



CT EVALUATION IN ABDOMINAL TRAUMA : FROM INITIAL ASSESSMENT TO SURGICAL DECISION MAKING.

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**ABSTRACT**

Trauma is the leading cause of death under forty, with abdominal injuries comprising 10% of these fatalities. This prospective cross-sectional study evaluates the role of computed tomography (CT) in evaluation of abdominal trauma by analyzing 50 patients (43 males, 7 females) over two years. CT was performed and findings guided treatment decisions. Results revealed that the spleen was the most commonly injured organ (40%), followed by the liver (35.3%), with road traffic accidents being the primary cause (72%). Single organ injuries were more prevalent (70%) than multiple organ injuries (30%). Most injuries were Grade III, with 68% managed conservatively and 32% requiring surgery. This study confirms critical role of CT in reducing unnecessary surgeries, thereby decreasing morbidity and mortality in abdominal trauma cases.

**KEYWORDS :** CT, Abdominal Trauma, Grade

**INTRODUCTION**

Trauma is the leading cause of death under the age of forty. 10% of all traumatic deaths are due to abdominal injury. Computerized tomography (CT) scan is the gold standard in stable patients with blunt abdominal trauma because it reduces the number of exploratory laparotomies. Hemodynamically stable patients with blunt trauma and suspected abdominal vascular injuries may benefit from an abdominal CT scan, as it helps localize a hematoma and evaluate solid organ injury<sup>1</sup>. The findings to be assessed are hemoperitoneum, solid organ laceration, contusion, subcapsular hematoma, mesenteric injury, free intraperitoneal and retroperitoneal air, diaphragmatic rupture and urinary bladder rupture<sup>2</sup>.

Delay in diagnosis and treatment of abdominal trauma substantially increases the morbidity and mortality in trauma patients due to bleeding from solid organs, vascular injury or infection due to perforation of a hollow viscous<sup>3</sup>.

The most important assessment in patients with abdominal trauma is to determine the need for laparotomy<sup>4</sup>. It is clearly an advantage to the operating surgeon if the same test is sensitive enough for determining the organ injured, more so when a conservative approach is planned<sup>5</sup>. The present study outlines the role of CT in the evaluation of abdominal trauma, wherein by reducing unwarranted surgeries there is reduction in the morbidity and mortality<sup>6</sup>.

**MATERIALS AND METHODS**

**Study Design**

It is Prospective cross sectional study of CT abdomen and pelvis in 50 patients(43 males and 7 females) with abdominal trauma who had positive findings irrespective of Age and Sex in DR Vitthalrao Vikhe Patil Foundation's Medical college and Hospital,Ahmednagar.,over a period of 2 years. CT was done on Philips 16 slice machine. Precontrast and contrast Images are acquired.

**Inclusion And Exclusion Criteria**

All patients with abdominal trauma irrespective of age and sex were included in the study. Patients with contraindication to administration of iodinated intravenous contrast medium underwent a plain study.

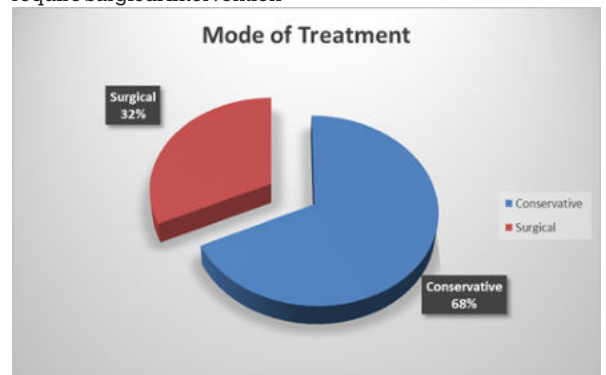
**RESULTS**

50 patients with abdominal trauma who underwent computed tomography and had positive findings were evaluated. Out of the 50 patients, 43 were males (86%) the rest were females (14%).Male to female ratio was 6.1:1.According to age distribution,21 out of 50 patients (42 %) were in the age group of 21-30 years, followed by 11 patients (22 %) in 11-20 years age group.The mode of injury in majority of the patients was a road traffic accident (72.0%) followed by a fall (20%) and assault (6.0%).

The spleen was the most common organ injured. This was seen in 26 of 50 patients in our study (40.0%). This was followed by involvement of the liver in 23 patients (35.3%). Unilateral/bilateral renal involvement was seen in 9 patients (13.8%). Injury to pancreas was seen in 3 patients (4.6%) and urinary bladder and mesentery in 2 patients each (3 %). The spleen and liver were the most commonly injured organs in abdominal trauma in our series followed by the kidney.

Single organ injury (70%) was seen to be more common than multiple organ (30%) injury in abdominal trauma.

It was observed that the majority of the visceral injuries were Grade III. Most of the patients with Grade IV and V injuries were operated upon. Very few of the patients with grade I to III injuries required surgery. Hence, most of the grade I to III visceral injuries were managed conservatively and rarely require surgical intervention

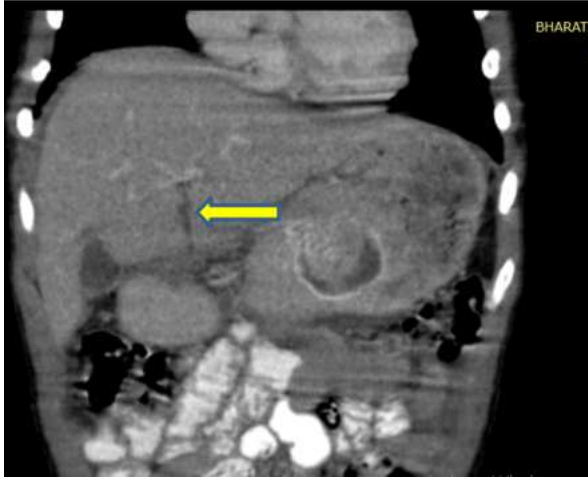


**Table 1: Grade Specific Solid Organ Injuries.**

Grade	Liver	Spleen	Kidney
I	5	4	2
II	2	4	-
III	8	2	1
IV	4	9	3
V	3	7	1
TOTAL	23	26	7

The chart (Fig1) above depict the number of cases treated surgically and conservatively. Out of 50 patients, 16 (32%) underwent surgical management and 34 (68%) were managed conservatively.

**Cases:**

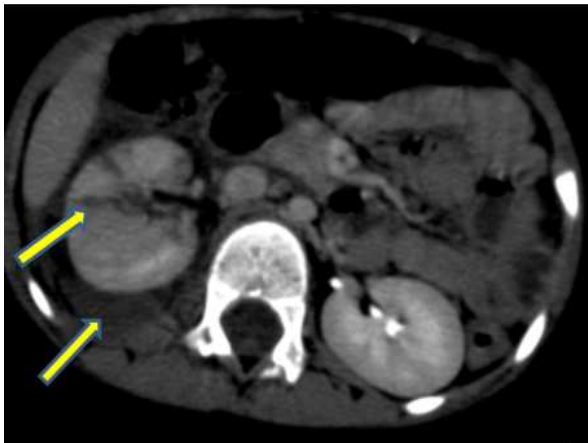


**Case 1:** 7-year-old boy, hit by bat while playing (Assault).

Coronal CT image showing a linear non-enhancing hypodense area <2.5 cm size in segment IV-A & B of left lobe of liver extending upto the inferior surface, suggestive of AAST Grade-II hepatic injury.

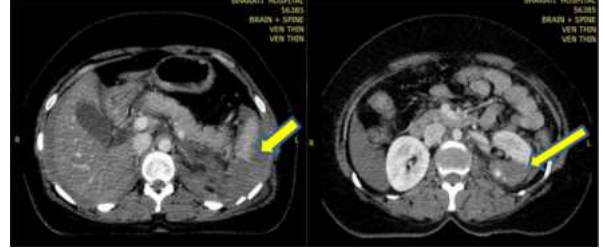


**Case 2 (A&B):** 25 year male, h/o RTA who sustained an impact on the left side of abdomen. A) CECT axial image showing shattered B) Post-operative image of the resected spleen in the same patient.



**Case 3:** 3 year-old boy, h/o RTA. Axial and CECT images

showing large right sided subcapsular hematoma and laceration extending through renal cortex, medulla and reaching upto the collecting system suggestive of an AAST Grade IV injury.



**Case 4:** 32 year female, h/o RTA.

Axial CECT images showing multi organ injury - grade IV splenic and grade III left renal injuries with hemoperitoneum.

**DISCUSSION**

Abdominal trauma presents variably. CT is the "gold standard" technique for assessing and managing abdominal trauma as it has high sensitivity and specificity. The most widely used methods for categorizing traumatic injuries are the American Association for Surgery of Trauma (AAST) injury scoring scales.

In our study, RTA represented the most common cause (72%), followed by falls (20%). This is in concurrence with a study done by Visrutaratna P et al<sup>82</sup> who found that the majority of blunt abdominal trauma was caused by RTA (more than 75% of cases).

Maria Daniela Podeanu et al<sup>7</sup> in 2012 evaluated 327 patients with blunt abdominal trauma. 37 of their 52 of patients who had positive findings were males and 15 were females. The patients were in the age group of two to 83 years. Majority of their patients were in the third decade with the least number of patients in the first decade. RTA was the cause of trauma in 79% of patients, followed by fall (13%).

In our study the spleen was the most commonly injured organ in our study (40%). This is in concurrence with a study done by Jansen JO et al<sup>8</sup> and Isenhour JL et al<sup>9</sup>, who stated that the most commonly injured organ in blunt abdominal trauma was the spleen (50%). This was also the conclusion drawn by Cahir JG et al<sup>10</sup>.

Anderson WS et al<sup>11</sup> studied 68 patients, of which 47 patients underwent computed tomography for evaluation of abdominal injuries. Grade II injuries were the commonest in their study (45%), followed by grade III and grade IV injuries with an incidence of 21% & 19% respectively. Grade I and grade V injuries were detected in 6 and 1 case respectively with an incidence of 13% and 9% each. In our study, there were 9 patients who had renal injuries. Of these, 33.3 % (4 patients) had grade III injuries. 14% patients had Grade I and II and Grade IV and V injuries each.

Laal Met al<sup>12</sup> studied 16,573 patients of which 106 patients had renal injuries. Grade I injuries were seen in 62.3% patients followed by grade II and grade III in 14% & 10% respectively. Grade IV and grade V injuries were seen in 8 patients each (7.5%)

In our study there were 2 patients with mesenteric injury who had mesenteric haziness and fat stranding on CT. These were nonspecific findings, but correlated with the mesenteric tear found intra operatively in one patient.

The male: female ratio in our study was 6.1:1 whereas in a study done by Michael Federle et al<sup>1</sup> the male: female ratio was 9:1.

**CONCLUSION**

Computed tomography (CT) remains the diagnostic modality of choice in the evaluation of patients with abdominal trauma as it helps in making decision regarding operative and non-operative treatment thus reducing mortality and morbidity.

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