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Surgical follow up after Focused Assessment with Sonography for Trauma Exam in Blunt Abdominal Trauma

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Abstract

Introduction: Blunt injury sustained from a blunt force may be related to motor vehicle accidents, falls, blows or crush injuries from animals, blunt objects or assailants. FAST is a low cost and portable method for evaluating BAT. It provides reasonable accuracy and has a high negative and positive predictive value for diagnosis of intraperitoneal injuries. Hence the aim of the study was to determine a relationship between the findings in focussed assessment with sonography in trauma and clinical outcome.

Materials and Methods: A total of 80 patients who underwent FAST were included in the study. A prospective analytical study was carried over 2 year's duration. The FAST findings were recorded and clinical follow up for seven days.

Result: There were more male patients with blunt injury abdomen than female patients. Most common age group was between 20 to 39 years. The most common cause of BAT was RTA fallowed by falls. Out of 80 patients with BAT in our study, 29.2% patients were FAST positive and 70.8% patients were FAST negative.

Discussion and Conclusion: On fallow up patient with negative FAST had fewer falls in hemoglobin and hematocrit compared to the patient with positive FAST. It concluded that FAST scan is a predictor of clinical outcome in BAT. It was concluded that FAST is a better diagnostic modality in ruling in than ruling out a patient with blunt abdominal trauma.

Keywords: Blunt injury, Focused assessment, Sonography, Trauma

Introduction

Blunt injury sustained from a blunt force may be related to motor vehicle accidents, falls, blows or crush injuries from animals, blunt objects or assailants. The World Health Organization estimates that, by 2020, trauma will be the first or second leading cause of years of productive life lost for the entire world population.[1]

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About 1.25 million people die each year as a result of road traffic crashes. Road traffic injuries are the leading cause of death among young people, aged 15–29 years. 90% of the world's fatalities on the roads occur in low- and middle-income countries, even though these countries have approximately half of the world's vehicles. Half of those dying on the world's roads are -vulnerable road users: pedestrians, cyclists and motorcyclists.[2]

The importance of the FAST examination is emphasized by the fact that it has been included as a part of the Advanced Trauma life support (ATLS) course. FAST is a quick and effective tool to evaluate BAT in emergency situations. It should be considered the 5th modality in the assessment of trauma situations. Currently FAST with its ability to rapidly determine any life-threatening injuries has become the method of choice in evaluating hemodynamically unstable patients. There is evidence that patient care is improved when the FAST exam is included in the initial work up of the patients.[3,4]

FAST is a low cost and portable method for evaluating BAT. It provides reasonable accuracy and has a high negative and positive predictive value for diagnosis of intraperitoneal injuries. However for spinal fractures, pulmonary contusions, diaphragmatic rupture, vascular injuries, bowel and mesenteric injuries and in the evaluation of injuries related to retroperitoneal structures like the pancreas its accuracy has been disputed.[5,6]

Over the past several years, major changes in the management of blunt abdominal injury have occurred. Because of the progress that has been made in the quality and wide availability of the multidetector computed tomography (MDCT) scan combined with minimally invasive intervention options like angioembolization[7], Nonoperative management (NOM) has evolved to be the treatment of choice for hemodynamically stable patients. NOM is a safe treatment for stable patients with traumatic liver, splenic or kidney injuries and success rates of up to 95% are described in the literature. Hence the aim of the study was to determine a relationship between the findings in focussed assessment with sonography in trauma and clinical outcome.

Materials and Methods

A prospective observational study carried out on patients with blunt abdominal trauma presenting to the Emergency Department of medical college and associated hospital. The duration of study was of 2 years. A total of 80 patients were included in the study. The required written consent was obtained from the institutional review board.

Inclusion criteria:

All patients with blunt abdominal injury undergoing FAST within 24 hours of the trauma event.

Exclusion criteria:

1. Patients with penetrating abdominal injuries.
2. Patients lost to follow up within 7 days of admission with history of blunt abdominal trauma.

Study methods:

All patients with a history of BAT presenting to the emergency medicine department were evaluated with FAST performed by an emergency physician. The parameters such as age, sex, mechanism of injury (RTA, fall) were noted. Haemodynamically stable patients without free fluid identified on FAST (FAST negative) were observed for a period of seven days. Those haemodynamically stable patients detected to have free fluid (FAST positive) underwent a CECT of the lower thorax, abdomen and pelvis to identify injuries which would require operative management. Any patient with haemodynamic instability will undergo exploratory laparotomy. Ultrasonography by a radiologist, echocardiography by a cardiologist, plain radiography of the chest or abdomen and CECT of the thorax and abdomen only if required for the patients' routine clinical management.

Patients were taken to exploratory laparotomy based on one or more of the following findings

1. Clinical deterioration with increasing abdominal distention.
2. Unexplained sustained hypotension (systolic BP < 90 mm of mercury) not responding to intravenous fluid infusion in the setting of BAT.

3. Signs of continuing intra-abdominal haemorrhage with decline in haematocrit.
4. Pneumoperitoneum detected on erect chest or abdominal radiography.
5. Presence of free fluid in the peritoneum detected by FAST or radiologist performed ultrasound scan with hemodynamic instability.

The clinical outcome of the patients in our study was categorized based on FAST scan findings into FAST positive and FAST negative cases. FAST positive cases with stable hemodynamics were NOM and were investigated further with CECT where as FAST positive cases with unstable hemodynamics underwent OM. FAST negative patients with stable hemodynamics were discharged from the Emergency Department with outpatient follow-up and FAST negative patients with associated other systems injuries were admitted for observation. All FAST positive cases were serially monitored for drop in Hemoglobin (Hb) and Hematocrit (PCV). The findings of FAST in these patients were compared with CECT and / or intraoperative surgical findings.

Result

The purpose of the present research was to determine a relationship between the findings in focussed assessment with sonography in trauma and clinical outcome. Total of 80 patients were included in study. In the present study, the youngest patient was 1 years old, and the oldest was aged 75 years. Maximum patients were in the age range of 20 to 39 years. Out of 80 patients from this study, 55 patients were male and 25 patients were female.

In this study out of the 80 patients included; 68 of the patients sustained blunt trauma abdomen by road traffic accident (RTA) and 12 patients had a history of fall. Among the patients studied 77 patients had stable vitals on arrival and 3 patients had unstable vitals on arrival. Among the patients who were included in the study 42 patients did not have any other injury on secondary survey. 18 patients had abrasions, 7 patients had long bone fractures and 7 patients had pelvic fractures. Head injury was present in 5 of the patients, and chest injury was present in 1 of the patients.

Patients with the presence of free fluid on FAST study and with stable vitals underwent CECT of the abdomen and pelvis after renal function test. Hemoperitimeum was seen in 22 of the patients, 3 patients had hemothorax. Solid organs like Liver was injured in 7 patients, Spleen was injured in 10 patients, Kidneys in 1patients, 1 patient sustained pancreatic injury, 1 patients had Bowel/Mesentery injury.

In this study, 43 cases were negative for intra-abdominal injury with hemodynamic stability was discharged based on the FAST findings within 24 hours of admission. All these patients had an uneventful follow-up on out - patient basis for 7 days.

Among the 22 FAST positive patients in this study 12 patients were operated and 10 FAST positive patients were conservative managed. Among the 58 FAST negative patients, 15 patients stayed more than 24 hours has this patients had significant other injuries like head injury, long bone fractures or pelvic fractures.

The sensitivity in this study was calculated with respect to how accurate FAST findings were in guiding patient management and to predict clinical outcome. Based on FAST findings, operative management was advised for 11 patients out of the 22 positive FAST scans.

Table 1: Clinical outcome of FAST management guidelines

Follow up for one week	No. of patients
FAST positive (NOM)	10
FAST negative (Discharge)	43
FAST (OM)	12
FAST negative (Other injuries)	15
Total	80

Discussion

FAST is a rapid, repeatable noninvasive bedside method that was designed to answer one single question: Whether free fluid is present in the peritoneal, pleural and pericardial cavity. It has been a valuable investigation for the initial assessment of blunt abdominal trauma as shown in large series from several North America trauma centers.[8,9]

FAST in patients with abdominal blunt trauma is used as first method at admission because it can be done quickly and can show posttraumatic intraperitoneal, pleural or pericardial fluid. Sometimes, the presence of free air or meteorism can make very difficult or impossible to see the lesions. CT exam brings additional information regarding fluid density, laceration's extension, active bleeding or especially pancreatic trauma. The presence of pelvic fractures implies to perform delayed scan sequences for the excretory phase which can show extravasation.[10,11]

In this study, the youngest patient was 1 years old, and the oldest was aged 75 years with mean age 34. Maximum patients were in the age range of 20 to 39 years. Among 80 patients in this study 55 patients were male and 25 patients were female. The predominant population involved was young males. Sanjeev Bhoi et al[12] showed that 86.6% were male and 13.4% were female with mean age of patient was 28 years, which shows that chest and abdominal traumas are more common in young people. In other words, trauma affects the quality of life and life itself, in a group that consists of the most efficient in society, and this brings about huge economic losses.

In the present study, RTA accounted for 84.2% of cases fallowed by 15.8% had fall. This was equivocal with other studies conducted by Perry and Morton et. al.[13] were RTA was most common cause of BAT. Thus prevention of accidents can decrease fatality in BAT. Among the patients studied 77 patients had stable vitals and 3 patients had unstable vitals on arrival, all the 4 unstable eventually underwent emergency laparotomy this was in consistent to studies conducted by D. Dammers et. al.[14] were among 637 patients with BAT 607 (95.29%) patients were stable and 30 (4.7%) were unstable.

In our study during secondary survey 7 patients had long bone fracture, 7 had pelvic fractures, 5 had Head injury, and 1 had chest injuries. This was similar to studies by Nikil Mehta et al[15] were 40% had chest injuries, 14 had head injuries, 10% had long bone fractures and 10% had pelvic fractures.

In our study, FAST is 92.10% Sensitivity and 93.4 % specificity compared to CT in detecting haemoperitoneum with Positive predictive value of 93.10% and Negative predictive value of 97.40% in detecting blunt abdominal trauma. Alexander Y. et. al. found that FAST had a sensitivity of 20.0%, specificity of 98.3%, positive predictive value of 73% and negative predictive value of 84% compared to CT.

In our study, follow up patient with negative FAST had fewer falls in hemoglobin and hematocrit compared to the patient with positive FAST. D. Dammers et. al. reported that patients with a positive FAST had a lower Haemoglobin (Hb) level and often received blood transfusions than patients with a true negative FAST.

In our study, 44 cases were negative for intra-abdominal injury with hemodynamic stability were discharged based on the FAST findings within 24 hours. Alexander Y et. al. found that 47.31% patients who underwent FAST never required a CT at all. This practice of ruling out intra-abdominal injury with FAST, which may be occurring with increasing frequency as ultrasound use became more prevalent. Thereby our findings stress that even in stable patients, one should not rely on a single negative FAST-exam to exclude serious abdominal injuries: either careful observation, or a repeated FAST-exam should be performed.

Ethical approval was taken from the institutional ethical committee and written informed consent was taken from all the participants.

Conflict of Interest: None

Source of Support: Nil

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