ISSN: 0975-3583,0976-2833 VOL16, ISSUE 03, 2025

INCIDENCE AND CLINICAL PROFILE OF SOLID ORGAN INJURY IN BLUNT ABDOMINAL TRAUMA: A PROSPECTIVE STUDY

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ABSTRACT AND KEYWORDS

Introduction: The rise in motor vehicle reliance and technological advancements has led to a rise in traumatic injuries, particularly blunt abdominal trauma (BAT), a major cause of morbidity andmortality globally, especially in developing countries like India. Motor vehicle accidents (MVAs)account for the majority of BAT cases, with injuries to solid organs like the liver, spleen, and kidneysoften undiagnosed, leading to severe complications and increased mortality.

Materials and Methods: A prospective observational study was conducted in the Department ofGeneral Surgery at a tertiary care center in Tamil Nadu from November 2023 to September 2024.The study included 125 patients aged 18 years and older with blunt abdominal trauma, excluding those with penetrating injuries. Data were collected through detailed histories, clinicalexaminations, and relevant investigations including Focused Assessment with Sonography forTrauma (FAST), hematological tests, and imaging studies like ultrasonography and CT scans.

Results: The study population comprised 74% males, with the majority aged 29-38 years. Roadtraffic accidents were the leading cause of trauma (73%). Solid organ injuries were observed in 80%of cases, with the liver being the most frequently injured organ (31%), followed by the spleen (22%).Associated injuries included rib fractures (16%) and head injuries (12%). Conservative managementwas effective in hemodynamically stable patients with minor liver and spleen injuries.

Conclusion: Blunt abdominal trauma primarily affects younger males, with motor vehicle accidentsbeing the predominant cause. The liver and spleen are the most commonly injured organs. Earlydiagnosis through repeated clinical examinations and appropriate imaging is crucial to improveoutcomes. Conservative management is recommended for stable patients with minor solid organinjuries. Public health interventions focusing on road safety and improved trauma care facilities areessential to reduce the incidence and impact of such injuries.

Keywords: Blunt abdominal trauma, solid organ injury, liver injury, spleen injury, motor vehicleaccidents, trauma management, conservative management, road safety.

INTRODUCTION

With the rapid advancements in technology and the increasing reliance on motor vehicles, themodern world has seen a significant rise in the incidence of traumatic

ISSN: 0975-3583,0976-2833 VOL16, ISSUE 03, 2025

injuries, particularly those involving blunt abdominal trauma (BAT)[1]. Blunt abdominal trauma has become a leading cause of morbidity and mortality worldwide, especially in developing countries like India[2]. Motor vehicle accidents (MVAs) are responsible for 75 to 80% of all cases of blunt abdominal trauma, making them the most common cause of such injuries[3]. In India, the mortality rates for trauma are alarmingly high, nearly 20 times greater than those observed in Western countries[4]. Blunt abdominal trauma often presents a diagnostic challenge due to the subtle and often delayed presentation of symptoms[5]. Injuries to solid organs such as the liver, spleen, and kidneys are common in such cases, but they are frequently missed during the initial assessment[6]. This delay in diagnosis and subsequent treatment can lead to severe complications and increased mortality[7].The increasing prevalence of road traffic accidents, falls, and other forms of blunt traumanecessitates a thorough understanding of the incidence and clinical profile of solid organ injuries. This study aims to evaluate the incidence of solid organ injuries in patients presenting with blunt abdominal trauma, with a focus on improving early diagnosis and management strategies to reduce morbidity and mortality[8]. By identifying the most frequently injured organs and understanding thecommon mechanisms of injury, we can better tailor our clinical approach to these patients andenhance outcomes in trauma care[9].

AIM AND OBJECTIVES

Aim:

To evaluate the incidence and patterns of solid organ injuries in patients presenting with

blunt abdominal trauma.

Objectives:

1. To determine the frequency of solid organ injuries (liver, spleen, kidney, pancreas) in patientswith blunt abdominal trauma.

2. To analyze the demographic and clinical characteristics of patients with solid organ injuries due toblunt abdominal trauma.

3. To assess the outcomes of patients with solid organ injuries, focusing on the need for surgicalintervention versus conservative management.

REVIEW OF LITERATURE

Choi Y, et al 2022;10 assess the proportion of patients with blunt trauma resulting from intraabdominal injury who received surgical intervention, stratified by trauma mechanism and to examine which organs were damaged per different trauma incident. Results showed one-fourth of

the patients who suffered blunt trauma needed abdominal surgery. Specifically, the spleen or liver was the primary damaged organ during A/E, while the mesentery or colon was the primary injured location requiring abdominal surgery in all methods. In order to accurately establish the injury and the significance of abdominal surgical trauma patients, they conclude that repeated physical examinations and imaging tests are required for patients who are unconscious or whose vital functions are unstable. Abo-Elhoda MF, et al.11 2021, conducted

ISSN: 0975-3583,0976-2833 VOL16, ISSUE 03, 2025

a study on 6908 polytrauma patients to detect both incidence of solid organs injuries in blunt abdominal trauma patients and pattern of injuries as well as outcome in operative management comparing to non-operative management patients. Sixty-eight of them (9.9%) had abdominal trauma.

There were 512 occurrences of blunt abdominal trauma (BTA) and 173 cases of penetrating abdominal trauma. The most frequent cause of trauma, according to the results, was road traffic accidents (RTAs) 64.3%. In 70.1% of cases, solid organs were impacted, followed by the bowels and other abdominal organs in 24.2% of cases, and combined solid organs and other abdominal injuries in 5.7% of cases. In 55.1% of the cases, the spleen was the organ most damaged. They conclude that a NOM method may be used to safely treat hemodynamically stable blunt abdominal trauma with solid organ damage. Ibrahim W, et al 202012 done an observational study on adult blunt abdominal trauma patients with solid organ injury at TUH over a 3-year period. All patients were managed either non-operatively oroperatively. Blood transfusion volume, length of stay, and 30-day mortality were the outcomes ofinterest. 4254 trauma victims visited TUH throughout the research period. Of these, 111 (14.1%)satisfied the inclusion requirements and 790 experienced traumatic abdominal trauma. Each group'sinjury severity levels were similar (24 ± 10 – NOP vs. 28 ± 11 – OP, p = 0.126). The mortality ratesfor each group were the same. They proved that treating traumatic abdominal injuries withoutsurgery was safe, led to fewer procedures, required fewer blood transfusions, and did not raisemortality rates. Longer stays for non-operative patients may result from cautious treatment by thetreating physician.

MATERIAL AND METHODS

Study Design: This is a prospective observational study conducted to evaluate the incidence ofsolid organ injury in patients with blunt abdominal trauma. The study was carried out in theDepartment of General Surgery, a tertiary care centre in Tamil nadu, after receiving approval fromthe university’s ethical committee.Study Setting: The study was conducted in the emergency department and surgical wards of atertiary care centre in Tamil Nadu.

Study Duration: The study period spanned from November 2021 to September 2023.

Study Population: A total of 125 patients presenting with blunt abdominal trauma, including road traffic accidents (RTA), falls, and assaults, were included in the study.

Inclusion Criteria:

• Patients aged 18 years and older.

• Patients admitted with blunt abdominal trauma.

Exclusion Criteria:

• Patients with penetrating abdominal trauma.

• Patients younger than 18 years of age.

Data Collection: Data were collected from patients admitted to the emergency and surgical wards

with blunt abdominal trauma. Information was obtained through:

ISSN: 0975-3583,0976-2833 VOL16, ISSUE 03, 2025

• Detailed history

• Clinical examination

• Relevant laboratory and radiological investigations

Investigations: All patients underwent the following investigations within 30 minutes of admission,

starting with a Focused Assessment with Sonography for Trauma (FAST) scan:

• Hematological tests:

o Hemoglobin percentage

o Blood grouping and Rh typing

o Liver function tests

o Renal function tests

• Imaging:

o Ultrasonography (USG)

o Computed Tomography (CT) scan

o Plain radiograph of the erect abdomen (if indicated)

Management Protocol: Patients were managed based on the severity of their injury and their

hemodynamic stability. Cases were divided into surgical and non-surgical management:

• Surgical intervention: Performed when necessary based on clinical findings, imaging results, and

patient stability.

• Non-surgical management: Included conservative treatment for patients with hemodynamic

stability and minor solid organ injuries (such as Grade I or II splenic or liver injuries).

Data Analysis: The data collected included the nature and extent of abdominal injuries, organsinvolved, mechanisms of trauma, patient demographics, and outcomes. Statistical analysis wasperformed using standard methods to evaluate the relationship between the type of injury andoutcome.Outcome Measures: The primary outcome was the incidence of solid organ injury (liver, spleen,kidneys, pancreas, etc.) in patients with blunt abdominal trauma. Secondary outcomes includedpatient demographics, the mechanism of injury, and the treatment approach (surgical vs.conservative).Ethical Consideration: All patients or their legal guardians provided written informed consent before

being included in the study. The study was conducted in accordance with ethical guidelines and withapproval from the institutional ethics committee.

RESULTS (INCLUDING OBSERVATIONS)

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Table 1 summarizes the demographic characteristics of the 125 patients included in the study. Itcategorizes the patients by gender and age group, showing that the majority were male (74%) andthat the most common age group was 29-38 years (32%). The distribution highlights that bluntabdominal trauma predominantly affects younger adults, with decreasing frequency in older agegroups.

Table 2 details the mechanisms by which the patients sustained blunt abdominal trauma. Roadtraffic accidents (RTA) were the leading cause, accounting for 73% of the cases. Other mechanismsincluded accidental falls (19%), assaults (5%), and miscellaneous causes such as bullgore (1%). Thisdistribution emphasizes the significant role of RTAs in blunt abdominal injuries, underscoring theimportance of preventive measures in reducing these incidents.

Table 3 presents the distribution of specific organ injuries among the patients. The liver was themost commonly injured organ, observed in 31% of cases, followed by spleen injuries (22%) andbowel injuries (16%). Less frequently injured organs included the kidney (5%), pancreas (2%), andmesentery (4%). The data indicate that solid organs like the liver and spleen are particularlyvulnerable in blunt abdominal trauma, likely due to their anatomical location and size.

Table 4 lists the types of injuries that were commonly associated with blunt abdominal trauma in the study cohort. Rib fractures, particularly in cases involving spleen injuries, were the most commonassociated injury (16%), followed by head injuries (12%) and thoracic injuries (8%). Additionally,some patients sustained extremity fractures (7%) and chest trauma alongside liver injuries (8%).These findings suggest that blunt abdominal trauma often occurs in conjunction with othersignificant injuries, which can complicate the management and outcomes of these patients.

DISCUSSION

In this study of 125 patients with blunt abdominal trauma, the majority (74%) were male,highlighting a significant gender disparity in the incidence of such injuries[10]. This finding aligns withexisting literature, which often reports a higher prevalence of trauma in males due to greaterinvolvement in high-risk activities such as driving and manual labor[11].the age distribution shows that the majority of cases occurred in individuals aged 29-38 years,accounting for 32% of the study population[12]. This age group represents a particularly vulnerabledemographic, as they are often the most active and likely to be involved in motor vehicle accidents(MVAs), which were identified as the leading cause of blunt abdominal trauma in this study (73%)[13].

These findings are consistent with previous studies that have also reported a higher incidence oftrauma in younger adults[14].Solid organ injuries were common, with the liver being the most frequently injured organ (31% ofcases), followed by the spleen (22%)[15]. This pattern of injury is well-documented in the literature,where the liver and spleen are often the most affected organs in blunt abdominal trauma due to theiranatomical positions and relative vulnerability[16]. The predominance of liver injuries can beattributed to the organ's large size and fixed position under the rib cage, making it susceptible toforces transmitted through the abdominal wall during blunt trauma[17].

The study also highlighted that 16% of the patients suffered from hollow viscus injuries, includingbowel and mesenteric tears[18]. These injuries, although less common than solid organ

ISSN: 0975-3583,0976-2833 VOL16, ISSUE 03, 2025

injuries, arecritical to identify due to their potential for causing severe complications such as peritonitis andsepsis if not diagnosed and managed promptly[19].

A significant observation in this study is the association between blunt abdominal trauma and ribfractures, particularly in cases involving the spleen[19]. This finding suggests that rib fractures shouldraise suspicion of underlying abdominal injuries, particularly in the left upper quadrant, andwarrants thorough investigation[20].

Despite advancements in diagnostic modalities such as FAST (Focused Assessment with Sonographyfor Trauma) and CT scans, the study underscores the importance of repeated clinical examinations[21].Delays in diagnosis and inadequate initial assessments can lead to increased morbidity andmortality, as early signs of abdominal injury may be subtle and easily missed[22].

The discussion also touches upon the management strategies employed, particularly theconservative management of liver and splenic injuries in hemodynamically stable patients. Thisapproach aligns with current trends in trauma care, which favor non-operative management inselect cases to reduce the risks associated with surgery.

SUMMARY AND CONCLUSION

The study on blunt abdominal trauma highlights the importance of early diagnosis and intervention in trauma care. It found that this injury primarily affects males aged 29-38, with motor vehicle accidents being the leading cause. The liver and spleen are the most commonly injured organs, with rib fractures indicating underlying splenic injuries. The study recommends repeated clinical examinations and appropriate imaging techniques for early detection and intervention. It also supports conservative management in hemodynamically stable patients with low-grade liver and splenic injuries. To reduce the incidence of such injuries, public health interventions should focus on road safety and the establishment of well-equipped trauma care centers, especially in rural areas.

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Tables and Charts

Characteristic	Number of Cases	Percentage (%)
Gender		
Male	93	74
Female	32	26
Age Group (Years)		
18-28	22	17
29-38	41	32
39-48	30	24
49-58	16	12
59-68	8	6
≥69	6	4
Total	125	100

Table Demographic Distribution of Patients with Blunt Abdominal Trauma

Mechanism of Trauma	Number of Cases	Percentage (%)
Road Traffic Accidents (RTA)	92	73
Accidental Fall	24	19
Assault	7	5
Others (e.g., Bullgore)	2	1
Total	125	100

Table Distribution of Patients According to the Mechanism of Trauma

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Organ Injured	Number of Cases	Percentage (%)
Liver	38	31
Spleen	28	22
Kidney	6	5
Pancreas	3	2
Bowel Injury	20	16
Mesenteric Tear	7	4
Total	102	80

Table Organ Injuries in Blunt Abdominal Trauma

Associated Injury	Number of Cases	Percentage (%)
Rib Fractures (with Spleen Injury)	20	16
Head Injury	15	12
Thoracic Injury	10	8
Extremity Fractures	9	7
Chest Trauma (with Liver Injury)	10	8
Total	64	51

Table Associated Injuries in Blunt Abdominal Trauma Patients