Original Research Article

Role of multidetector computed tomography in assessment blunt abdominal trauma in a tertiary care hospital

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Abstract

Background: Trauma is a most important cause of mortality and around 10% of these can be recognized to abdominal trauma. Recognition of intra abdominal solid organ injuries is often difficult and often medical result can be unconvincing. In such cases multi detector computed tomography (MDCT) is a brilliant modality to assess the solid organ injuries. **Aims and Objectives:** recognition of the solid organ injuries in blunt abdominal trauma. Further classify the injuries on root of their severity. Compare the result of CECT scan with intra-operative or follow-up results. **Study design:** Descriptive analysis carried out in Dept of Radio-diagnosis GEMS hospital, Ragolu, Srikakulam over a period from June 2017 to October 2018 consisting of 105 patients of blunt trauma abdomen with positive ultrasound results. All patients underwent a non contrast and contrast CT scan of the abdomen. The CT findings were compared and correlated with the operative findings, or clinical follow-up in conservatively managed cases. **Results:** One hundred five patients were concerned in this study there were 83 males (79%) and 22 females (21%), and the mean age was 21.96 ± 18.15 (15–78) years. Solid organ injuries were identified in 81% of the cases of blunt trauma. Out of these maximum cases were of liver followed by spleen. The in general sensitivity and specificity in our study with value to CT findings guiding patient management was 77 % and 100% **Conclusion:** The assessment of CT scans is particularly helpful for the assessment of solid organ injuries following trauma patients. CT scans can reveal a wide variety of injuries but In addition, CT assessment is fast and widely accessible for solid organ injuries following trauma.
Key Word: CT scan, MDCT, Trauma, Ultrasonography, Injury.

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INTRODUCTION

Trauma is the most important cause of mortality between people who are younger than 45 years.[1] One of the major causes of death after trauma, with information ranging from 40 to 80%, is exsanguinations caused by injuries to the abdominal organs. The spleen and liver are the mainly frequently injured organs as an effect of blunt trauma and kidney is also frequently injured.[2] More than the past 40 years, several changes in the main analysis and treatment of patients with blunt abdominal trauma have occurred. Blunt injury occurs most commonly through road accidents.[1] Frequently of these patients have multisystem injuries significantly from high velocity mechanisms. Detection of severe intra-abdominal pathology is often difficult. When assessing the condition of an abdominal trauma patient coming to the emergency department, clinical history and physical examination are often unpredictable and even false. Clinical diagnosis can be challenging due to the lack of specific physical findings in many patients. Immediate detection of damage with

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fast and proper treatment to reduce morbidity and mortality is the goal of modern trauma care and hence accurate diagnosis is essential. Contrast enhanced CT, and in particular the use of faster helical CT, has revolutionalised the supervision of haemodynamically unstable patient. Its advent has practically eliminated the need for invasive DPL. The elevated correctness of CT in solid viscera opinion, with restricted intraparenchymal organ injuries, and evaluation of the retroperitoneum has defined its role in trauma. CT as the sole modality enables assessment of other related injuries in adding to worldwide evaluation of injuries related to trauma for example Pelvic fracture, vertebral fracture, lung base injury etc[3]. This study is an effort to evaluate the role of MDCT in the assessment of patient with blunt abdominal trauma and helping settle on further course of management.

MATERIAL AND METHODS

A descriptive study of 105 cases of blunt abdominal trauma patients presenting to CT scan section of Department of Radio diagnosis, Great Eastern Medical School and Hospital, Ragolu, Srikakulam from June 2017 to October 2018 was done. Our study aimed to assess the mode of injury in cases of Blunt abdominal trauma, and Classify the injuries in blunt abdominal trauma based on involvement of solid organs further characterize the injuries on basis of their severity and finally correlate the findings of CECT scan with intra-operative or follow-up findings. We were evaluated 105 patients suspected to which presented with symptoms and signs of blunt abdominal trauma lesions with positive findings on FAST ultrasound imaging. We included Clinical suspicion of intra-abdominal injury, Haemodynamically stable patient, Multi-trauma patient, A positive ultrasonography study. All haemodynamically unstable patients and with obvious peritoneal signs and progressive abdominal distention were taken up for surgery immediately were excluded from the study.

OBSERVATIONS AND RESULTS

Of the 105 patients evaluated by us in the study, 83 patients were males and 22 patients were females giving a male to female ratio of about 4:1, as males have a more outdoor nature of work and more travel. The major age group concerned between 21-30 years, constituting 32% of the total patients. Mode of injury mainly MVA/RTA was 72.2% in male and 40.9% female overall Percentage was 65 %. Assault was 10.8% in male and 27.2% female overall Percentage was 15%. Fall from height was 16.86% in male and 31.8% female overall Percentage was 21% shown in table1.

Table1: showing the mode of injury in percentage

Mode of injury	Male	Female	Percentage (%)
MVA/RTA	60(72.2%)	9(40.9%)	69(65.7%)
Assault	9(10.8%)	6(27.2%)	15(14.2%)
Fall from height	14(16.86%)	7(31.8%)	21(20%)
Total	83(100%)	22(100%)	105(100%)

The patients with haemoperitoneum or demonstrable abdominal visceral injury or both were considered as positive for intra abdominal injury. The patients whose assessment did not expose either visceral injury or haemoperitoneum were considered as negative for intra abdominal injury. Out of the 31 positive patients reported in our study, haemoperitoneum was detected in 28 patients, visceral injury in 23 patients and 2 patients had injury to the abdominal wall secondary to trauma without visceral injury Among the visceral injuries, spleen was the most common organ involved (36.17%) followed by the liver, which accounted for 29.79% of cases.

Table 2: CT based findings in percentage

	No. of Cases	%
Solid Organ Injuries with hemoperitoneum	74	70%
Solid Organ Injuries without hemoperitoneum	8	8%
Isolated Hemoperitoneum	23	22%
Total	105	100%

Table 3: Distribution based on involvement of solid organs

Abdominal viscera involved	No. Cases	Percentage (%)
Liver	34	32.38%
Gall bladder	1	0.95%
Biliary system	2	1.90%
Spleen	31	29.52%
Pancreas	9	8.5%
Adrenal gland	3	2.85%
Kidneys	17	16.20%
Bowels/Mesentery	3	2.85%
Urinary bladder	5	4.76%
Total	105	100%

Table 4: Further characterization of solid organ injuries

Grade	Liver	Spleen	Renal	Pancreas	Adrenal
I	9	4	3	4	0
II	12	9	8	7	2
III	13	11	6	2	1
IV	6	2	2	0	1
V	0	2	1	0	0
VI	0	0	0	0	0
Total	40	28	20	13	4

Table 5: Result of CT based management guidelines(Conservative vs Surgery) of blunt abdominal trauma patients in this study

	Operative management	Conservative management	Total
Positive	True positive (12)	False negative (0)	12
Negative	False positive (4)	True negative (89)	93
Total	16	89	105

DISCUSSION

The significance of CT in the diagnosis of abdominal trauma lies in its accuracy of identifying injuries that involve early on examination and provides evaluation of the severity of the injury which helps deciding the management. The rate of negative laparotomy is reduced by avoiding surgical interference in cases that can be managed conventionally. In our study there were total 105 visceral injuries recruited. Out of these only 8% (8 cases) of visceral injuries were not related with haemoperitoneum. Thus, a common of patients 92 % (97 cases) with visceral injury had related haemoperitoneum. As of 105 patients with positive intra-abdominal injury, 12 patients (11.4%) were taken up for surgery. All the CT results of hemoperitoneum and/or solid organ injury were confirmed in the 12 cases taken up for surgery, further 4 cases of bowel injuries were diagnosed and one case of renal injury upgraded from grade III to IV subsequently laparotomy. CT was 100% responsive in detecting haemoperitoneum. In our study, the majority frequent injured organ was liver 32.38% (34 cases). Hassan R, *et al*4 in their study found liver was most commonly injured organ (92.3%) in blunt abdominal trauma. Atri M et. al, 5 in their study, 38 (40%) of 96 patients had surgically important bowel and/or mesenteric injury, and 58 (60%) of 96 patients had also no or surgically insignificant bowel and/or mesenteric injury. Sensitivities of the 3 reviewers in the diagnosis of surgically important bowel and/or mesenteric injury ranged from 87% (33 of 38) to 95% (36 of 38); specificities ranged from 48% (28 of 58) to 84% (49 of 58). In our study, splenic injuries found in 29.52% (31 cases). Majority of them, 35.48% (11 out of 31) were grade III injuries. We have the same opinion with Becker CD *et al* 6 who in their study found that, CT findings in splenic trauma cannot be used to determine reliably which patients necessitate surgery and which patients can be treated predictably. Renal injuries were the third most frequently injured organ in this study (16.20%, 17cases). Out of them 47% (8 out of 17) were grade II injuries. There was one case of grade V injury for which nephrectomy was done based on CT findings. All findings of CT were confirmed on laparotomy. There were 09 cases (8.5%) of pancreatic injury in our study. Majority of them (7 cases) were grade II injuries. All patients were managed conservatively. No grade IV and V injury were found. Gupta *et al* 7 in their study found that CT scan was 68 % (19 of 28) accurate in diagnosing pancreatic injury. Hence, in the overall CT analysis of visceral injuries in this study, OIS grading in isolation, appeared to predict the management protocols in most patients, except in cases of bowel injuries (CT sensitivity for bowel injuries was only 58.1% in this study). The in general sensitivity and specificity in this study with deference to CT findings guiding patient administration was 77 % and 100% respectively. The optimistic predictive value was 100%, negative predictive value 94% and precision of this study was 96%. The reduced overall sensitivity was completely due to the reduced sensitivity of CT in detecting bowel injuries. CT was extremely correct with value to other visceral injuries in this study, with 100% sensitivity in detecting hemoperitoneum. Kumar M M, *et al* 8 had an in general sensitivity, specificity and positive predictive value (for trauma detection by CT) of 93%, 100% and 100% respectively.

CONCLUSION

The assessment of CT scans is particularly helpful for the assessment of solid organ injuries following trauma patients. CT scans can reveal a wide variety of injuries but in addition, CT assessment is fast and widely accessible for solid organ injuries following trauma.

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