

MULTI-DETECTOR COMPUTED TOMOGRAPHY AND INTRA-OPERATIVE CORRELATION IN BLUNT ABDOMINAL TRAUMA

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ABSTRACT: BACKGROUND: With the change in the pace of life fast, faster, fastest being the motto of the present day, the incidence of trauma and the associated mortality and morbidities is on a continuous rise. Imaging plays a very important role in the management of these injuries in deciding which injuries, in trauma the final verdict of organ injury in abdomen is intra-operative findings. **AIMS:** In view of the above said we considered to study to determine diagnostic accuracy of MDCT (Multi-Detector Computed Tomography) in detection of intra-abdominal solid organ injury in blunt abdominal trauma and to highlight the importance of MDCT in evaluation of blunt abdominal trauma. **METHODS AND MATERIALS:** This was a prospective study done between over a period of 2 years from between January 2011 to February 2013 on patients who presented with blunt abdominal trauma after excluding patients who were managed conservatively and normal on imaging, the data we compared had 32 patients and the analysis was as follows. **RESULTS:** Blunt abdominal trauma was common in males, the male to female ratio was 9:1, road traffic accident is the most common mode of injury in blunt abdominal trauma with 60% of the patients in this mode of injury, single organ injury is 22 patients (76%) spleen is the most commonly injured organ 15(47%) patients having splenic injury, with grade 3 being the commonest splenic injury 8 out of the 15 patients had splenic injury bowel injury was the second common organ injured in blunt trauma abdomen. In this study computed tomography grading correlated well with intra-operative grading with a PPV of= 95.45 % (95% ci: 84.50 % to 99.31 %) Asensitivityof 76.36 % (95% ci: 62.98 % to 86.76 %). **CONCLUSION:** Computed tomography is an important imaging technique for diagnosis of organ injuries in patients with abdominal trauma. It helps in grading of the type of injury and accordingly deciding the management of patient. It is a highly sensitive imaging modality for diagnosing of abdominal injuries.

KEYWORDS: MDCT (MULTI-DETECTOR COMPUTED TOMOGRAPHY), INTRA-OPERATIVE CORRELATION, BLUNT TRAUMA ABDOMEN.

INTRODUCTION: With the change in the pace of life fast, faster, fastest being the motto of the present day, the incidence of trauma and the associated mortality and morbidities is on a continuous rise. There is on one spectrum minimal damage with maximum benefit from medical interventions on the other the need to accurately decide the onwhich interventional modality is needed in management of patients with trauma is necessary. Approximately 10% of all trauma deaths are a result of abdominal injuries. Imaging plays a very important role in the management of these injuries in deciding which injuries, in trauma the final verdict of organ injury in abdomen is intra-operative findings.

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METHODS AND METHODS: This was a prospective study conducted, after obtaining consent from the patients and or their relatives. All consenting patients who presented with intra-abdominal solid organ injury due to blunt abdominal trauma were chosen using purposive sampling technique after they met the predefined criteria which excluded patients who. Patients their net kin and who were chosen were explained of their advantages and disadvantages and the complications of the procedure. A third generation cephalosporin was given an hour before and 6 hours after the procedure then continued till 5th post-operative day. The intra operative and MDCT findings were co-related.

RESULTS: In our study done from January 2011 to February 2013 on patients who presented with blunt abdominal trauma, of 138 patients who had presented with abdominal trauma 57 had positive findings, 25 patients were managed conservatively and hence were not included in the study. The data we compared had 32 patients and the analysis was as follows.

Blunt abdominal trauma is common in males, the male to female ratio was 9:1, road traffic accident is the most common mode of injury in blunt abdominal trauma with 60% of the patients in this mode of injury, single organ injury is 22 patients (76%) spleen is the most commonly injured organ 15(47%) patients having splenic injury, with grade 3 being the commonest splenic injury 8 out of the 15 patients had splenic injury bowel injury was the second common organ injured in blunt trauma abdomen. In this study computed tomography grading correlated well with intra-operative grading with a PPV of= 95.45 % (95% ci: 84.50 % to 99.31%). A sensitivity of 76.36 % (95% ci: 62.98 % to 86.76 %)

DISCUSSION: There has been a rapid increase in the incidence of trauma with the industrialization of the world. With the present mantra in life speed is the motto the incidence of trauma deaths has also increased. It is estimated that of all mortalities' in trauma, death due to abdominal injuries account for approximately 10%^{1,2}. Owing to the variety of etiologies of abdominal trauma and it being a home for variety of structures; adequate characterization of abdominal injuries is a very important factor in appropriately choosing a proper management^{3,4}. CT has become increasingly valuable and is extensively used in the early clinical management of blunt abdominal trauma^{5,6} as it is highly sensitive and specific method for the detection of abdominal injuries. The accuracy of CT in the diagnosis of blunt abdominal trauma has been reported to be as high as 97%^{7,8}. MDCT allows for complete scanning in a single breath-hold, and faster scanning speeds and narrow collimation increase contrast opacification in the mesenteric, retroperitoneal, and portal vessels, as well as in parenchymal organs. This improves identification of organ injury and, additionally, sites of active arterial bleeding. CT is now well established as an accurate non-invasive technique for the detection of the entire spectrum of various abdominal organ injuries⁹ and helps to decide on management especially on decision whether to treat conservatively¹⁰.

In a study by Michael Federle et al¹¹, including 100 cases of abdominal trauma and the revealed that there was maximum incidence of trauma in age group 21-30 years, which was 35%. Followed by age group below 20 years, and males, predominated over females in the incidence of abdominal trauma which is comparable to our study.

Siddique M A B et al.¹² studied 50 patients of abdominal trauma and concludes stab injuries in 21 patients as leading cause followed by motor accidents in 12 patients, assault in 7 patients and

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fall from height in 4 patients and other causes in 6 patients. In his study vehicular accidents are the major cause of blunt abdominal trauma.

In their study Radhiana et.al concluded that CT scans accurately depict various patterns of splenic injuries and other associated surgically important findings¹³. In another study in which contrast enhanced-spiral computerized tomography was used in assessing blunt abdominal trauma they concluded that the sensitivity was 95%, specificity 100%, positive predictive value 100% and negative predictive value 78%¹⁴. In another study it was shown that even in clinically stable patients around 18% of CT scans showed arterial extravasation was higher than anticipated¹⁵.

Study Name	Most Common Organ Injured	Percentage
Kailidou E Et al ¹⁴	Spleen	41%
Yao D et.al ¹⁵	Spleen	49.0%
Our Study	Spleen	47%

Table 1: Comparing our study to other studies with regard to the most commonly injured organ

Study name	Sensitivity	PPV
Yao DC et.al ¹⁵	95%	100%
Allen TL et.al ¹⁶	95.0%	Not studied
Our study	76.36%	95.45 %

Table 2: Comparing our study to other studies with regard to sensitivity

CONCLUSION: Computed tomography is an important and highly sensitive imaging modality for diagnosis and categorizing of organ injuries in patients with abdominal trauma. It helps in grading of the type of injury and accordingly deciding the management of patient and should be considered in deciding the appropriate management for blunt abdominal trauma. Modern generations of CT scanners employ multiple rows of detector arrays as compared to the conventional single-slice helical CT allowing rapid scanning and wider scan coverage, also the images can be viewed in all imaging planes with similar spatial resolution leading to routine utilization of 3 dimensional visualization tools. MDCT offers some valuable options to reduce the radiation exposure, like choosing optimized exposure parameters or its superior dose efficiency in comparison to single-slice CT.

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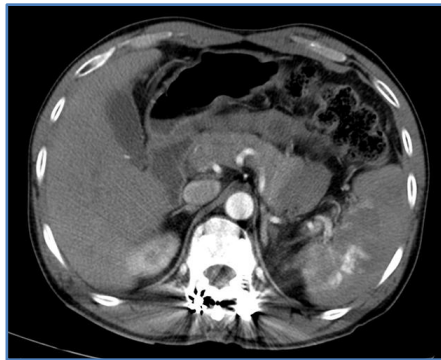


Fig. 1: Grade III Splenic Injury with Active Contrast Extravasation



Fig. 2: Grade IV Spleen Injury and Liver Injury



Fig. 3: Grade V Splenic Injury with Contrast Extravasation

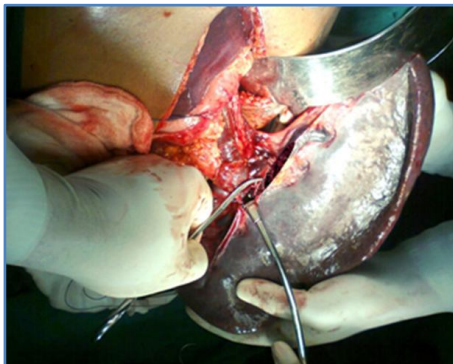


Fig. 4: Splenic Hilar Vascular Injury Controlled with Clamps

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Fig. 5: Grade IV Liver Injury

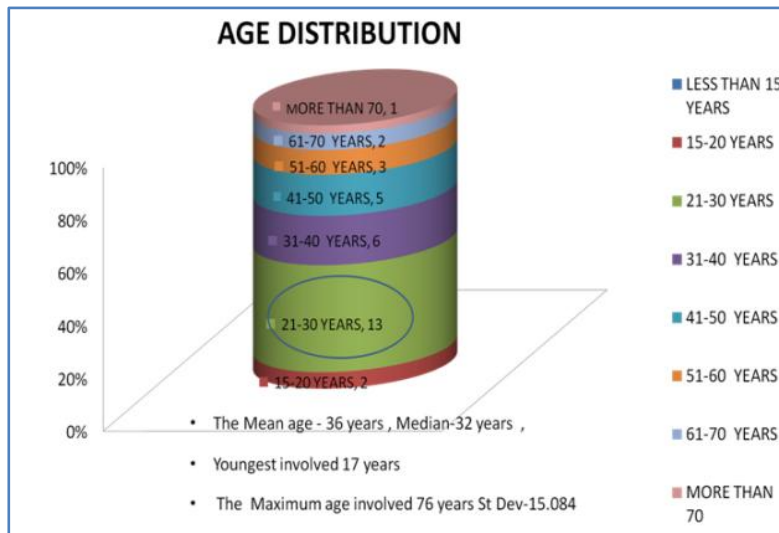


Fig. 6: Age Distribution in our Study

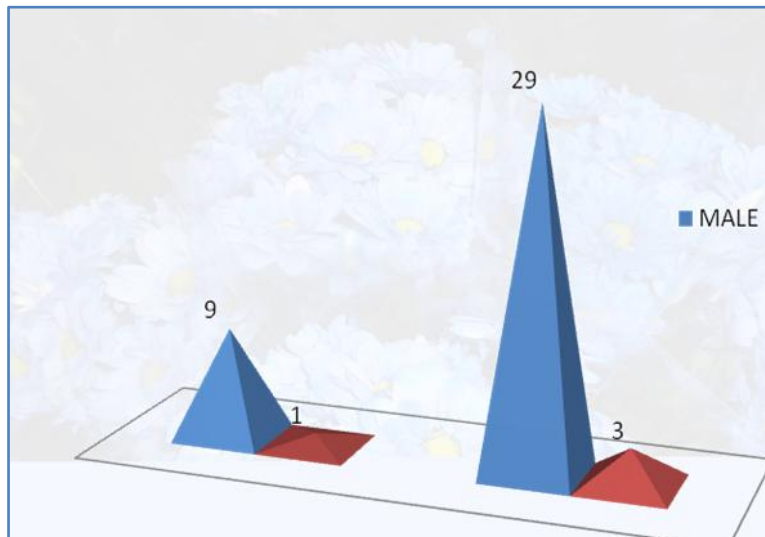


Fig. 7: Sex Distribution in our Study

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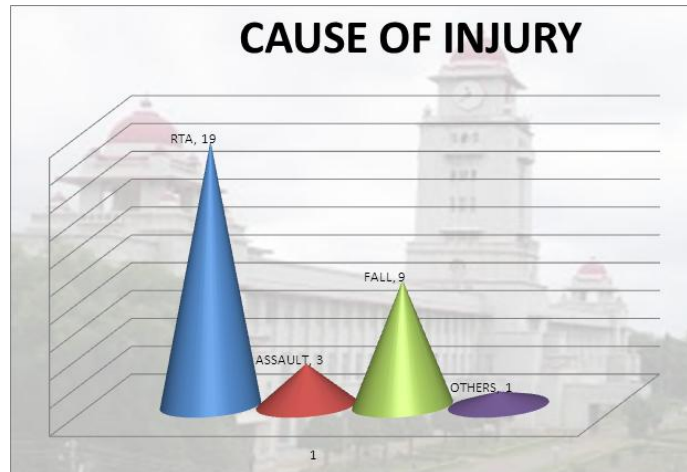


Fig. 8: CAUSE OF INJURY

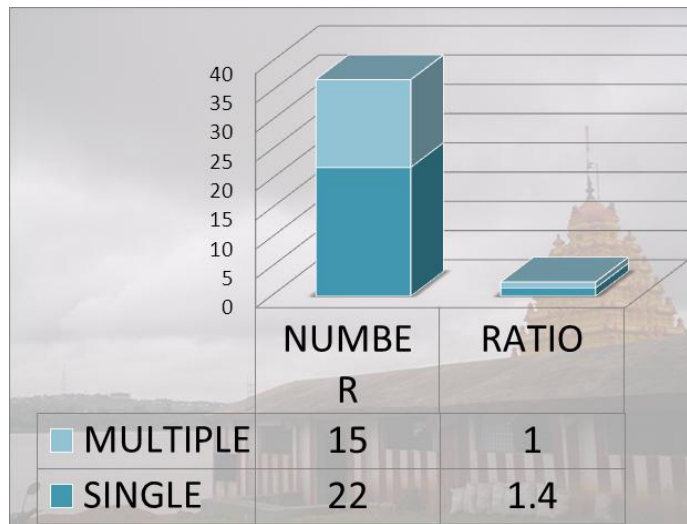


Fig. 9: Number of Organs Injured in Trauma

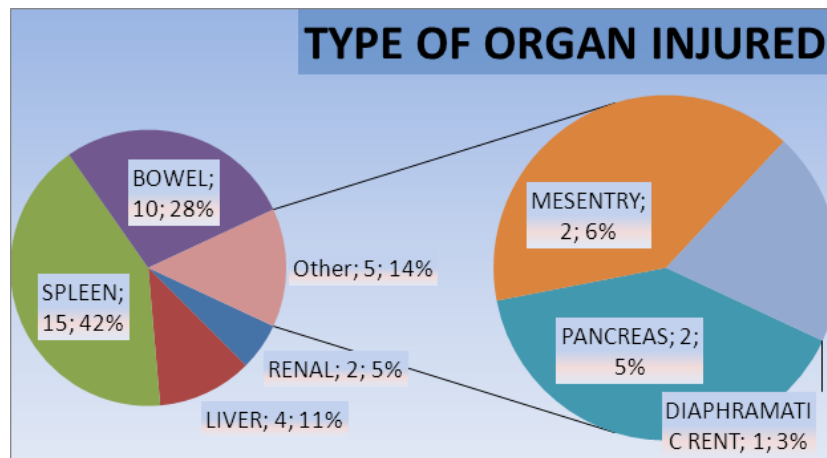


Fig. 10: Organ Injured

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