is to ascertain whether or not a laparotomy is needed, and not the diagnosis of specific injury" - Polk 1983

If one agrees with the statement above, then ultrasound has many important advantages over traditional methods of abdominal assessment in trauma. When compared to physical examination, diagnostic peritoneal lavage (DPL) and computerized tomography (CT), FAST is non-invasive, rapid, portable and accurate. DPL is particularly sensitive, but not all patients with a positive DPL would require laparotomy. CT allows localisation of injury site and grading of severity but it is time consuming and requires a stable co-operative patient. Therefore, FAST has a specific role in the unstable patient with abdominal trauma, and according to current evidence is a highly useful modality in deciding which patients require emergency laparotomy

The sole goal of FAST is to detect free intraperitoneal fluid.

Diagnosis of organ injury, localisation of organ injury and grading of injury severity are more suited to formal ultrasound scanning or CT.

The FAST examination is designed for rapid assessment; there are just 4 scanning positions in the examination. These are windows of ultrasound scanning and do not correspond to anatomical descriptions of planes such as sagittal or coronal.

1. Perihepatic – structures in the right upper quadrant (RUQ) are visualised – right lobe of liver, kidney and the hepatorenal space
2. Perisplenic – structures in the left upper quadrant (LUQ) are visualised spleen, kidney, perisplenic area
3. Pelvis – structures in the pelvic cul de sac are visualised– Pouch of Douglas between bladder and uterus in females, or rectovesical pouch in males
4. Pericardial – essentially a subcostal echocardiographic view of the heart, liver and pericardium[2,3,5,6,8]

PATIENTS AND METHODS:

• Source of data:

This is a prospective study of blunt abdominal injuries in Smt SCL General Hospital within 2011 to 2013. Number of cases studied is 100.

Objective:

Evaluation of FAST sensitivity and specificity in detection of hemoperitoneum in blunt abdominal trauma victims.

Inclusion criteria:

All patients, who have blunt abdominal injury and hospitalized for the same.

Exclusion criteria:

All patients who have blunt abdominal injury but not hospitalized. Patient having associated penetrating injuries. Four standard views were performed in each case, namely,

- (1) right upper quadrant view to include Morrison's pouch;
- (2) left upper quadrant view to include the splenorenal recess;
- (3) transverse pelvis view;
- (4) longitudinal pelvis view to visualize the pelvic space .

- The main focus of the FAST scan was to detect free intra-peritoneal fluid.
- The FAST considered positive when free fluid noticed at least in one view without any quantitative measures or specific attempt to identify solid organ injury.
- The result of FAST did not allowed to interfere with standard diagnostic and therapeutic measures of the patients except when positive FAST noticed in a patient who otherwise will not be further investigated.
- The methods used to confirm the result of FAST examination were either laparotomy or observation for at least two days with or without a formal ultrasound and then follow up as an outpatient.

Results and Discussion:

Clinical and demographic characteristics of the injured patients

Characteristics	No of patients
Total no of patients	100
Age range in years	2-65
Mean age in years	25.32
Male : female ratio	74:26 (2.8:1)

Highest incidence of injury was noted in age group 21-30 because they are exposed to outdoor work and the increased incidence of vehicular accident in this age group.

Mode of injury:

Mode of injury	Number of patients
Road traffic accident	50
Beaten by blunt object	41
Fall down	09

Most common mean of blunt abdominal injury in this study is road traffic accidents, followed by beaten by blunt object. Around 50% of cases were of road traffic accidents.

Diagnostic performance of FAST in blunt abdominal trauma patients

FAST exam	Definitive test* positive	Definitive test* negative	Total
Positive	27(true)	2(false)	29
Negative	4(false)	67(true)	71
Total	31	69	100

Definitive test is either laparotomy or observation for at least two days with or without formal ultrasound. The total no of FAST examinations were 100 from these examinations 94 examinations were true (27 true positive and 67 true negative) and 6 examinations were false (2 false positive and 4 false negative) with over all sensitivity 87%, specificity 97% in patients with blunt abdominal trauma. The chi-

square statistic is 73.6479. The P value is 0. This result is significant at p<0.05.

Laparotomy were done in 31 patients (31%). 27 positive laparotomies for positive FAST examinations, four positive laparotomies for negative FAST examinations. The decision for exploration relied on clinical examination.69 patients (69%) were admitted and formal ultrasound done for them all the formal ultrasounds were negative (two for positive FAST and 67 for negative FAST), observed at least for two days during which the clinical findings subsided completely and discharged well without squally during the follow up.

Regarding the false positive cases (the first one has abdominal injury with both side fracture superior and inferior Pubic rami, the second has associated chest injury), all of them treated conservatively based on clinical background and discharged well after negative formal ultrasound.

While the four false negative cases, all of them explored when the clinical findings of abdominal injury became more obvious and the operative findings varied between ileal perforation(one case), caecum perforation(one case), mesentric tear(one case), bladeerrupture (one case).

DISCUSSION:

- Emergency ultrasound differs from formal ultrasound in fundamental aspects, it is performed at the bed side in the emergency room simultaneously or shortly after the initial resuscitation and clinical evaluation and described as an extension of the palpating hand and a "visual stethoscope" trying to answer a specific questions. For example: in situation of trauma, is there any free intraperitoneal fluid (blood).
- Being non invasive, repeatable and without risk of irradiation make it attractive tool in evaluation of trauma patients.
- In our study, FAST examination in blunt abdominal trauma patients, was highly sensitive (87 %) and specific (97 %) in detection of free intraperitoneal fluid.
- The high specificity shows the appropriateness of FAST scan as "rule in" technique in evaluating trauma victims and many international studies concluded that the FAST scan can be used effectively in initial screening of blunt abdominal trauma patients.
- FAST is operator dependantand operators vary in their expertise, performance and their training.
- FAST is relatively poor in detection of injuries without enough hemoperitoneum at time of examination such as; hallow viscus, diaphragm, retroperitoneal structures injuries and concealed hematoma of the liver and spleen.
- Other limitation is some anatomical facts such as the perinephric fat and fluid in the intestine and stomach which may be misdiagnosed as free fluidespecially when inappropriate gain setting is applied.
- Some limitations are related to the patient such as: morbid obesity, surgical emphysema, wounds and dressing close to the sites of the FAST examination, all of these factors affect on the "echoic windows" through which the scan is done and affect its accuracy.

FAST: Strengths and Limitations

- Strengths
 - Rapid (~ 2 min)
 - Portable
 - Relatively inexpensive
 - Technically simple, easy to train (studies show competence can be achieved after ~ 30 studies
 - Can be performed serially
- Limitations
 - Does not typically ID source of bleeding, or detect injuries that do not cause hemoperitoneum
 - Limited in detection of intraperitoneal fluid (<250 mL)
 - Poor at detecting bowel and mesenteric damage
 - Difficult to assess retroperitoneum
 - Limited by body habitus in the obese

CONCLUSIONS

FAST is highly sensitive and specific, it can be used in the initial management of blunt abdominal trauma patients. Its high specificity make it suitable as "rule in" test in blunt abdominal injury

However FAST is operator dependent and has its own limitation, in hemodynamically stable patients, with suspicious clinical findings a repetition of FAST ,application of extra views and the use of scoring system will assist the surgical decision.

In unstable patients FAST may help in triaging and identifying those requiring laparotomy. Negative FAST scans do not exclude abdominal injury.

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