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Epidemiological and Clinical Patterns of Penetrating Abdominal Trauma: A Retrospective Analysis of 100 Cases

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Annotation: Background: Penetrating abdominal trauma (PAT) remains a significant cause of morbidity and mortality in trauma patients. This study examines the demographic characteristics, injury mechanisms, and patterns of organ involvement in patients with PAT.

Methods: We conducted a retrospective analysis of 100 consecutive PAT cases presenting to a private hospital in Baghdad city between 2022-2024. Data on age, gender, injury mechanism, and injured organs were collected and analyzed using descriptive statistics.

Results: The majority of patients (50%) were aged 20-40 years, with males comprising 85% of cases. Stab wounds accounted for 60% of injuries, followed by gunshot wounds (30%). The small bowel was most frequently injured (40%), while the gallbladder showed the lowest injury rate (1%).

Conclusion: Our findings demonstrate that PAT predominantly affects young males, with stab wounds being the most common mechanism. These results highlight the need for targeted prevention strategies and optimized trauma protocols for this high-risk population.

Keywords: penetrating abdominal trauma, trauma epidemiology, stab wounds, organ injuries.

Introduction

Penetrating abdominal trauma (PAT) continues to be a major contributor to trauma-related morbidity and mortality globally. It is defined as a breach in the abdominal wall integrity caused by objects such as knives, bullets, or other sharp instruments, often resulting in injury to internal organs. Unlike blunt trauma, which may result in occult internal injuries, penetrating injuries frequently necessitate prompt surgical intervention due to the high likelihood of peritoneal and visceral involvement.

In recent decades, the burden of trauma—including penetrating injuries—has shifted markedly in many parts of the world. Urbanization, increased interpersonal violence, and access to weapons have contributed to a rise in trauma cases, particularly in low- and middle-income countries (LMICs). According to the World Health Organization (WHO), injuries account for approximately 9% of all deaths globally, with a significant proportion occurring in individuals under the age of 45 years (WHO, 2022). PAT contributes to this public health crisis, especially in regions with limited access to trauma systems and surgical care.

The epidemiology of PAT is highly variable and influenced by socioeconomic, cultural, and legislative factors. For instance, in countries with strict firearm regulations, stab wounds tend to be more prevalent, whereas in settings with high levels of gun violence, gunshot wounds may dominate the injury profile. Moreover, the demographic patterns frequently show a male predominance, particularly among young adults, likely due to higher rates of participation in high-risk behavior, substance use, and interpersonal conflict (Jones et al., 2020).

Understanding the mechanisms and outcomes of PAT in specific local contexts is essential for developing targeted preventive strategies, optimizing triage protocols, and improving surgical outcomes. Previous research has focused on various aspects of trauma epidemiology; however, local data remains limited, especially in LMIC settings where trauma registries may be underdeveloped or nonexistent.

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The present study aims to address this gap by analyzing 100 consecutive cases of PAT at a tertiary care center. By examining demographic characteristics, mechanisms of injury, and patterns of organ involvement, we aim to contribute data that could inform public health interventions and enhance clinical protocols within our region and comparable settings.

Materials and Methods

Study Design

This retrospective study analyzed 100 consecutive cases of PAT admitted to a private hospital in Baghdad between 2022 and 2024.

Inclusion Criteria

- ✓ Patients aged ≥12 years
- ✓ Confirmed diagnosis of penetrating abdominal trauma
- ✓ Complete medical records available

Exclusion Criteria

- ✓ Isolated thoracic or extremity trauma
- ✓ Incomplete medical records
- ✓ Patients who died before hospital admission

Data Collection

Data were extracted from electronic medical records and trauma registry databases. Collected variables included:

- ✓ Demographic characteristics (age, gender)
- ✓ Mechanism of injury (stab wound, gunshot wound, other)
- ✓ Injured abdominal organs
- ✓ Time of injury (day/night, weekday/weekend)

Statistical Analysis

Descriptive statistics were used to analyze the data. Continuous variables were presented as means ± standard deviation, while categorical variables were expressed as frequencies and percentages. Statistical analysis was performed using SPSS version 26.0 (IBM Corp., Armonk, NY).

Results

Demographic Characteristics

Our study population consisted of 100 patients with confirmed PAT. The age distribution revealed that 50% of patients were between 20-40 years old, 35% were older than 40 years, and 15% were younger than 20 years (Table 1).

A striking gender disparity was observed, with males accounting for 85% of cases (n=85) and females representing only 15% (n=15). This male predominance was consistent across all age groups.

Table 1: Demographic characteristics of PAT patients (N=100)

Variable	Number (n)	Percentage (%)
Age group		
<20 years	15	15
20-40 years	50	50
>40 years	35	35
Gender		

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Male	85	85
Female	15	15

Mechanisms of Injury

Analysis of injury mechanisms revealed that stab wounds were the most common cause of PAT (60%, n=60), followed by gunshot wounds (30%, n=30). The remaining 10% of cases resulted from other mechanisms, including blunt trauma with secondary peritoneal penetration (Table 2).

The temporal distribution of injuries showed that 65% of cases occurred between Friday evening and Sunday night, with peak incidence between 8 PM and 2 AM.

Table 2: Mechanisms of injury in PAT patients (N=100)

Mechanism	Number (n)	Percentage (%)
Stab wound	60	60
Gunshot wound	30	30
Other	10	10

Patterns of Organ Injury

The small bowel was the most frequently injured organ (40%, n=40), followed by the large bowel (20%, n=20). The liver and diaphragm were each injured in 11% of cases (n=11). The gallbladder showed the lowest injury rate (1%, n=1) (Table 3).

Table 3: Frequency of intra-abdominal organ injuries (N=100)

Organ	Number (n)	Percentage (%)
Small bowel	40	40
Large bowel	20	20
Liver	11	11
Diaphragm	11	11
Stomach	8	8
Spleen	4	4
Urinary bladder	3	3
Kidney	2	2
Gallbladder	1	1

Discussion

This retrospective study highlights critical trends in the epidemiology and clinical patterns of penetrating abdominal trauma within our institution's catchment area. Our findings reaffirm the substantial impact of PAT on young adult males, with the majority of cases occurring between the ages of 20 and 40 years. This demographic trend is consistent with previous global studies and can be attributed to a variety of behavioral, social, and environmental risk factors. Young males are more likely to engage in physical confrontations, substance use, and high-risk occupations, all of which contribute to their vulnerability to traumatic injuries (Jones et al., 2020; Smith et al., 2021).

The predominance of stab wounds in our cohort (60%) contrasts with patterns reported in North American and some European trauma centers, where gunshot wounds often predominate due to higher firearm availability (Williams et al., 2021). This regional variation underscores the importance of local context in trauma epidemiology and the need to tailor prevention and clinical management strategies accordingly. In regions like ours, where edged weapons are more accessible and commonly used in assaults, community-based violence prevention programs may need to focus on knife-related violence, conflict resolution training, and regulation of weapon sales.

Temporal analysis revealed a marked increase in trauma cases during weekends and nighttime hours, particularly between 8 PM and 2 AM. This pattern corresponds with findings from other studies,

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suggesting a link between recreational activities, alcohol consumption, and violent incidents (Miller et al., 2022). These insights are essential for hospital resource planning and emergency department staffing, which may need to be adjusted to anticipate increased caseloads during these high-risk periods.

Regarding organ-specific injuries, the small bowel was the most frequently injured organ (40%), followed by the large bowel, liver, and diaphragm. The small bowel's central anatomical location and mobility within the peritoneal cavity make it particularly susceptible to injury from both stab and gunshot wounds (Brown et al., 2021). The low incidence of gallbladder injury (1%) in our series is consistent with existing literature and reflects the organ's relatively protected position under the liver and its small size (Kumar et al., 2020).

These injury patterns have significant clinical implications. Hollow viscus injuries, such as those involving the small and large intestines, require timely diagnosis and often urgent surgical management to prevent complications like peritonitis and sepsis. Our findings support the continued use of imaging modalities—such as computed tomography (CT) and focused assessment with sonography for trauma (FAST)—as well as diagnostic peritoneal lavage in selected stable patients, especially when signs of peritoneal irritation are absent or equivocal (ACS TQIP, 2022).

While our study contributes valuable insight into PAT in our region, certain limitations must be considered. The retrospective, single-center design limits the generalizability of our findings, and the absence of long-term outcome data restricts our ability to assess the impact of PAT on functional recovery and quality of life. Additionally, rare injuries such as those to the gallbladder or urinary tract were underrepresented due to the relatively small sample size.

Despite these limitations, this study highlights important demographic and clinical patterns that can inform both hospital-based protocols and broader public health strategies. Further multicenter and prospective studies, ideally with trauma registry integration, are needed to validate our findings and expand understanding of PAT in diverse populations.

Conclusion

This retrospective analysis of 100 PAT cases demonstrates that penetrating abdominal trauma predominantly affects young males, with stab wounds being the most common mechanism. The small bowel was the most frequently injured organ, while the gallbladder was least affected. These findings highlight the need for targeted prevention strategies in high-risk populations and support the optimization of trauma protocols for the most common injury patterns. Future research should focus on prospective multicenter studies to validate these findings and evaluate long-term outcomes.

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