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## Which is better?? e-Fast or contrast enhanced computed tomography in blunt abdominal trauma: An observational study in tertiary care center

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### Abstract

**Background:** Blunt Abdominal trauma is one of the most common causes among injuries caused mainly due to road traffic accidents and assaults. The rapid increase in number of 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, industrial mishaps, sport injuries, bomb blast and fall from riding bicycle. Due to the delay in diagnosis and inadequate treatment of the abdominal injuries, most of the cases are fatal. The knowledge in the management of blunt abdominal trauma has progressively increased. The reason for this could be due to the interval between trauma and hospitalization, inadequate and lack of appropriate surgical treatment, delay in diagnosis, post-operative complications and associated trauma especially to head, thorax and pelvis.

**Aims and Objectives:** To study the sensitivity of eFAST in comparison with CECT in blunt injury abdomen patients.

**Material and Methods:** All the patients brought to emergency department with the history of road traffic accident, fall from height, assault with blunt objects, industrial mishaps, sport injuries, bomb blast and fall from riding bicycle are included in the study. eFAST was done in the resuscitation area for all the patients. After admission all the patients with eFAST positive were on close observation for to proceed with CECT Abdomen and Pelvis or to operate the patient.

**Results:** A total of 50 cases of blunt injury abdomen presenting in our trauma care setup were included in our study. Of these cases 44 cases (88%) were males and 06 cases (12%) were females. The age group spectrum studied was comprised of 16 years to 72 years and the mean age of the study group was 37.22 years. 40 patients were operated for haemoperitoneum and other 10 patients were managed conservatively.

**Conclusion:** CECT is the gold standard technique for evaluating of blunt injury patients because it is highly sensitive and panoramic compared with eFAST. However eFAST can help us in assessing the severity of the trauma and helps in decision making for emergency laprotomy.

**Keywords:** Trauma, e-Fast, CECT abdomen and pelvis, exploratory laprotomy

### Introduction

Blunt Abdominal trauma is one of the most common causes among injuries caused mainly due to road traffic accidents. The rapid increase in number of 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, industrial mishaps, sport injuries, bomb blast and fall from riding bicycle. Blunt abdominal trauma is usually not obvious. Hence, often missed, unless, repeatedly looked for. Due to the delay in diagnosis and inadequate treatment of the abdominal injuries, most of the cases are fatal. The knowledge in the management of blunt abdominal trauma has progressively increasing. In spite of the best techniques and advances in diagnostic and supportive care, the morbidity and mortality remains large. The reason for this could be due to the interval between trauma and hospitalization, inadequate and lack of appropriate surgical treatment, delay in diagnosis, post operative complications and associated trauma especially to head, thorax and pelvis.

### Aims and Objectives

- To study the sensitivity of eFAST in comparison with CECT in blunt injury abdomen patients
- To determine the choice of management (Operative versus conservative) by using the information provided from CT by grading the visceral injuries using The American Association for the Surgery of Trauma (AAST) classification.
- To compare intra-operative findings with CT findings to assess the sensitivity and specificity of CT scan in blunt trauma.

### Material and Methods

The study was a single-center, prospective, randomized controlled trial carried out in the Department of Surgery from August 2021 to August 2022. A total of 50 patients were included in the study. The study was approved from the institutional ethical committee. All the patients who participated in the study were explained about the procedure in detail and the written informed consent was obtained prior to the study.

### Inclusion Criteria

- All blunt abdominal injury patients.
- Age between 16 to 72 years
- Ready to give informed consent

### Exclusion Criteria

- All patients with head trauma and chest trauma
- Age below 16 and above 72 years
- Patients not willing for admission
- Intubated patients during resuscitation
- Any patient who declined to participate in the study

All the patients came to emergency department with any form of abdominal trauma were evaluated. Primary survey of the patient was done and eFAST was done to all the patients included in the study. As a part of primary survey eFAST was done and all the following windows in the body were examined: Right Upper Quadrant View (RUQ), Left Upper Quadrant View (LUQ), Pelvic View, Cardiac View (Parasternal Long Axis or Subxiphoid), Lungs (Right and Left).

In cases of multiple trauma including tension pneumothorax, pericardial tamponade, external bleeding and unstable pelvic fractures, potentially lethal and treatable injuries that requires immediate intervention to restore circulating blood volume was given priority in the initial assessment.

The evaluation then was focused on rapid identification and management of catastrophic bleeding. eFAST (Extended Focused Assessment with Sonography for Trauma) showed the presence of free fluid in the abdomen which helped in the decision making whether to perform emergency laparotomy or manage conservatively. Those patients who did not require immediate laparotomy, i.e, hemodynamically stable are further evaluated with diagnostic testing. With decrease in use of diagnostic peritoneal lavage, diagnosis of abdominal injuries is exclusively relied on accurate findings from adequately done CT scans in a timely manner.

### Results

#### Age and Sex Distribution

A total of 50 cases of blunt injury abdomen presenting in our trauma care setup were included in our study. Of these cases 44 cases (88%) were males and 06 cases (12%) were females. The range of age of the patients studied was from 16 years to 72

years and the mean age of the study group was 37.22 years. The greatest distribution of cases was found in the 31-40 year age group with 16 cases (32%), followed by 21-30 years age group with 14 cases (28%) and 41-50 years age group with 12 cases (24%). Only 2 cases (4%) were documented in the < 20 years age group and one case (2%) in the > 60 years age group. Cumulatively, the age groups of 21-50 years represented the bulk of the study population with 42 cases (84%).

### Mode of injury

In our study, Road traffic accidents were the predominant cause of blunt injury with 43 cases (86%) being attributed to Road traffic accidents. Rest of the cases were due to fall from height.

All the patients underwent eFAST in the primary survey, all 50 patients were eFAST positive, 44 of the patients were vitally and hemodynamically stable so they were advised CECT Abdomen and pelvis and other 6 patients were taken up for emergency exploratory laprotomy immediately.

The table (1) under shows the details of the eFAST positive findings in all patients.

All the patients who were vitally stable underwent CECT Abdomen and pelvis and the findings are mentioned in the table (2).

The CECT findings and the intra-operative findings were compared and following findings were noted as shown in table (3).

A total of 50 patients who were referred for emergency CECT abdomen and pelvis as a case of blunt abdominal injury from emergency department were studied. These patients were followed up till management of the condition either surgically or conservatively.

**Table 1:** eFAST positive findings of various patients

Quadrants	No of patients	Percentage
Xiphisternum	1	2%
Morrison pouch	5	10%
Right hypochondrium	15	30%
Left hypochondrium	22	44%
Pelvis	2	4%
Combined	5	10%

**Table 2:** Findings of CECT Abdomen and pelvis

CECT findings	No of patients	Percentage %
Splenic injury	18	40%
Liver injury	14	32%
Renal injury	3	6%
Bladder injury	1	2%
Hollow viscus perforation	1	2%
Multiple organ injury	10	20%

**Table 3:** Comparison of CECT ABDOMEN & PELVIS with Intra-operative Findings

Organ involved	No of patients	Percentage %
Spleen	14	40%
Liver	10	31%
Kidney	4	12%
Mesentry	2	6%
Bladder	2	5%
Intestine	1	3%
Pancreas	1	3%

Among the 50 patients, 10 patients (20%) were managed conservatively and 40 patients (80%) were taken up for surgery based on the eFAST or CECT findings. Out of the 44 patients in

whom the visceral injury was present for whom CECT Abdomen & Pelvis was done, 34 patients were taken up for surgery and the remaining 10 patients were managed conservatively. We had a NO mortality among any of the patients included in our study.

### Discussion

Based on the study conducted by us, it clearly states that RTA is the most common mode of injury because of increased number of vehicles recently. The young people also give priority to speed rather than safety.

USG abdomen (Extended Focused Abdominal Sonography for Trauma) was done in all cases out of which 45 cases had solid organ injury. Therefore USG abdomen is more reliable in detecting solid organ injury and free fluid in the abdomen. Our study shows spleen is the most common organ injured in Blunt Abdominal trauma accounting to 40%, followed by liver in 37.5% cases and kidney in 12.5% cases in total. eFAST is important in early decision making for the further management of the patient.

Extended Focused abdominal Sonography in Trauma (eFAST) examination of peri-cardial, peri-hepatic, peri-splenic and pelvic areas help in early detection of clinically important abdominal injuries in blunt abdominal trauma. eFAST examination can be performed number of times and is an excellent tool in addition to physical examination of the patient in trauma emergencies.

CECT was done in 44 cases who were vitally and hemodynamically stable. It was positive in all cases. Contrast enhanced computed tomography (CECT) can provide trusted information on haemoperitoneum, grade of solid organ injuries, retro-peritoneal organ injuries, most case of hollow viscus damage and ongoing bleed by means of radio-graphic blushing. Based on CECT Abdomen and pelvis, there were total of 22 patients had splenic trauma, out of which 18 patients had exclusive splenic trauma and 4 patients had other organ injury too. 14 patients out of 18 patients were operated and rest of the 4 patients were managed conservatively. There were total of 18 patients had trauma to liver out of which 14 patients had exclusive liver trauma and 4 patients had other organ injury too. 10 patients out of 14 patients were operated and rest of the 4 patients were managed conservatively. 2 other patients with CECT Abdomen findings of grade 2 liver laceration and grade 1 splenic hematoma were managed conservatively.

Other findings intra-operatively seen were 4 with renal injury, 2 patients had mesenteric tear, 2 patients had bladder rupture, a patient with large bowel perforation and a patient with pancreatic injury.

The undifferentiated trauma patient can present several simultaneous diagnostic and disposition challenges. The eFAST exam provides trauma practitioners with a bedside tool that can provide adjunctive information to the primary survey and help prioritize care. A literature reveals that eFAST(USG) is an excellent tool for visualization of haemoperitoneum, with a sensitivity of 63-99%. The main limitation is its poor ability to depict parenchymal lesions.

The value of eFAST in revealing an organ injury varies greatly according to the lesion located. In the detection of spleen injuries, the sensitivity ranges from 27% to 68.6%. The bigger size of the liver and easier approach implies the higher sensitivity of eFAST for lesion of liver, ranging from 51% to 87.5% in various studies. For renal or supra renal injuries, however, FAST has a low sensitivity (25-40%).

In haemo-dynamically stable patients the diagnostic modality of choice is CECT with intravenous contrast. It is found to be of

use in detecting free air and intra-peritoneal fluid, grade the extent of solid viscera injury, detect retro-peritoneal organ injury, and helps in the decision for a conservative management. Helical CECT is done rapidly which decreases the time the patient stays in the CECT scan room. Furthermore, CECT improves the sagittal and coronal reconstruction views which are of use for detecting a ruptured diaphragm.

### Conflict of Interest

Not available

### Financial Support

Not available

### Conclusion

CECT is the gold standard technique for evaluating of blunt Abdominal injury patients because it is highly sensitive and panoramic compared with eFAST. eFAST(USG) is widely available largely used as the preferred screening tool in many trauma centers, eFAST has been observed as a valuable primary imaging technique because it is rapid, noninvasive, can be used on bedside of the patient, and it was found not to interrupt resuscitation efforts. eFAST(USG) easily repeatable and less expensive. eFAST is found to be diagnostic tool initially to detect intra-abdominal fluid in abdominal trauma. With proper training and under-standing the limitations of ultrasound, optimization of the results of eFAST is obtained. CECT forms the core investigation of choice in dealing with blunt injury abdomen patients who are hemodynamically stable.

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