

Original research article

## A Clinical Study of Blunt Trauma Abdomen in a Tertiary Care Teaching Hospital

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### Abstract

**Background:** Blunt abdominal trauma has become common recently due to the increased number of vehicles plying on roads. It is the third most common form of injury in road traffic accidents after orthopedic injuries and head injuries. Since most of the victims are young aged early diagnosis and management are crucial for the patients. We in the current study tried to evaluate the clinical presentation and management of the blunt abdominal trauma cases arriving at our tertiary care hospital.

**Methods:** All the cases of blunt abdominal trauma admitted and managed at our tertiary care institute were included. A detailed physical examination was done along with clinical history. Investigations included X-rays, ultrasonography, and CT if required. Laboratory tests were conducted to arrive at a diagnosis. The available data were analyzed using statistical software.

**Results:** The commonest cause of blunt abdominal injury was road traffic accidents n=38 cases. Among these cases n=13 cases were injured in car accidents, n=18 in a motorcycle accidents and n=7 were pedestrians hit by vehicles. This study found the most common organ involved in injury was the liver in 28.33% of cases, followed by the spleen in 20% of cases. Small bowel injuries occurred in 15% of cases and mesentery was injured in 11.67% of cases. The urinary bladder was the least commonly involved organ in 1.67% of cases. N=40(66.67%) cases were managed surgically and n=20(33.33%) cases were managed conservatively.

**Conclusion:** Blunt abdominal trauma is very common, especially among young males. Two important organs injured frequently in blunt abdominal trauma included the liver and spleen. Because the clinical presentation is variable trauma surgeons should depend on physical findings along with diagnostic investigations. The need for early detection of the amount of damage by suitable imaging (X-ray, ultrasound, or CT abdomen) is critical

**Keywords:** Blunt trauma abdomen, organ injury, Road traffic accidents.

### Introduction

Abdominal injuries are a leading source of morbidity and mortality; timely detection and treatment of intra-abdominal injuries are critical for avoiding morbidity and death. <sup>[1]</sup> Crushing, deforming, stretching, and shearing forces are hypothesized to be involved in blunt injuries. The magnitude of these forces is proportional to their rate of acceleration and deceleration, as well as the impact direction. <sup>[2]</sup> Falling from a great height, being assaulted with blunt items, sports injuries, and bomb blasts can all result in blunt abdominal injuries. <sup>[3]</sup> Improved

resuscitation, assessment, and treatment can reduce unnecessary deaths and complications. Rapid resuscitation is required to preserve the unstable but salvageable patient with abdominal injuries. <sup>[4]</sup> An essential purpose of the examination is to ensure an accurate diagnosis and minimize unnecessary surgery. <sup>[5]</sup> To address imminent life-threatening conditions, rapid use of diagnostic techniques and aggressive therapy should be used. In the examination of blunt injuries to the abdomen, focused assessment with sonography for trauma, or FAST, has emerged as a valuable method. In the absence of or inability to fund diagnostic modalities, it is necessary to expose the abdomen for diagnosis rather than wait. <sup>[6]</sup> After physical trauma to the abdomen, concealed bleeding is the second most common cause of death, and undetected abdominal injuries are a common source of morbidity and late mortality in patients who survive the initial injury period. Reduced morbidity and mortality can be achieved by maintaining a high level of awareness and initiating adequate treatment as soon as possible. <sup>[7, 8]</sup> Hemorrhage and sepsis are the most common consequences of abdominal injuries. And the most common cause of early death after abdominal injuries. Blood is usually a non-irritating substance, and enormous amounts can be trapped within the abdominal cavity before any clinical indications appear. Solid organs, such as the spleen and liver, are commonly injured by blunt trauma. <sup>[9]</sup> Within 48 hours after an injury, sepsis is the most likely cause of mortality. The most common cause of intra-abdominal sepsis after trauma is hollow viscus damage, which results in the leakage of gut contents. This occurs commonly after penetrating trauma. The affected organs are easier to anticipate in stab wounds since the injuries are generally contained to the tract. <sup>[10]</sup> Intraabdominal, retroperitoneal, and pelvic hollow viscera can all burst. <sup>[11, 12]</sup> With this background we in the current study tried to evaluate the incidence, clinical presentation, and management of cases of blunt abdominal trauma arriving at the Department of General surgery of our tertiary care Institute.

### **Material and Methods**

This cross-sectional study was conducted in the Department of General Surgery, Malla Reddy Institute of Medical Sciences, Hyderabad, Telangana State. Institutional Ethical approval was obtained for the study. Written consent was obtained from all the participants of the study. The sampling method was convenient sampling.

### ***Inclusion Criteria***

1. Successive cases of blunt abdominal trauma
2. Aged above 18 years
3. Males and Females
4. Sports-related abdominal trauma
5. Willing to participate in the study voluntarily

### ***Exclusion criteria***

1. Penetrating abdominal wounds
2. Associated with head injuries
3. Associated with orthopedic injuries
4. Pregnant females
5. Those not as per inclusion criteria

The history of the nature of trauma was obtained by the interview of the patient's relative or accompanying person a detailed note of all points was done. A complete clinical examination of the patient was done. After initial resuscitation and hemodynamic stability of the patient, a complete assessment of injuries was carried out. Documentation was done regarding the demographic profile, history, and clinical findings. Depending on the clinical findings the patients were subjected to the diagnosis which included an X-ray chest/abdomen, and focused

assessment with sonography for trauma and contrast-enhanced CT if required. The decision for operative management or nonoperative management was based on the diagnosis, hemodynamic stability, and CT findings of the abdomen. The patients selected for non-operative management were placed strictly on bedrest and hourly examination of vital parameters and repeat examination of the abdomen were done. Cases with surgical management were done as per the standard protocol and the intraoperative findings and the cases were followed up till their discharge. The postoperative morbidity and duration of hospital stay and complications were recorded. All the available data was uploaded on an MS Excel spreadsheet and analyses with SPSS version 21 in windows format. The continuous variables were represented as mean and standard deviations and categorical variables as numbers and percentages. To determine the significance between the two groups Chi-square test/Fisher's extraction test was used.

## Results

Based on the inclusion and exclusion criteria n=60 consecutive cases of abdominal trauma were included in the study. Out of these cases, n=42(70%) were male patients and n=18(30%) were female cases. The male to female ratio was approximately 2.5: 1. The youngest case in this study was an 18-year-old male and the oldest case was 63 years old male. The mean age of the cases in the study was 28.5 years. 35% of the cases of the study were belonging to the age group 18 – 30 years the details of the demographic distribution of the cases in the study are given in table 1.

**Table 1: Demographic profile of the cases included in the study**

Age group	Male	Female	Total (Percentage)
18 – 20	09	06	15 (25.00)
21 – 30	15	05	20 (33.33)
31 – 40	08	03	11 (18.33)
41 – 50	05	02	07 (11.67)
51 – 60	03	02	05 (08.33)
> 60	02	00	02 (03.33)
Total	42	18	60 (100.00)

The commonest cause of blunt abdominal injury was road traffic accidents n=38 cases. Among these cases n=13 cases were injured in car accidents, n=18 in a motorcycle accidents and n=7 were pedestrians hit by vehicles. Among these cases, n=10 sustained a direct strong blow to the abdomen. Fall from height was found in n=20 cases among these cases n=8 had fallen from the bed when asleep and n=6 cases were injured by falling from a tree when working in a forest n=5 had fallen from the terrace while flying kites and n=1 had to fall from a horse. A detailed depiction of the cases and percentages are given in table 2.

**Table 2: The etiology of blunt abdominal injury in cases of the study**

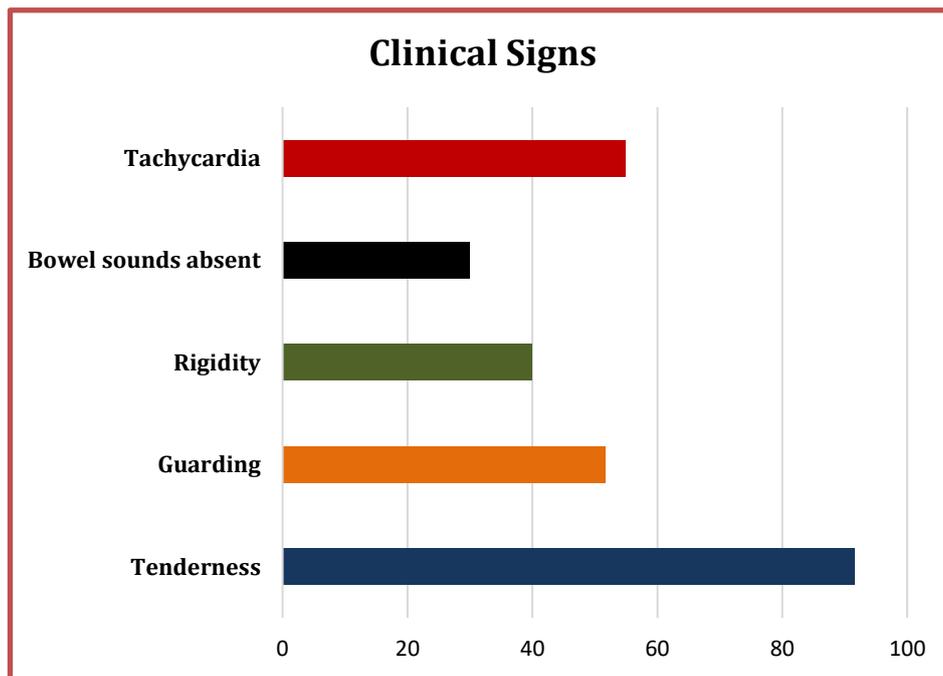
<i>Cause of Injury</i>	<i>Frequency</i>	<i>Percentage</i>
Road traffic accidents	38	63.33
Fall from height	12	20.00
Assault	02	03.33
Sports-related	03	05.00
Others	05	08.33
Total	60	100.0

On admission n=58 patients complained of abdominal tenderness of varying intensity, n=2 cases were unconscious and unable to respond. N=20 cases had abdominal bruises and n=4 suffered compression by car seat belts. Abdominal distension was found in n=30 cases, and vomiting was reported in n=19 cases. Evidence of GI bleeding was found in n=3 cases. The details have been depicted in table 3.

**Table 3: Symptoms recorded in the cases of the study**

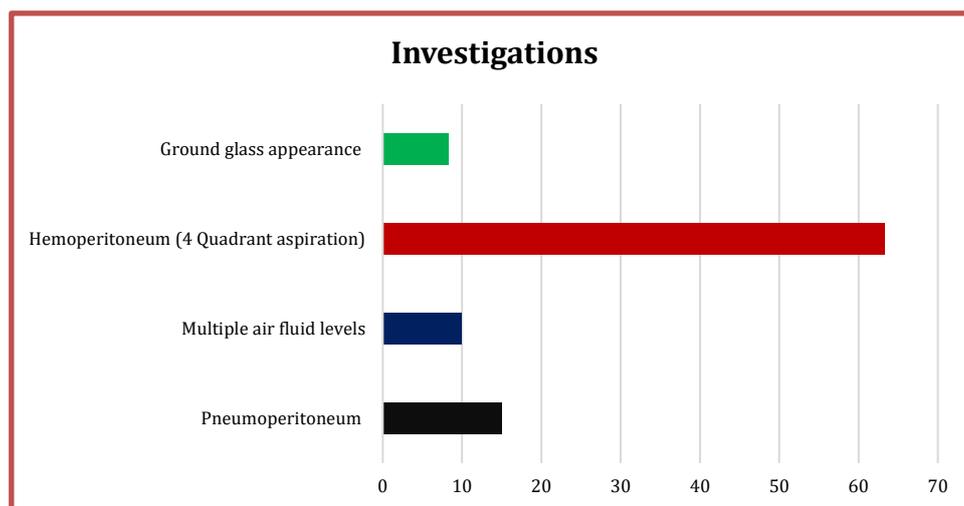
<i>Symptoms</i>	<i>Frequency</i>	<i>Percentage</i>
Abdominal Pain	58	96.67
Abdominal Distension	30	50.00
Vomiting	19	31.67
Hematuria	03	05.00
Others	05	08.33
Total	60	100.0

The common sign found in the patient was tenderness of the abdomen in n=55 cases and guarding in n=31 cases. Tachycardia was found in n=33 cases, rigidity in n=24 cases, and absent bowel sound in n=18 cases. The percentage-wise distribution of the signs in the study has been depicted in Graph 1.



**Graph 1: shows the clinical signs in the cases of the study**

The patients were subjected to various investigations and the following results were obtained. Pneumoperitoneum was found in n=9 cases, multiple air-fluid levels in n=6 cases. Hemoperitoneum diagnosed by 4 quadrant aspiration was found in n=38 cases and ground glass appearance was found in n=5 cases. The percentage-wise distribution of the results of investigations has been depicted in graph 2.



**Graph 2: Investigations in the cases of the study**

The current study found the most common organ involved in injury was the liver in 28.33% of cases, followed by the spleen in 20% of cases. Small bowel injuries occurred in 15% of cases and mesentery was injured in 11.67% of cases. The urinary bladder was the least commonly involved organ in 1.67% of cases. The detailed distribution of the injuries to the organs has been depicted in table 4.

**Table 4: Showing the organs involved in blunt abdominal injuries**

<i>Organs involved</i>	<i>Frequency</i>	<i>Percentage</i>
Spleen	12	20.00
Liver	17	28.33
Small Bowel	09	15.00
Mesentery	07	11.67
Pancreas	02	03.33
Large Bowel	08	13.33
Urinary bladder	01	01.67
Retroperitoneal hematoma	03	05.00
Combined	07	11.66

Out of n=60 cases, n=40(66.67%) cases were managed surgically and n=20(33.33%) cases were managed conservatively. Out of the n=40 cases managed surgically, 20% developed complications of wound infection followed by 7.5% cases developed pneumonia. Wound dehiscence, anastomotic leakage, and intestinal obstruction were found in 2.5% of cases each. The wound complications have been represented in table 5.

**Table 5: Postoperative complications in the cases of the study**

<i>complications</i>	<i>Frequency</i>	<i>Percentage</i>
Wound infections	08	20.00
Wound dehiscence	01	02.50
Pneumonia	03	07.50
Anastomotic leakage	01	02.50
Pelvic abscess	00	00.00
Intestinal obstruction	01	02.50

## Discussion

Our research revealed that most instances of abdominal trauma occur in the second and third year of life (18–40 years). Most of the incidents occurred throughout one's first four decades of life. Even though no age group was spared from acute abdominal injuries. Because they are more exposed to the perils of job and road traffic, young adults are more vulnerable to blunt abdominal injuries. In the current study, we found the males to be affected in 70% of cases and females in 30% of cases. The male to female ratio was 2.5:1. Tripathi *et al.*,<sup>[13]</sup> reported a ratio of 4.4:1 in Uttarakhand State. The mean age of the cases in the study was 28.5 years. Curie *et al.*,<sup>[14]</sup> found the maximum number of cases with males and the mean age of 39 years. Allen *et al.*,<sup>[15]</sup> have found the maximum cases of 28% in the age of 20 – 29 years in agreement with the observations of the present study. The most common cause of blunt abdominal injury was road traffic accidents accounting for 63.33% of cases which is comparable to other similar studies. Mohapatra *et al.*,<sup>[16]</sup> found 62% of cases of blunt abdominal injuries were reported due to RTA. M Goel *et al.*,<sup>[17]</sup> also reported 62% of abdominal injuries are due to RTA. Due to the increased number of motor vehicles plying on the roads, vehicle collisions, especially in urban areas is the common cause of abdominal trauma. Seat belts in cars can reduce head and chest injuries however, they pose threat to organs such as the intestine and pancreas due to sudden compression by the belt across the abdomen. Falls from heights caused abdominal injuries in 20% of cases. M Goel *et al.*,<sup>[17]</sup> reported 22% of cases of abdominal trauma occurred due to a fall from height. Pain abdomen was the common symptom reported in 96.67% of cases and abdominal tenderness was noted in 91.66% of cases. Abdominal guarding was found in 51.67% of cases and abdominal rigidity was found in 40% of cases. Srihari *et al.*,<sup>[18]</sup> found the most common symptom was pain abdomen (96.6%), followed by abdominal tenderness (85%). Abdominal distension was present in (50%) followed by vomiting and hematuria. Magray *et al.*,<sup>[19]</sup> abdominal pain was the most common symptom observed in blunt abdominal trauma patients (77%). Abdominal tenderness was the most common sign observed (72%). The two important involved in the blunt abdominal trauma in our study were the liver 28.33% and the spleen 20.00%. The mix of organs injured is determined by the location and degree of the hit, as well as the victim's posture during the injury.<sup>[20]</sup> The organs in the retroperitoneal area might bleed excessively, resulting in hypovolemic shock before the patient is admitted to the emergency department, which is why abdominal injuries are life-threatening. The liver is especially sensitive due to its size and location, and roughly 5% of individuals with abdominal trauma have liver impairment.<sup>[21]</sup> N=40(66.67%) cases were managed surgically and n=20(33.33%) cases were managed conservatively the common surgeries performed in patients included splenectomy, primary closure of perforation, resection, and anastomosis. Similar surgeries were required in patients with blunt trauma abdomen as reported by Siddique *et al.*,<sup>[22]</sup> and 41(41%) were managed surgically. Wound infection was the common complication it was managed adequately with the removal of sutures, debridement, and regular dressing change along with antibiotic coverage.

## Conclusion

Blunt abdominal trauma is very common, especially among young males. Two important organs injured frequently in blunt abdominal trauma included the liver and spleen. Because the clinical presentation is variable trauma surgeons should depend on physical findings along with diagnostic investigations. The need for early detection of the amount of damage by suitable imaging (X-ray, ultrasound, or CT abdomen) is critical. For hemodynamically stable patients with solid organ injury, conservative management can be considered. The importance of appropriate therapies, blood transfusions, and surgical procedures in therapy and management cannot be overstated.

## References

1. Schwartz's principles of surgery, 9<sup>th</sup> edition, chapter 9<sup>th</sup>, Schwartz, Seymour I, Brunnicardi, F Charles. New York: McGraw-Hill Medical Pub. Division, c201; 1928:135- 196.
2. Ahmet K, Tongue Y. Blunt abdominal trauma: evaluation of diagnostic options and surgical outcomes. Turkish J Trauma Emerg Surg 2008; 14:205-10.
3. Townsend CM. Sabiston Textbook of Surgery. 19<sup>th</sup> ed., Vol. 19. Philadelphia, PA: Saunders; 2012; p. 455-59.
4. Meyer AA, Crass RA. Abdominal trauma. Surg Clin North Am 1982; 62:105-11.
5. Davis JJ, Cohn I Jr, Nance FC. Diagnosis and management of blunt abdominal trauma. Ann Surg 1976; 183:672-78.
6. Dongo AE, Kesieme EB, Irabor DO, Ladipo JK. A Review of Posttraumatic Bowel Injuries in Ibadan. ISRN Surg. 2011; 2011:1-4.
7. JLK, PNM, Mathur K, FSM. A retrospective study of blunt trauma abdomen. J Evol Med Dent Sci. 2015; 4:10263-39.
8. Jansen JO, Yule SR, Loudon MA. Investigation of blunt abdominal trauma. BMJ (Clinical Res ed). 2008; 336:938-42.
9. Weledji P, Tambe J. Perspectives on the Management of Abdominal Trauma. J Univer Surg. 2018; 6 (2).
10. Hassan R, Aziz AA. Computed tomography (CT) imaging of injuries from blunt abdominal trauma: a pictorial essay. The Malaysian journal of medical sciences: MJMS. 2010; 17:29.
11. Kendall J, Kestler AM, Whitaker KT, Adkisson MM, Haukoos JS. Blunt abdominal trauma patients are at very low risk for intra-abdominal injury after emergency department observation. Western Journal of Emergency Medicine. 2011;12(4): 496-504.
12. Baradaran H, Salimi J, Nassaji-Zavareh M, Rabbani AK. Epidemiological study of patients with penetrating abdominal trauma in Tehran-Iran. Acta Medica Iranica. 2007; 45:305-08.
13. Tripathi MD, Srivastava RD, Nagar AM, Pratap VK, Dwivedi SC. Blunt abdominal trauma with special reference to early detection of visceral injuries. Indian I Surg 1991; 53:179-84.
14. Curie RA, Watne AL. Blunt abdominal trauma. Am J Surg 1964; 107:321-27.
15. Allen RB, Curry GJ. Abdominal trauma; a study of 297 consecutive cases. Am J Surg 1957; 93:398-404.
16. Mohapatra S, Prasad S, Rao KR, Bastia B. Options in the management of solid visceral injuries from trauma. Indian J Surg Blunt Abdom 2003; 65:263-68.
17. Goyal M, Kumar L, Dobhal D. A Clinical Study of Blunt Trauma Abdomen in a Tertiary Care Hospital of Uttarakhand. Int J Sci Stud 2020;8(3):39-43.
18. Srihari V, Jayaram J, Sabira S. A Clinical Study of Blunt Injury Abdomen. Paripex Indian Journal of Research. 2015;4(1):123-25.
19. Magray M, Shahdhar M, Wani M, Shafi M, Sheikh J, Wani H. The Role of Computed Tomography in Selective Management of Blunt Abdominal Trauma Patients in A Single Tertiary Care Centre in Northern India. The Internet Journal of Surgery. 2013;30(2):1-6.
20. Holmes JF, Offerman SR, Chang CH, Randel BE, Hahn DD, Frankovsky MJ, *et al.* Performance of helical computed tomography without oral contrast for the detection of gastrointestinal injuries. Ann Emerg Med 2004; 43:120-28.
21. Fabian TC, Bee TK. Liver and biliary trauma. In: Moore EJ, Feliciano DV, Mattox KL, editors. Trauma. New York: McGraw-Hill, Medical Publications; 2004; p. 637.
22. Siddique MA, Rahman MK, Hannan AB. Study of abdominal injury: An analysis of 50 cases. TAJ 2004; 17:84-8.