



ROLE OF CT IN EVALUATION OF BLUNT ABDOMINAL TRAUMA

Radio-Diagnosis

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ABSTRACT

Introduction: Evaluating patients who have blunt abdominal trauma remains one of the most challenging and resource intensive aspects of acute trauma care. Missed intra-abdominal injuries continue to cause preventable deaths. CT imaging is the diagnostic tool of choice for the evaluation of abdominal injury. **Aims & Objective:** Role of CT scan in evaluating blunt abdominal trauma patients. **Materials and Methods:** 45 cases of blunt abdominal trauma was studied in the department of radiology in Dr. Vasantao Pawar medical college & hospital, Nashik, between January 2021 to December 2022. Written informed consent taken. All patients who were admitted in the hospital during the above mentioned time frame with blunt abdominal trauma who were hemodynamically stable were considered in the study. Recorded data included age, sex, type of injuries and scan results. Organ injuries were graded using the AAST grading. **Results:** A total of 45 patients were enrolled in the study. Out of 45 patient's 25 patients had splenic injury, 18 patients had liver injury and 10 patients had renal injury. There were 3 cases of bowel injury. There were 2 cases of pancreatic, 2 cases of bladder and 3 cases of adrenal injury. **Conclusion:** CT scan was found 100 % sensitive in diagnosis of blunt abdominal trauma.

KEYWORDS

Blunt abdominal trauma, CT scan, Spleen, Hemoperitoneum, AAST grading.

INTRODUCTION

Trauma can be defined as any bodily wound or shock produced by sudden physical injury, as from accident, injury or impact. The care of trauma patients is demanding and requires speed and efficiency. Blunt Abdominal Trauma usually results from motor vehicle collisions, assaults, recreational accidents, or falls. Men tend to be affected slightly more often than women. Evaluating patients who have sustained blunt abdominal trauma (BAT) remains one of the most challenging and resource-intensive aspects of acute trauma care. Missed intra-abdominal injuries continue to cause preventable deaths. Neurological impairment due to the traumatic event itself or to concomitant factors such as intoxication markedly limits the usefulness of the clinical examination.

The most commonly injured organs are the spleen, liver, retroperitoneum, small bowel, kidneys, bladder, colon, diaphragm, and pancreas. CT imaging is the diagnostic tool of choice for the evaluation of abdominal injury due to blunt trauma in hemodynamically-stable patients¹. CT scan of the abdomen can reveal other associated injuries, notably vertebral and pelvic fractures and injuries in the thoracic cavity². CT scans, unlike direct peritoneal lavage (DPL) or Focused Assessment with Sonography for Trauma (FAST) examinations, have the capability to determine the source of haemorrhage. Many retroperitoneal injuries go unnoticed with DPL and FAST examinations. CT scans provide excellent imaging of the pancreas, duodenum and genitourinary system. The images can help quantitate the amount of blood in the abdomen and can reveal individual organs with precision. Imaging plays a critical role in the evaluation of patients with blunt abdominal trauma. CT as the sole modality, enables evaluation of other associated injuries in addition to global evaluation of abdominal trauma.

CT requires a cooperative, hemodynamically stable patient. CT scanners are now available in most trauma centers, and with the advent of helical scanners, scan time has been significantly reduced. The accuracy of CT in hemodynamically stable blunt trauma patients has been well established. Sensitivity between 92% and 97.6% and specificity as high as 98.7% has been reported in patients subjected to emergency³⁻⁵.

AIMS & OBJECTIVE

Role of CT scan in evaluating blunt abdominal trauma patients.

MATERIAL & METHODS

The prospective study of the role of CT scan in case of blunt abdominal trauma was carried out in the department of radiology in Dr. Vasantao Pawar Medical College & Hospital, Nashik, between January 2021 to December 2022. Total 45 patients (males & females) with blunt abdominal trauma & positive intra-abdominal injury were included in this study.

All patients who were admitted in the hospital during the above mentioned time frame with blunt abdominal trauma who were hemodynamically stable were considered in the study.

Patients were enrolled in the study after taking informed written consent. USG were done for all patients. If vital signs of patient were found stable other related X-rays were done according to site of injury, CT Scan was advised for patient in whom USG was suggestive of any abnormality or there is any clinical doubt in hemodynamically stable vital signs.

Technique Of Ct Scan:

Preparation of patient: Risks of contrast administration was explained to the patients and consent was obtained prior to the contrast study. Plain scans were followed by intravenous contrast scans.

- 1) Scout: Craniocaudal.
- 2) IV Contrast: Iohexol 370 (70 ml, 2.5-3.0 ml/sec)
- 3) Start location: lower thorax, End location: Symphysis pubis
- 4) Kv: 130 mA: Auto
- 5) Sections were taken in arterial, venous, portal venous and delayed phases of scanning.

Post study reconstructions were done at 3 mm. Sagittal and coronal reconstructions were made wherever necessary. The patients with hemoperitoneum or abdominal visceral injury or both were considered as positive for intra-abdominal injury. The patients with neither visceral injury nor hemoperitoneum were considered as negative for intra-abdominal injury and not included in this study.

RESULTS:

A total of 45 patients were enrolled in the study. Blunt abdominal injury was most common in age group of 21-40 years (51%). The incidence of abdominal trauma in male population is 89%.

Table-1: Incidence of intra-abdominal organ injury on CT Scan		
Organ Injury	No. of patients	Percentage
Liver	18	40%

Spleen	25	55%
Kidney	10	22%
Bowel	3	6%
Pancreas	2	4%
Mesentery	1	2%
Adrenal	3	6%
Urinary bladder	2	4%

Table 1 shows that out of 45 patient's 25 patients had splenic injury, 18 patients had liver injury and 10 patients had renal injury. There were 3 cases of bowel injury. There were 2 cases of pancreatic, 2 cases of bladder and 3 cases of adrenal injury.

Table-2: Incidence of associated extra-abdominal injuries detected on CT scan

Associated injuries	No. of patients	Percentage
Lung injury	4	9%
Hemothorax	8	17%
Pneumothorax	3	6%
Rib fractures	14	31%
Other fractures	4	9%

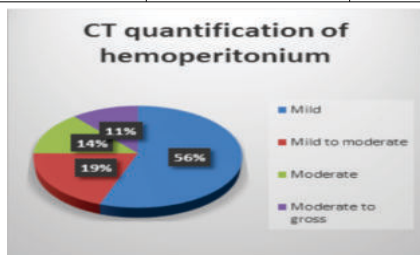
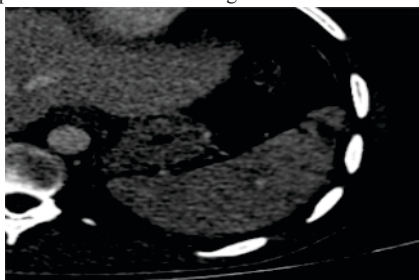


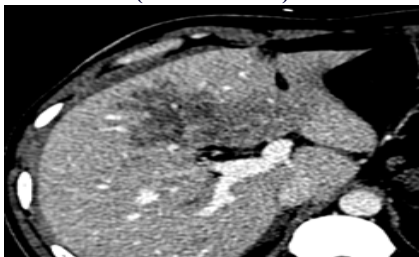
Table-3: Incidence of intra-abdominal injuries on the basis of AAST grade

Grades	No. of patients	Percentage
AAST I	7	15%
AAST II	17	38%
AAST III	20	44%
AAST IV	8	18%

In all patients USG (FAST) is done before CT, out of these 45 patients in about 8 patients no abnormal findings were found on USG.



Small splenic contusions (AAST-Grade I)



Liver laceration with parenchymal hematoma (AAST Grade II)



Pancreatic laceration-contusion (AAST Grade III)



Right renal vascular injury (AAST grade IV)

DISCUSSION

No age is bar for blunt abdominal trauma. In our study, maximum abdominal trauma cases was in age group of 21-40 yrs. This was because patient in this age group lead more active life and have more outdoor activities. Patient in age group > 50 years, lead a less active life, have less incidence of trauma. In this study, nearly 51 % of patients were from age group 21-40 years. This age represent working population. Thus trauma is not only a problem for individual but also social, as society loses a large amount of human resources.

In this study, 89 % of patients were males. The incidence of abdominal trauma in male population is higher because in our country male leads more active life and has more outdoor activities. Women are usually housewives, majority of injuries in women are due to vehicular accident and fall from height.

Poor results of USG may be due to overlying bowel shadow, surgical emphysema, empty bladder and lack of skilled radiologist at emergency hours. A study was done before demonstrates the superiority of CT over USG as diagnostic tool in blunt abdominal trauma⁶. CT scan altered the diagnosis and choice of management in 8 patients who were not suspected of having intra-abdominal injury on USG. Hence, it indicates that CT scan is better investigation as compared to USG abdomen in cases of blunt abdominal trauma. CT scan is superior diagnostic modality in the diagnosis of abdominal trauma. USG can be a valuable initial investigation; however, USG can miss crucial injuries and may lead to inappropriate management in some patients. Hence it is imperative that all USG positive cases should be followed by CT. Similarly CT must also be performed in symptomatic patients with negative USG scans and in patients with suboptimal USG scans.

Solid organ injury like liver, spleen and kidney were more accurately detected by CT scan than USG. CT scans provide excellent imaging of the pancreas, duodenum and genitourinary system. The images can help quantitate the amount of blood in the abdomen and can reveal individual organs with precision CT scan as the sole modality, enables evaluation of other associated injuries in addition to global evaluation of abdominal trauma. In cases of abdominal trauma, Chest and Orthopedic injuries were maximum associated injuries.

It is found that in about of 44% of cases AAST grade III injury is common which is followed by AAST grade II injury found nearly about 38% of cases. AAST IV injury is less common found nearly about 18% of cases.

CT is very sensitive in detecting hemoperitoneum. Quantification of hemoperitoneum using CT is very helpful in deciding need for surgery.

CONCLUSION

In this study, CT scan was 100 % sensitive in diagnosis of blunt abdominal trauma. AAST grading, quantification of hemoperitoneum and anatomical site of organ injury predict the management protocols in the majority of our patients. Result of this study shows that CT scan is a superior diagnostic modality in the diagnosis and management of blunt abdominal trauma.

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