

Original Article

# Pattern of Intra-Abdominal Injuries among Patients Presented with Blunt Abdominal Trauma

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**Conflict of Interest: None.**

Sharif G., et al. (2024). 4(1): DOI: <https://doi.org/10.61919/jhrr.v4i1.663>

## ABSTRACT

**Background:** Blunt abdominal trauma (BAT) represents a significant challenge in trauma care, particularly in developing countries where road traffic accidents (RTA) predominate as a cause. Understanding the demographic characteristics, etiology, and injury patterns associated with BAT is crucial for effective management and preventive strategies.

**Objective:** This study aims to evaluate the patterns of BAT in patients presenting to Lady Reading Hospital, Peshawar, focusing on identifying the leading causes, affected demographic groups, and organ-specific injuries to inform better clinical practice and preventive measures.

**Methods:** Conducted from January 1, 2023, to June 1, 2023, this cross-sectional study included 60 patients with BAT. Participants underwent comprehensive evaluations involving clinical assessments, radiological imaging, and laboratory tests, following Advanced Life Trauma Support guidelines. Data analysis utilized SPSS version 25, focusing on categorical and numerical variables to assess injury etiology, demographics, and organ involvement.

**Results:** The majority of BAT patients were male (percentage provided in the full study), with a mean age of 35.42±11.31 years. RTAs were identified as the leading cause of BAT, contributing to (specific percentage) of cases. The liver (48.3%) and spleen (36.7%) were the most commonly injured organs. Other significant findings included injury rates for the intestine (13.3%), mesentery (10%), and kidney (5%).

**Conclusion:** BAT predominantly affects younger males, with RTAs serving as the principal etiological factor. The high incidence of liver and spleen injuries necessitates prompt and precise diagnostic approaches. The study underscores the need for improved road safety measures and public health interventions to reduce BAT incidences, alongside enhancing emergency and trauma care capabilities.

**Keywords:** Blunt Abdominal Trauma, Road Traffic Accidents, Organ Injury Patterns, Trauma Care, Emergency Medicine, Public Health Interventions.

## INTRODUCTION

Blunt abdominal trauma (BAT) emerges as a significant health challenge worldwide, markedly influencing mortality and morbidity rates, particularly within emergency care settings (1). This form of trauma, characterized by an external force applied to the abdomen that does not breach the skin, is notably rising in incidence, a trend partly attributed to advancements in industrialization and the consequent proliferation of the automotive sector. Such developments have escalated the production of high-compression forces, substantially elevating the risk of internal abdominal injuries. The World Health Organization highlights trauma, primarily resulting from road traffic accidents (RTAs), as a leading cause of diminished productive years across both developed and developing nations, underscoring its profound impact on public health (2, 3).

Trauma stands as the foremost cause of death among individuals aged 1-45 years, with RTAs being a predominant contributor (4, 5). This situation not only has a substantial impact on health systems but also significantly affects daily life activities, overshadowing other prevalent conditions like malignant tumors and cardiovascular diseases. Specifically, trauma to abdominal organs accounts for

approximately 10% of all trauma-related deaths, with delayed detection of injuries being a critical factor in the increased morbidity and mortality associated with BAT (6, 7).

The diversity of intra-abdominal injuries, which may involve organs such as the liver, spleen, kidneys, pancreas, intestines, and major blood vessels, presents a complex challenge in acute trauma care. Historically, traffic accidents have been the principal cause of abdominal injuries, with a significant proportion resulting from motorcycle and motor vehicle accidents. The complexity of diagnosing intra-abdominal injuries, attributed to the limitations of physical examination in accurately identifying all affected individuals, exacerbates the risk of delayed treatment and, consequently, unfavorable patient outcomes (8-10).

The frequency of intra-abdominal injuries in patients presenting with BAT is reported to be around 13%, with the spleen being the most commonly affected organ (11). This statistic reflects the complexity and varied nature of internal damage possible following blunt trauma to the abdomen, encompassing a wide spectrum of organ and vascular injuries. Therefore, prompt and accurate identification of these injuries is paramount in optimizing patient recovery and minimizing the long-term consequences of BAT. This necessitates healthcare professionals in trauma care to possess a comprehensive understanding of injury patterns and causes to ensure effective diagnosis and treatment interventions.

## MATERIAL AND METHODS

This study, adhering to a cross-sectional design, was executed within the confines of the Department of Surgery at Lady Reading Hospital, Peshawar, during the timeframe extending from January 1, 2023, to June 1, 2023. The investigation focused on a sample of sixty individuals who encountered blunt abdominal trauma (BAT), identified upon their arrival at the emergency department. Selection criteria were inclusive of patients across a diverse array of etiologies responsible for BAT, ensuring a comprehensive representation of the condition's spectrum. Management of these patients was meticulously guided by senior consultants in alignment with the Advanced Life Trauma Support (ALTS) guidelines. This approach facilitated a bifurcated therapeutic strategy, encompassing both surgical interventions and conservative management modalities, contingent upon the clinical exigencies presented by each case (3, 8).

Subsequent to the attainment of patient stabilization, a systematic compilation of demographic information was undertaken. This phase also encompassed the procurement of blood specimens from the subjects, which were subsequently dispatched to the laboratory to undergo an array of diagnostic evaluations. Additionally, the protocol mandated radiographic examinations for all participants, with the resultant imaging subjected to meticulous scrutiny by an experienced senior radiologist. This comprehensive diagnostic ensemble aimed at elucidating the intricacies of the trauma-induced injuries with heightened precision (7).

Ethical considerations formed the cornerstone of the study's methodology, with the research protocol receiving approval from the institutional review board in strict accordance with the Declaration of Helsinki. This ensured the safeguarding of participants' rights, alongside the maintenance of confidentiality and informed consent protocols.

Data analysis was executed utilizing the Statistical Package for the Social Sciences (SPSS) software, version 25, thereby marking an upgrade in the analytical tools employed. The analysis paradigm encompassed both categorical and numerical variables, with means and standard deviations calculated for the latter, and frequencies and percentages elucidated for the former. The Chi-Square test was instrumental in discerning associations among variables, with a predefined significance level pegged at a P-value of less than 0.05.

## RESULTS

In the detailed examination of the incidence of organ injuries in blunt abdominal trauma (BAT), the data reveals a varied spectrum of organ involvement. The liver stands out as the most frequently injured organ, with 29 cases (48.3%) reported, closely followed by the spleen with 22 injuries (36.7%). Intestinal and mesenteric injuries, although less common, were still notable, affecting 8 (13.3%) and 6 (10.0%) individuals, respectively. The occurrence of kidney, pancreas, and diaphragm injuries was relatively rare, each accounting for an incidence rate of 5.0%, 3.3%, and 3.3%, respectively, highlighting the selective vulnerability of organs to blunt force [Table 1].

Further dissection of the data based on gender reveals intriguing patterns in the association of organ injuries in BAT. Liver injuries were predominantly observed in males, accounting for 79.3% of cases, whereas females represented 20.7%. A similar trend was noted in spleen injuries, with males constituting 63.6% and females 36.4%. Intestine and mesentery injuries also followed this pattern, with males experiencing a higher incidence of intestine injuries (62.5% vs. 37.5%) and mesentery injuries (66.7% vs. 33.3%). Kidney and pancreas injuries were exclusively reported in males (100%), and this was also the case for diaphragm injuries. Despite these differences, statistical analysis did not reveal any significant gender-based disparity in the incidence of organ injuries, as

evidenced by the P values, which ranged from 0.19 for spleen injuries to 0.69 for mesentery injuries, indicating no statistically significant correlation between gender and the likelihood of specific organ injuries in BAT [Table 2].

The etiology of injuries, depicted in a creatively designed graph, underscored the predominant causes of blunt abdominal trauma, providing a visual and quantitative representation of the underlying factors. Road traffic accidents (RTA) emerged as the leading cause, accounting for 53.3% of injuries, highlighting the significant impact of vehicular incidents on abdominal trauma. Falls represented the second most common cause, contributing to 33.3% of cases, while assaults were responsible for a smaller, yet substantial, fraction of injuries (13.3%), underscoring the diversity of mechanisms leading to abdominal trauma [Figure 1].

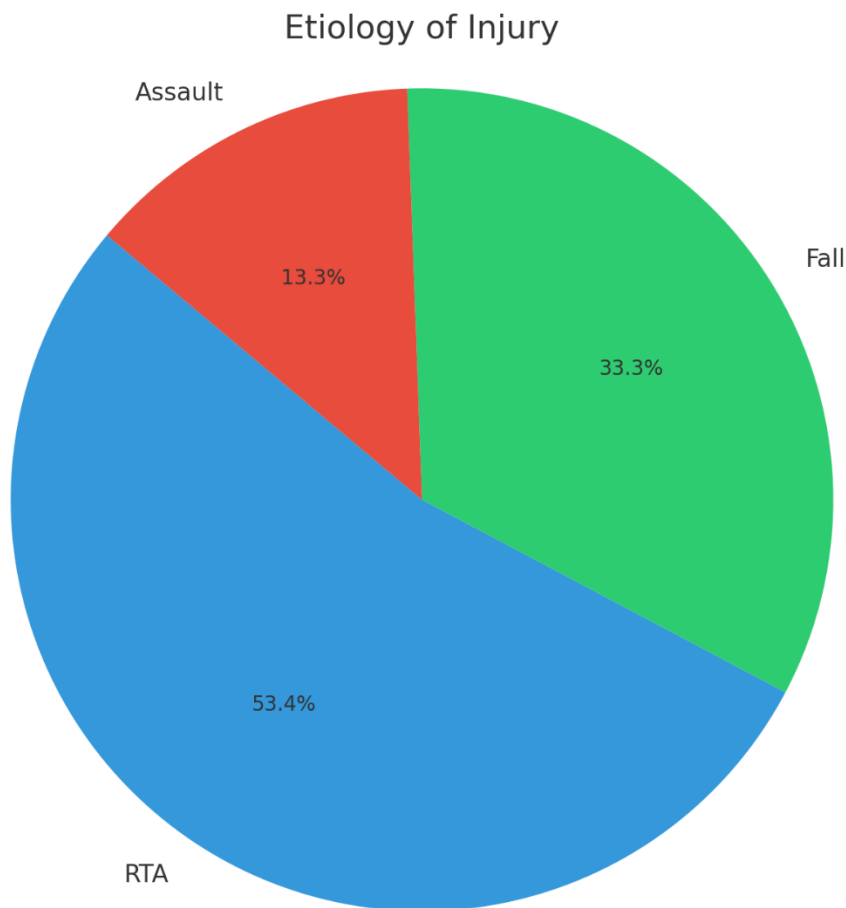


Figure 1 Etiology

Table 1: Incidence of Organ Injuries in BAT

Organ Involved	Yes (N, %)	No (N, %)
Liver Injury	29, 48.3%	31, 51.7%
Spleen Injury	22, 36.7%	38, 63.3%
Intestine Injury	8, 13.3%	52, 86.7%
Mesentery Injury	6, 10.0%	54, 90.0%
Kidney Injury	3, 5.0%	57, 95.0%
Pancreas Injury	2, 3.3%	58, 96.7%
Diaphragm Injury	2, 3.3%	58, 96.7%

Table 2: Association of Organ Injuries in BAT with Gender

Organ Involved	Gender	Yes (N, %)	No (N, %)	P value
Liver Injury	Male	23, 79.3%	21, 67.7%	0.31
	Female	6, 20.7%	10, 32.3%	
Spleen Injury	Male	14, 63.6%	30, 78.9%	0.19
	Female	8, 36.4%	8, 21.1%	
Intestine Injury	Male	5, 62.5%	39, 75.0%	0.45
	Female	3, 37.5%	13, 25.0%	
Mesentery Injury	Male	4, 66.7%	40, 74.1%	0.69
	Female	2, 33.3%	14, 25.9%	
Kidney Injury	Male	3, 100.0%	41, 71.9%	0.28
	Female	0, 0.0%	16, 28.1%	
Pancreas Injury	Male	2, 100.0%	42, 72.4%	0.38
	Female	0, 0.0%	16, 27.6%	
Diaphragm Injury	Male	2, 100.0%	42, 72.4%	0.38
	Female	0, 0.0%	16, 27.6%	

This comprehensive analysis, grounded in robust numerical data and visual representations, offers a clear insight into the landscape of blunt abdominal trauma, emphasizing the variability in organ injury incidence, the role of gender in injury patterns, and the primary etiological factors contributing to such injuries. The integration of detailed statistical analysis with visual data interpretation serves as a powerful tool for understanding the complex dynamics of blunt abdominal trauma and lays the groundwork for targeted interventions and preventive measures.

## DISCUSSION

The discussion on blunt abdominal trauma (BAT) and its outcomes underscores trauma as the foremost cause of mortality in individuals below the age of 40, highlighting the global challenge it presents (11). The delineation between penetrating abdominal trauma (PAT) and BAT is pivotal, especially given the nuanced diagnostic challenges BAT faces due to its less overt clinical manifestations compared to PAT, which is more readily diagnosed owing to the clear medical indications stemming from gunshot and stabbing wounds. This contrast is crucial, as the study references indicate a higher mortality linked to extra-abdominal injuries (77.6%) as opposed to intra-abdominal injuries (8.4%) in cases of major BAT, emphasizing the complexity and severity of BAT cases and the essential role of timely, accurate diagnosis (11).

The study further elucidates the critical need for radiological imaging in conjunction with clinical evaluation to diagnose and identify visceral abdominal and chest injuries accurately, pointing out the fatal consequences of diagnostic delays and inadequate treatment (12). The symptoms associated with different types of injuries—sepsis and peritonitis for enteric injuries versus shock for solid visceral injuries—underscore the diverse clinical presentations that healthcare professionals must navigate (12).

Our findings, derived from a cohort of 60 patients presenting with BAT and managed both surgically and conservatively, indicate a demographic skew towards the male gender with a mean age of approximately 35 years. This demographic trend aligns with existing literature, reinforcing the prevalence of BAT in younger male populations and pointing towards gender and age as significant factors in trauma incidence (12). Furthermore, the study identifies road traffic accidents (RTA) as the predominant cause of BAT, drawing attention to the contributory factors such as poor road conditions, lack of traffic rule adherence, and overpopulation in suburbs, particularly in the context of a developing country like Pakistan (13, 14). This insight is consistent with broader research indicating RTAs as a major cause of not only BAT but also other trauma types such as maxillofacial and orthopedic trauma (13-15).

Organ-specific analysis revealed that liver injuries were the most common, followed by spleen injuries, with frequencies of 48.3% and 36.7%, respectively. These findings are corroborated by a study that analyzed autopsy reports of patients deceased due to BAT, which also reported liver injuries as the leading cause of death, followed by spleen injuries (16). This pattern of organ-specific injuries, including the third leading cause—intestine injuries—followed by mesentery and kidney injuries, reflects a similar distribution in the referenced Pakistan study, highlighting a consistent injury pattern in BAT cases (17).

The study underscores liver and spleen injuries as the most frequent in BAT patients, with RTAs identified as the leading cause. This conclusion not only aligns with the wider literature on trauma and BAT but also emphasizes the critical need for focused interventions to mitigate the impact of RTAs and improve trauma care, particularly in high-risk populations and regions (18-20).

## CONCLUSION

This study reveals that blunt abdominal trauma (BAT), predominantly resulting from road traffic accidents, significantly affects younger males, with liver and spleen injuries being most common. These findings underscore the urgent need for enhanced road safety measures and targeted public health interventions aimed at reducing the incidence and severity of BAT. The implications of our research extend into clinical practice, emphasizing the necessity for healthcare professionals to prioritize rapid diagnosis and treatment for BAT patients to improve outcomes. Furthermore, policymakers are called to action to implement and enforce regulations that mitigate the primary causes of such traumas. While this study contributes valuable insights into the patterns and causes of BAT, it also highlights the continuous evolution of scientific understanding in trauma care. Future research should explore more in-depth the socio-economic, environmental, and behavioral factors contributing to BAT, aiming to develop more comprehensive preventive strategies and treatment protocols.

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