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# A STUDY ON ISOLATED BOWEL INJURY IN BLUNT ABDOMINAL TRAUMA

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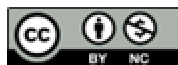

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## ABSTRACT

**Background:** Blunt abdominal trauma (BAT) is a major cause of morbidity and mortality worldwide. While solid organ injuries are common and well characterized, isolated bowel injuries are relatively rare and often present with subtle clinical features, leading to delayed diagnosis and increased complications. **Objective:** To evaluate the clinical profile, diagnostic findings, management strategies, and outcomes of patients with blunt abdominal trauma, with particular emphasis on isolated bowel injuries in comparison to solid organ injuries. **Materials and Methods:** This retrospective observational study was conducted at a tertiary care center over a 5-year period (January 2018 to May 2024). Adult patients (≥18 years) with confirmed blunt abdominal injury were included. Patients with penetrating injuries, significant head or other systemic injuries, incomplete data, or those discharged against medical advice were excluded. Data on demographics, mechanism of injury, clinical presentation, imaging findings, management approach, and outcomes were analyzed. Patients were categorized into isolated bowel injury and solid organ injury groups. Statistical analysis was performed using SPSS version 25.0, with a *p*-value <0.05 considered significant. **Results:** Young adult males constituted the majority of patients, with road traffic accidents being the predominant mechanism of injury. Solid organ injuries were more common than isolated bowel injuries. Hemodynamic instability was observed more frequently in solid organ injuries (20%) compared to isolated bowel injuries (14.3%). The ileum was the most commonly affected segment in bowel injuries. Clinical presentation of bowel injury was often nonspecific, contributing to diagnostic delays. Morbidity was primarily related to postoperative complications, particularly in cases with delayed diagnosis. **Conclusion:** Isolated bowel injuries following blunt abdominal trauma are uncommon but associated with a high risk of delayed diagnosis due to subtle clinical and radiological findings. The absence of shock or peritonitis should not exclude significant injury. A high index of suspicion, serial clinical evaluation, and timely surgical intervention are essential to reduce morbidity and improve outcomes.

## INTRODUCTION

Blunt abdominal injury (BAI) is a significant contributor to trauma-related morbidity and mortality worldwide and remains a challenging surgical emergency. Early diagnosis is crucial, as clinical manifestations are often subtle or delayed compared with penetrating trauma, resulting in missed or late presentations. Road traffic accidents (RTAs) are the leading cause, predominantly affecting young adult males, followed by falls and interpersonal violence.[1]
The liver and spleen are the most commonly injured organs in blunt abdominal trauma, followed by the kidneys and intestines.[2,3] Solid organ injuries typically present with hemodynamic instability or evidence of intra-abdominal hemorrhage, whereas bowel and mesenteric injuries are more difficult to detect at initial evaluation and are associated with higher complication rates due to diagnostic delay.[4]
Although clinical examination remains fundamental, its sensitivity is limited; therefore, imaging modalities such as contrast-enhanced computed tomography (CECT) and focused assessment with sonography for trauma (FAST) have become indispensable in patient evaluation.[5]
Over the past two decades, the management of blunt abdominal trauma has undergone a paradigm shift. While exploratory laparotomy was previously considered mandatory in many suspected cases, non-operative management (NOM) has become the

standard of care in hemodynamically stable patients, facilitated by advances in imaging and critical care monitoring.[6,7] Recent studies report success rates exceeding 90% for NOM in solid organ injuries, with associated reductions in morbidity, hospital stay, and healthcare costs.[8,9]

In India, the burden of abdominal trauma continues to rise in parallel with increasing RTAs. Tertiary care centers frequently encounter diagnostic and therapeutic challenges, particularly in resource-limited settings. A comprehensive understanding of epidemiology, clinical presentation, diagnostic modalities, and outcomes is therefore essential to optimize trauma care.

This study aims to evaluate the clinical profile, management strategies, and outcomes of patients with blunt abdominal trauma, with particular emphasis on isolated bowel injuries, in order to inform and strengthen evidence-based management protocols.

**Objective**

To evaluate the clinical profile, diagnostic findings, management strategies, and outcomes of patients with blunt abdominal trauma, with particular emphasis on isolated bowel injuries in comparison to solid organ injuries.

## MATERIALS AND METHODS

**Study Design and Setting**

This retrospective observational study was conducted at PSG Hospitals, a tertiary care center, over a 5-year period from January 2018 to May 2024.

**Study Population**

The study included adult patients admitted with blunt abdominal trauma during the study period.

**Inclusion Criteria**

- Age ≥18 years
- Confirmed blunt abdominal injury based on clinical, radiological, or intraoperative findings
- Availability of complete medical records

**Exclusion Criteria**

- Penetrating abdominal injuries
- Associated head injuries
- Significant extra-abdominal injuries contributing to morbidity or mortality
- Patients discharged against medical advice (DAMA)
- Incomplete or missing clinical data

**Ethical Considerations**

Ethical approval for the study was obtained from the Institutional Human Ethics Committee prior to commencement.

**Data Collection and Variables**

Hospital records were reviewed retrospectively to collect data on:

- Demographic characteristics
- Mechanism of injury
- Clinical findings at admission
- Imaging findings (FAST and/or CECT)
- Type of intra-abdominal injury (isolated bowel vs. solid organ)
- Management approach (non-operative vs. operative)
- Intraoperative findings (where applicable)
- Patients were stratified into two groups: isolated bowel injuries and solid organ injuries for comparative analysis.

**Statistical Analysis**

Data were entered into Microsoft Excel and analyzed using IBM SPSS Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA).

Categorical variables were expressed as frequencies and percentages and analyzed using the Chi-square test or Fisher's exact test, as appropriate. Continuous variables were expressed as mean ± standard deviation (SD) and compared using the independent samples *t*-test. A *p*-value <0.05 was considered statistically significant.

## RESULTS

**Table 1: Age Distribution**

| AGE GROUP | <20 | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70+ |
|---|---|---|---|---|---|---|---|
| NUMBER OF INDIVIDUALS | 6.9% | 34.5% | 20.7% | 20.7% | 13.8% | 3.4% | 0.0% |

Most individuals affected are in the 20-29 age group, constituting about one-third (34.5%) of the population in this dataset.

**Table 2: Gender Distribution**

| Gender | Frequency | Percentage |
|---|---|---|
| Male | 22 | 75.9 |
| Female | 7 | 24.1 |

Most individuals are male, representing roughly three-fourths of dataset.


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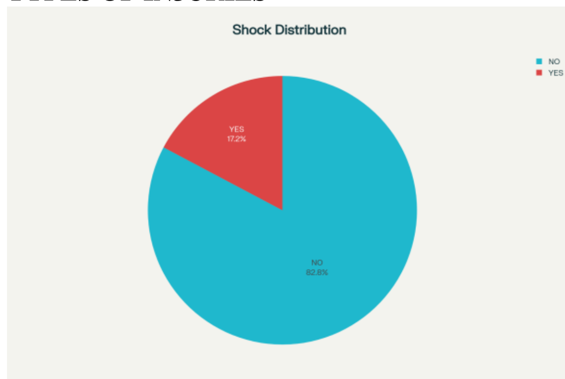
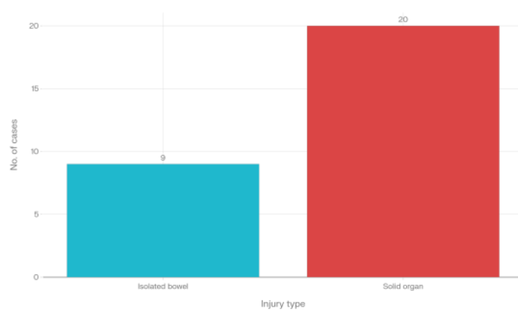
## DISTRIBUTION OF SHOCK AMONG ALL TYPES OF INJURIES

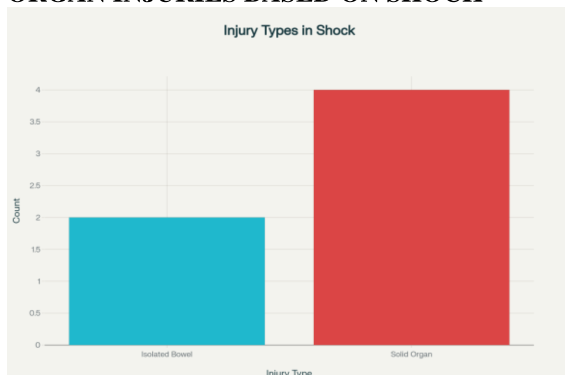



## ESTIMATION OF ISOLATED INJURIES VS SOLID ORGAN INJURIES



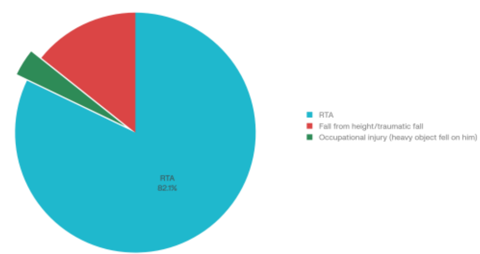

The bar graph visually depicts the higher frequency of solid organ injuries compared to isolated bowel injuries in the dataset.

## COMPARISON OF ISOLATED AND SOLID ORGAN INJURIES BASED ON SHOCK

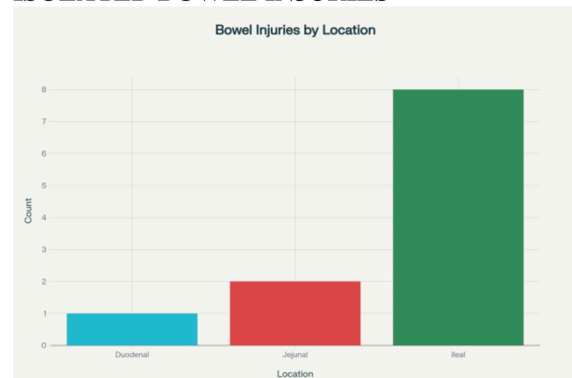



Shock occurred in 14.3% of isolated bowel injury cases and 20% of solid organ injury cases, showing a higher proportion in solid organ injury cases.

## Mode of Injury




## ANATOMICAL DISTRIBUTION AMONG ISOLATED BOWEL INJURIES




This indicates that the ileum is the most frequently affected segment of the bowel in this trauma dataset.

# DISCUSSION

The abdomen is one of the most commonly injured regions in trauma, ranking third after craniofacial and extremity injuries. Patients with blunt abdominal trauma more frequently demonstrate clinicoradiological evidence of solid organ injury. Consistent with previous literature, the present study confirms that hepatic and splenic injuries are more common than bowel injuries following blunt trauma.[3,4]

Isolated bowel injury following blunt abdominal trauma is relatively uncommon, with reported incidence rates as low as 0.3%. This low incidence can be explained by the anatomical and physiological properties of the bowel. The mobility and compliance of the intestines enable dissipation of external forces, in contrast to relatively fixed retroperitoneal structures.[5] As a result, bowel injuries are more commonly associated with concomitant solid organ injuries rather than occurring in isolation. Additionally, most existing literature has focused on penetrating bowel trauma, with comparatively limited attention to blunt bowel injuries, which may contribute to delays in diagnosis and suboptimal outcomes.

The clinical presentation of bowel injury is often subtle and nonspecific, posing a significant diagnostic challenge. Initial physical examination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findings may be inconclusive, particularly in the presence of associated injuries. Symptoms such as abdominal pain due to peritoneal irritation may be absent in early stages. In this context, the absence of bowel sounds may serve as an important clinical indicator of bowel injury. Delayed diagnosis can result in progression to peritonitis and sepsis, thereby increasing morbidity and mortality.

In the present study, hypovolemic shock was observed in a smaller proportion of patients with isolated bowel injury (14.3%) compared to those with solid organ injuries. This difference reflects the underlying pathophysiology, as solid organ injuries are typically associated with acute hemorrhage, whereas bowel perforations may initially cause minimal hemodynamic compromise. Importantly, the absence of shock should not be interpreted as exclusion of significant intra-abdominal injury.

Radiological evaluation adds further complexity. Although CECT is the imaging modality of choice in blunt abdominal trauma, its sensitivity for detecting hollow viscus and mesenteric injuries remains limited. Classical findings such as pneumoperitoneum may be absent early in the disease course. Therefore, attention to indirect signs—including free intraperitoneal fluid without solid organ injury, bowel wall thickening, mesenteric stranding, and mesenteric hematomas—is essential. These subtle findings are easily overlooked, particularly in hemodynamically stable patients.

Regarding anatomical distribution, the ileum was the most frequently involved segment, followed by the jejunum and colon, consistent with previous studies.[8,9] This susceptibility may be attributed to its relative mobility combined with fixation near the ileocecal junction, predisposing it to shearing forces during rapid deceleration injuries. The mesenteric border is particularly vulnerable to devascularization and perforation.

While non-operative management is well established for solid organ injuries in stable patients, its role in isolated bowel injury is limited. Once bowel injury is suspected or confirmed, early surgical intervention remains the definitive treatment. A high index of suspicion is therefore essential, particularly in patients with equivocal imaging findings, persistent abdominal symptoms, or unexplained clinical deterioration. Timely diagnosis and intervention are critical to improving outcomes.

## CONCLUSION

Blunt abdominal trauma continues to pose a significant diagnostic and therapeutic challenge, particularly in the context of isolated bowel injuries. Although relatively uncommon, these injuries are associated with a high risk of delayed diagnosis due to their subtle and nonspecific presentation.

The absence of classical signs such as shock or peritonitis should not be considered reassuring. Isolated bowel injuries may remain clinically occult in the early phase, leading to delayed recognition and progression to severe complications, including peritonitis and sepsis, thereby increasing morbidity and mortality.

A high index of clinical suspicion, combined with serial clinical assessment, appropriate use of imaging, and timely surgical intervention, is essential for optimal patient outcomes. Early recognition and prompt management remain the cornerstone in reducing complications associated with missed bowel injuries in blunt abdominal trauma.

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