

## PATTERN OF INJURIES AND FINDINGS IN BLUNT INJURY ABDOMEN: A PROSPECTIVE STUDY

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### Abstract

**Background:** Since blunt abdominal trauma has a high morbidity and mortality rate globally, it requires meticulous assessment and management for the best possible result. Considering the scarcity of resources, the financial burden is also an essential factor for its effective management. So, this study aimed to determine the pattern of injuries and findings among patients with Blunt injury abdomen admitted to a tertiary care centre. **Materials and Methods:** A one-year prospective study was conducted among patients admitted for Blunt injury abdomen. Their demographic details like age and gender were collected along with the pattern of injuries and management. They were followed up to discharge and the outcome was assessed. The details were analyzed using descriptive statistics by SPSS software version 21. **Result:** The current study found that solid viscera injuries from blunt abdominal trauma are more common in the over-30 age group (54.8%), with a 93.54% male preponderance. The most frequent type of injury (75%), after unintentional falls, was RTA. The liver (32.3%) and spleen (22.6%) are the most often injured viscera, respectively. The mortality rate reported to the tertiary care centre was 6.5% among Blunt Abdominal Trauma patients. **Conclusion:** Road Traffic accidents were the most common mode of injury and the organ frequently affected was the liver.

## INTRODUCTION

A significant morbidity rate is linked to blunt abdominal trauma (BAT), which can affect individuals of all ages.<sup>[1]</sup> Blunt abdominal trauma can produce contusions, injure the bowel, spleen, liver, or intestines, or injure the internal organs, leading to internal bleeding.<sup>[2]</sup> Additionally, patients may have extra-abdominal injuries, such as trauma to their extremities.<sup>[3]</sup> Abdominal trauma mortality rates are claimed to range from 1 to 20% globally, which is probably due to diversity in the populations that are recorded.<sup>[4]</sup>

The abdomen lacks any bone cage to protect its organs and viscera from trauma, in contrast to the thoracic and cranial chambers, which are shielded from harm by the rib cage and skull. The World Health Organisation (WHO) estimates that over five million people worldwide die from injuries each year. They make up 9% of all deaths worldwide. In developing nations like India, trauma from vehicle accidents and assaults is a leading cause of illness and mortality.<sup>[5]</sup>

The two most often affected organs from forceful trauma are the liver, spleen, and kidney. The primary

determinants of treatment technique are the patient's hemodynamic status, the degree of injury, and radiological and clinical evaluations.<sup>[6]</sup> BAT may lead to potentially fatal consequences in the near and far future.<sup>[7]</sup> Since patients may have distracting injuries and altered mental status, a clinical examination alone may not always be sufficient. In patients with little and clinically observable indications of abdominal injury, initial resuscitation combined with focused assessment using sonography in trauma (FAST) and computed tomography (CT) abdomen is desirable and part of established protocols. The majority of blunt abdominal trauma cases involve overlooked intra-abdominal injuries and hidden haemorrhage, which raises morbidity and fatality rates, particularly for those who survive the first stages of an injury. Despite the most advanced treatments and advancements in supportive and diagnostic care, there is still a significant rate of morbidity and mortality.<sup>[8]</sup> So, this study aimed to determine the pattern of injuries and findings among patients with Blunt injury abdomen admitted to a tertiary care centre.

## Objective

- To determine the pattern of injuries and findings among patients with Blunt injury abdomen admitted in a tertiary care centre.

## MATERIALS AND METHODS

This was a one-year prospective study of the operative management among patients presenting with blunt trauma abdomen to the General Surgery department for the duration from January 2023 to December 2023 in the tertiary care centre, Tamil Nadu.

This study covers all patients receiving surgery in the accident and emergency room (A&E), general surgery department, and surgical intensive care units (ICUs) who have been diagnosed with blunt abdominal trauma (BAT). Patients who were operated on at another medical facility and then referred to a tertiary care centre, who were on non-operative management, who were unable to provide a complete history of the trauma, and who lacked a companion relative to offer consent were not included in the study. For this study, thirty-one patients with blunt abdominal trauma who were admitted to Trichy SRM Medical College Hospital's surgical units between January 2023 and December 2023 were included. The study was approved by the Institutional Ethical Committee, Trichy SRM Medical College Hospital.

The patients with a clear history and clinical signs suggesting visceral injury were included in the case selection process; these findings were later corroborated by tests, laparotomies, and autopsies. A thorough history was obtained detailing the type and extent of the accident. The clinical features were examined in detail, paying particular attention to any concomitant injuries such as fractures to the limbs, chest injuries, and head injuries. In every case, basic tests such as blood grouping, blood urea, blood Hb, blood sugar, and serum creatinine were performed. The Glasgow Coma Scale (GCS) was used to categorize patients with head trauma. There were three categories: mild (13 – 15), moderate (9 - 12), and severe (3 to 8). Every patient had surgery and received follow-up care for 30 days or until mortality. For assessment, patients were seen on the first, third, seventh, and thirty days. Data was gathered using a pre-tested questionnaire.

Sociodemographic information (age and sex), the mechanism of the injury, pre-hospital care, the amount of time between the injury and admission, systolic blood pressure (BP), pulse rate (PR), the type, etiology, and pattern of the injury, any associated extra-abdominal injuries, the course of treatment, and any complications upon arrival are all included in the questionnaire. The outcomes included mortality, length of stay (LOS), and post-operative complications.

Peritoneal tapping was performed in all four quadrants and on all patients with a history of blunt abdominal injuries under aseptic precaution using a

sterile 18 G needle. A methodical approach was used during the laparotomy, including an inspection of every intraabdominal organ. The patients were kept on aspiration, nasogastric, and antibiotics following surgery. Particular attention was paid to the detection and appropriate treatment of any postoperative problems.

Statistical data analysis was done using Microsoft Excel and SPSS software, version 21.0. Frequency tables and proportions were used to summarise the data for categorical variables. Ranges, medians, and inter-quartile ranges (IQRs) were utilized for continuous variables. P-values of less than 0.05 were deemed significant for categorical variables, which were calculated using chi-square (X<sup>2</sup>) and Fisher's exact tests.

## RESULTS

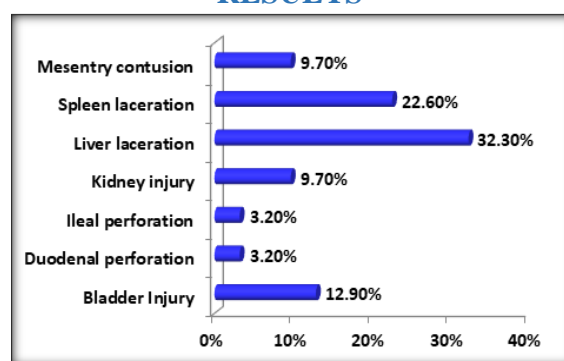


Figure 1: Pattern of Injuries among Blunt Abdominal Trauma patients



Figure 2: Post-operative complications (n = 31)

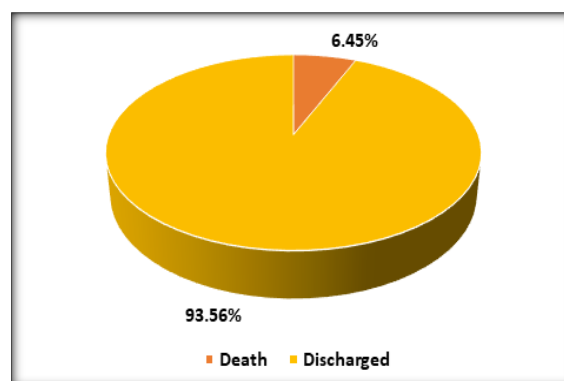


Figure 3: Mortality among Blunt Abdominal Trauma (n=31)

This study was conducted among thirty-one patients admitted with blunt abdominal trauma in the surgical department for the period of one year. The mean age of patients was 33.419±10.37 years (18 – 60 years) and the median age was 32 years. 54.8% of the BAT patients belonged to the age group of more than thirty years. Most of the BAT patients were male patients. The common mode of injury to be BAT was accidental fall (19.42%), Bull gore (12.9%), Road traffic accident (64.5%), and wall collapse (3.2%). [Table 1] describes the descriptive data of BAT patients.

[Figure 1] shows the pattern of injuries among BAT patients. The most common organ that got injured was the liver. The pattern of injuries among BAT was Liver laceration (32.3%), spleen laceration (22.6%), bladder injury (12.9%), kidney injury (9.7%), mesentery contusion (9.7%), ileal perforation (3.2%) and duodenal perforation (3.2%). The patients with liver lacerations were treated surgically by gel foam packing and two of them (6.5%) were managed using

Hepatorraphy. Splenectomy was used to manage spleen laceration patients and ileal, and duodenal perforation were managed by primary closure.

The injuries associated with BAT were mesenteric injury, retroperitoneal hematoma, and rib fracture among 3.2%, 3.2%, and 6.5% of patients respectively.

[Figure 2] shows the post-operative complication among BAT patients. Two of them developed wound infection. Intra-abdominal abscess and wound dehiscence were also reported.

[Figure 3] shows the mortality among BAT patients. The mortality of BAT patients in this current study was 6.5%.

[Table 2] exhibits the association between variables with mortality. The variables like age group, gender, and pattern of injury do not show any significant association with mortality. The mode of injury like Road traffic accidents and wall collapses were significantly associated with mortality.

**Table 1: Descriptive data of participants.**

| S No | Variables      | Frequency             | Proportion |        |
|------|----------------|-----------------------|------------|--------|
| 1    | Age group      | > 30 years            | 17         | 54.8%  |
|      |                | ≤ 30 years            | 14         | 45.2%  |
| 2    | Gender         | Male                  | 29         | 93.54% |
|      |                | Female                | 2          | 6.56%  |
| 3    | Mode of Injury | Accidental fall       | 6          | 19.42% |
|      |                | Bull gore             | 4          | 12.9%  |
|      |                | Road Traffic Accident | 20         | 64.5%  |
|      |                | Wall collapse         | 1          | 3.2%   |

**Table 2: Association between variables with mortality**

| S No              | Variables         | Frequency             | Proportion | p-value  |       |
|-------------------|-------------------|-----------------------|------------|----------|-------|
| 1                 | Age group         | > 30 years            | 16 (94.1%) | 1 (5.9%) | 0.887 |
|                   |                   | ≤ 30 years            | 13 (92.9%) | 1 (7.1%) |       |
| 2                 | Gender            | Male                  | 27 (93.1%) | 2 (6.9%) | 0.701 |
|                   |                   | Female                | 2 (100%)   | 0        |       |
| 3                 | Mode of injury    | Accidental fall       | 6 (100%)   | 0        | 0.002 |
|                   |                   | Bull gore             | 4 (100%)   | 0        |       |
|                   |                   | Road Traffic Accident | 19 (95%)   | 1 (5%)   |       |
|                   |                   | Wall collapse         | 0          | 1 (100%) |       |
| 4                 | Pattern of injury | Bladder injury        | 4 (100%)   | 0        | 0.952 |
|                   |                   | Duodenal perforation  | 1 (100%)   | 0        |       |
|                   |                   | Ileal perforation     | 1 (100%)   | 0        |       |
|                   |                   | Kidney injury         | 3 (100%)   | 0        |       |
|                   |                   | Laceration liver      | 11 (91.7%) | 1 (8.3%) |       |
|                   |                   | Mesentery contusion   | 3 (100%)   | 0        |       |
| Laceration spleen | 6 (85.7%)         | 1 (14.3%)             |            |          |       |

## DISCUSSION

This study was conducted among thirty-one Blunt abdominal trauma patients admitted to the Surgery department to determine the pattern of injuries.

**Demographic variables:** Our study described the mean age group of BAT patients as 33.419±10.37 years and 93.4% of them were males.

In a four-year retrospective review, Arumugam S et al,<sup>[9]</sup> reported that the majority of participants were male (93%), with a mean age of 30.6 ± 13 years which was similar to this study. Ghimire R et al,<sup>[10]</sup> also reported that the male patients were the most commonly injured due to Blunt trauma similar to our

study. Ntundu S. H. et al,<sup>[11]</sup> also showed that the male patients were frequently affected by Blunt trauma. Ntundu S. H. et al,<sup>[11]</sup> showed that the common age group involved in BAT was 21 – 40 years which was similar to our study results.

**Mode of injury:** Our study explained that the common mode of injury to be BAT was Road traffic accident (64.5%), accidental fall (19.42%), Bull gore (12.9%), and wall collapse (3.2%).

Arumugam S et al,<sup>[9]</sup> and Ghimire R et al,<sup>[10]</sup> reported that the most common mechanism of injury was traffic accidents (61%) followed by falls from heights (25%) and falls of heavy objects (7%). Our study also depicted that the common mode was RTA, however,

our study population did not report falls from height and heavy objects.

Road traffic accidents were the most common cause of injury, according to Ntundu S. H. et al,<sup>[11]</sup> Jayan N P et al,<sup>[12]</sup> and Verma et al,<sup>[6]</sup> which shows similar findings to our study results.

**Pattern of injury:** Our study found that the pattern of injuries among BAT were Liver laceration (32.3%), spleen laceration (22.6%), bladder injury (12.9%), kidney injury (9.7%), mesentery contusion (9.7%), ileal perforation (3.2%) and duodenal perforation (3.2%). Arumugam S et al,<sup>[9]</sup> reported that the most frequently affected organs were the kidney (18%), spleen (32%), and liver (36%). Chest (35%), musculoskeletal (32%), and head traumas (24%), were the most often reported extra-abdominal injuries. Ntundu S. H. et al,<sup>[11]</sup> and Ghimire R et al,<sup>[10]</sup> found that among blunt injuries, the spleen and small bowel were the most frequently affected organs which shows controversial results compared with our study. The proportion of injuries varied with our study might be due to patients admitted during the data collection and sample size.

The liver was the most often injured organ in both the adult (38.8%) and pediatric (40.9%) populations, according to a retrospective study by Bhatia V et al,<sup>[13]</sup> which was similar to our study results. Larsen J W et al,<sup>[14]</sup> from Norway, Verma et al,<sup>[6]</sup> from Haryana and Jayan N P et al,<sup>[12]</sup> from Kerala also reported that the common organ to be injured in BAT was the liver which shows similar results of our study. An autopsy-based study by Reddy N et al,<sup>[15]</sup> and Ranjan S K et al,<sup>[16]</sup> reported that the most common organ was the liver which was similar to our study.

Sisodiya S et al,<sup>[8]</sup> reported the most external injuries noted along with BAT was rib fractures which was similar to our study results. Our study reported the common consequence was wound infection followed by intra-abdominal abscess and wound dehiscence. The most common consequences were urinary tract infection (1.4%), pneumonia (3%), and wound infection (3.8%) reported by Bhatia V et al.<sup>[13]</sup>

**Mortality:** The mortality of BAT patients included in this study was 6.5%. Arumugam S et al,<sup>[9]</sup> showed that the overall death rate was 8.3%, similar to our study results. Ntundu S. H. et al,<sup>[11]</sup> and Larsen J W et al,<sup>[14]</sup> reported 13.2% and 12.5% mortality among BAT patients respectively which shows a higher proportion of mortality compared with our study. This contrasting result was due to the sample size included in the study as Larsen J W et al,<sup>[14]</sup> and Ntundu S. H. et al included 7202 patients and 136 patients respectively. Ghimire R et al,<sup>[10]</sup> and Jayan N P et al,<sup>[12]</sup> reported that the mortality rate was 2.24% and 3.3% respectively which was low compared with our study.

## CONCLUSION

Our study highlighted that the male population was commonly involved in BAT and the commonest mode of injury was Road traffic accidents. The most common injured organs during BAT were the liver and spleen. The frequently reported extra abdominal injury was a rib fracture. The mortality rate of included BAT patients was 6.5% which was mainly due to intra-abdominal abscess and wound dehiscence.

**Limitations:** The larger sample size might be considered for generalizing results.

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