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Original Research Article

A one-year analysis of penetrating abdominal and chest injuries

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ABSTRACT

Background: The increasing incidence of penetrating injuries, often linked to rising societal pressures and aggression, presents a significant public health and clinical challenge, contributing substantially to morbidity and mortality.
Methods: This was a retrospective cohort study conducted at K. R. Hospital, involving 83 adult patients (age >18 years) who presented with penetrating injuries to the chest or abdomen between 01 January 2024 and 31 December 2024. Data collected included demographics, injury details, surgical procedures, ICU admission, and mortality. Injury severity was classified using anatomical and physiological scores, including the abbreviated injury scale (AIS), injury severity score (ISS), new injury severity score (NISS), and revised trauma score (RTS).
Results: A total of 83 patients with penetrating wounds presented, with 25 requiring admission. The mean age was 32.6 years, and the cohort was predominantly male (male: female ratio of 24:1), with 80.8% of admitted patients under 45 years old. Fourteen patients required surgical intervention, and 35.6% were admitted to the intensive care unit (ICU). The overall 30-day and in-hospital mortality rate was 4.1% (3 deaths). Fatalities were associated with severe injuries, including multiple injuries (ISS 17 and 75) and a severe isolated abdominal injury (ISS 25).
Conclusions: Penetrating injuries disproportionately affect young adult males and are associated with a significant mortality rate of 4.1%. The findings underscore the need for effective violence prevention strategies, rapid trauma assessment, and specialized surgical care to improve outcomes in patients presenting with severe, often multi-regional, penetrating wounds.

Keywords: Penetrating injuries, Chest, Abdomen

INTRODUCTION

As society becomes increasingly civilized, certain unintended consequences of modernization have started to emerge—most notably, road traffic accidents, warfare, and environmental pollution. Road traffic crashes alone result in approximately 1.19 million deaths globally each year and are the leading cause of death for children and young adults aged 5–29 years.[1]

Rapid urbanization, population growth, and escalating competition for limited resources, compounded by economic hardships, have contributed to rising stress levels and social unrest. Many fast-growing cities create conditions of significant disparities that set up a natural environment for conflict over resources, increasing the risks that violence and conflict will originate from urban settings.[2]

One alarming manifestation of this trend is the growing incidence of stab injuries. These injuries may result from accidents, suicidal attempts, or, more troublingly, deliberate assaults. Regardless of the cause, they contribute significantly to morbidity and mortality rates.[3]

In recent times, the frequency of stab wounds has surged dramatically in certain regions. For instance, one maximal-care trauma center observed a significant rise in stab wounds requiring treatment between 2015 and 2024.[4] This trend is consistent with reports from the UK, where assault

knife injuries were found to represent a growing percentage of trauma cases between 2015 and 2018.[5] The rising prevalence of such violent injuries underscores the urgent need for preventive strategies, better law enforcement, and public awareness to mitigate this disturbing trend.

Literature review

In a nationwide Icelandic cohort of hospitalized stab injury patients, the reported 30-day mortality was 4.1%, identical to the mortality observed in the present study, with all deaths occurring in patients sustaining severe or unrevivable injuries.[6] This reinforces the concept that fatal outcomes in penetrating trauma are largely driven by injury burden at presentation rather than deficiencies in acute care.

A Japanese nationwide retrospective study spanning ten years found that patients with high ISS and evidence of active haemorrhage accounted for the majority of in-hospital deaths, while overall mortality rates remained relatively stable over time.[7] Similar findings have been reported in multi-institutional comparisons between the United States and the Netherlands.[8]

The Icelandic study and other tertiary emergency department–based analyses noted that a substantial proportion of patients required surgical intervention, often followed by prolonged intensive care stays. These findings parallel the high ICU admission rate (35.6%) observed in the current study, highlighting the considerable strain penetrating trauma places on critical care resources even when overall mortality remains relatively low.

A case-control study examining patients over 55 years of age demonstrated higher complication rates, longer hospital stays, and increased mortality compared with younger cohorts.[9] This finding is clinically relevant, as advanced age and associated comorbidities are known to exacerbate physiological vulnerability and complicate trauma management.

The objectives of the study aimed to describe the epidemiology and compare the severity of assault-related penetrating injuries to the chest and abdomen.

METHODS

Statistical analysis

Descriptive statistics was used to analyse the data. Trauma scoring systems, descriptive statistical methods like measures of central tendency, measures of dispersion, frequency and proportions were used.

Data visualization tools like frequency tables, bar charts and pie charts were used for organizing and presenting the results.

Design and population

This was a retrospective cohort study involving all the patients who presented in emergency department of KR hospital following a penetrating injury to chest or abdomen sometime between 01 January 2024 and 31 December 2024. For each patient, the following data were collected from medical records: age, sex, date of injury, type of injury (assault, self-inflicted injury, or accident), anatomical site of injury, whether intoxicated with alcohol when injured, surgical procedures, ICU admission, blood transfusions, length of stay (both in the ICU and total hospital stay (in days)), and 30-day and hospital mortality.

Study population and data sources

Inclusion criteria

Included in the study were all patients more than 18 years of age who sustained a penetrating injury (with sharp objects) and presented in K. R. Hospital casualty. Patients who were treated in the emergency department but discharged without admission were also included also in the study. Patients who died in the surgery emergency department before being admitted to hospital were included for calculation of total mortality.

Exclusion criteria

Exclusion criteria included patients aged less than 18 years and patients who didn't reach K. R. Hospital surgery emergency department before death are excluded from the study

Severity of injury

Injury classification was done by calculation of anatomical and physiological scores using the abbreviated injury scale (AIS), the injury severity score (ISS), the new injury severity score (NISS) and the revised trauma score (RTS). Of these, AIS, ISS, and NISS are all anatomical scoring systems used to rate the severity of each injury to the body whereas the RTS takes into account the physiological parameters such as Glasgow coma scale, respiratory rate, and systolic blood pressure on first medical contact.

Ethical approval was not required for this analytic study.

RESULTS

Patient demographics and presentation

A total of 83 patients presenting with penetrating stab wounds were treated in the K. R. Hospital Emergency Department (ED) during the study period. Analysis of the patient demographics revealed a significant skew toward older adults, with 81% of the stab injury cases being above 45 years of age (Figure 1).

The mean age of presentation was 32.6 and the age range showed a considerable spread (Figure 2). Regarding sex distribution, the majority of patients were male, though the exact male-to-female ratio is detailed in Figure 3.

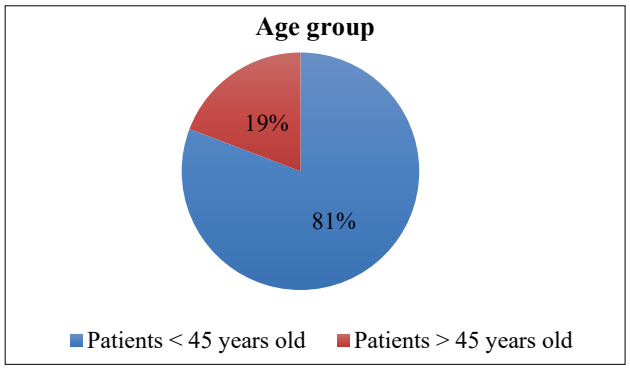

Figure 1: Pie chart showing that 81% of stab injury cases were above 45 years of age.

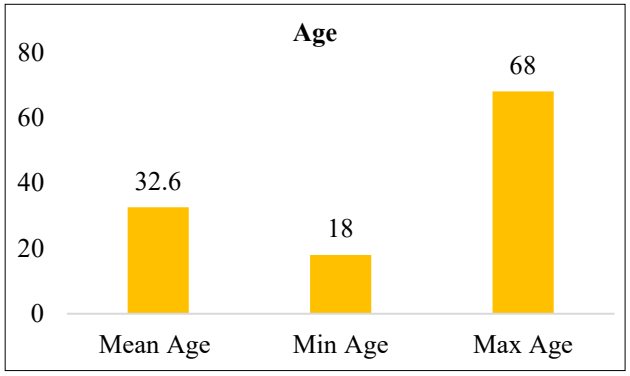

Figure 2: Bar chart showing mean age of presentation and the minimum and maximum age of presentation.

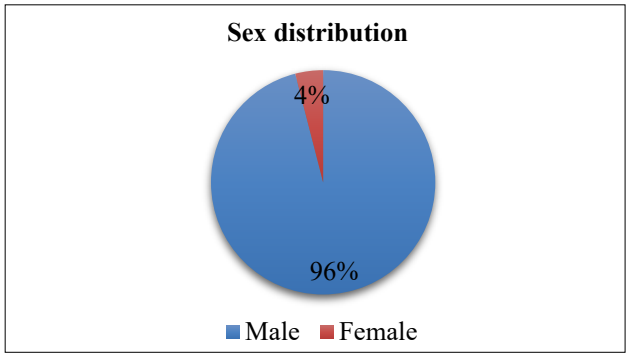

Figure 3: Pie chart showing the sex distribution.

Clinical course and outcomes

Of the total cases, 25 patients required admission, 14 required intervention and 3 deaths were recorded (Table 1 and Figures 4 and 5). The overall clinical management involved a significant surgical intervention rate (Figure 6).

Post-stabilization, the rate of ICU admission was substantial, recorded at 35.6% of admitted or total cases (Table 2). The 30-day mortality rate for all patients was calculated at 4.1% (Table 2).

Table 1: Number of penetrating injury cases presented in K. R. Hospital emergency department.

Characteristics	Value
Total patients with stab wounds in emergency	83
Total deaths	3
Total admitted cases	25

Table 2: ICU admission rates and mortality rates.

Characteristics	Percentage (%)
ICU admissions	35.6
30-day mortality rate	4.1

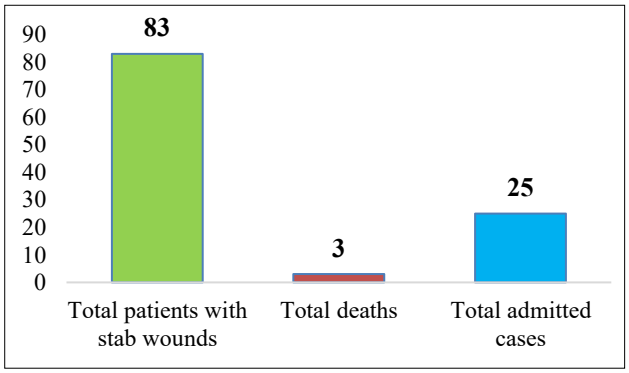

Figure 4: Bar chart showing total patients with stab injuries and total death and admitted cases.

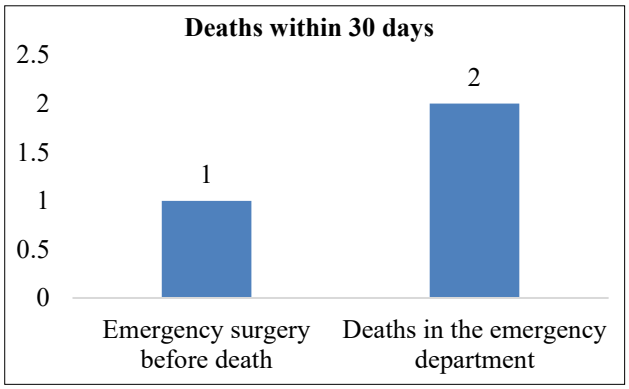

Figure 5: Bar chart showing the number of deaths.

Among the three fatalities, two patients sustained injuries involving multiple anatomical regions, with injury severity scores (ISS) of 17 and 75, respectively. The third patient had a severe isolated abdominal injury with an ISS of 25.

One of these patients underwent emergency surgery but succumbed postoperatively due to a burst abdomen and septic shock. The remaining two patients died in the emergency department as a result of injury-related complications. (Table 3).

Table 3: Table showing the causes of deaths.

Parameter	Details
Causes of death	Two patients had multiple injuries (ISS: 17 and 75)
	One patient had a severe abdominal injury (ISS: 25)

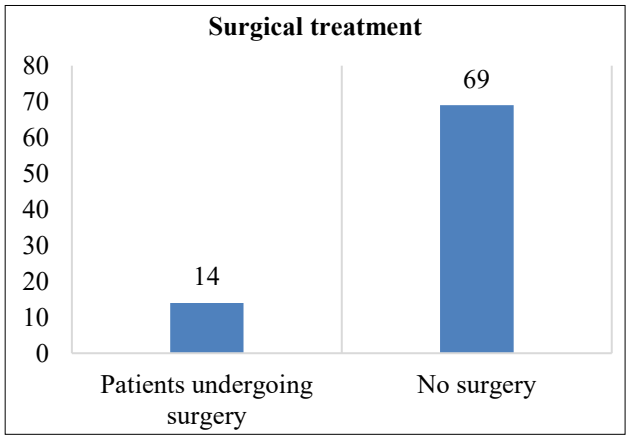

Figure 6: Bar chart showing number of patients who underwent surgery.

DISCUSSION

Injury severity and mortality

The overall 30-day mortality rate was 4.1%, which is comparable to reported figures for civilian penetrating trauma but warrants closer scrutiny given the characteristics of the three fatal cases. Analysis of the causes of death, supported by the injury severity score (ISS), revealed that fatalities were confined to patients with severe to maximal, unsurvivable injuries. Two patients had multiple injuries (ISS: 17 and 75). The current study, focusing on 83 patients presenting with penetrating stab wounds to the K. R. Hospital Emergency Department (ED), highlights several critical findings regarding the demographics, injury severity, and outcomes of this trauma subset.

Age and demographic vulnerability

A striking finding was the high proportion of older adults, with 81% of stab injury cases occurring in patients above 45 years of age. Penetrating trauma is traditionally associated with younger demographics; thus, this observation suggests a potential shift in the vulnerable population in our catchment area or indicates specific socio-environmental factors contributing to injury risk in this older group.

The aging patient population also has significant clinical implications, as older trauma patients often have pre-existing comorbidities that complicate management, increase the risk of surgical complications, and contribute to overall worse outcomes, even with moderate injury severity severe abdominal injury (ISS: 25). The ISS of 75 represents the maximum score, indicating an immediately life-threatening or unsurvivable injury upon arrival, likely limiting the effectiveness of even the most aggressive resuscitation and surgical interventions.

Clinical resource utilization

The high rate of ICU admissions (35.6%) and the necessity for surgical intervention in a significant number of admitted patients (Figure 5) underscore the severe nature of injuries sustained by those requiring hospitalization. This high resource utilization demonstrates the substantial burden penetrating trauma places on critical care services and surgical teams.

Furthermore, this data supports the established principle that even patients who survive the initial impact of penetrating trauma require prolonged, specialized, and expensive intensive care management to recover.

Limitations

This study is based on a single centre, K. R. Hospital and the duration of study is short and depends on the quality of documentation available in the hospital.

CONCLUSION

Despite advances in trauma care and surgical intervention, patients with severe multi-regional or abdominal injuries still face significant morbidity and mortality, reflected by an overall 30-day mortality rate of 4.1%. Improving outcomes for this vulnerable population requires rapid assessment, appropriate triage, and timely surgical management. Furthermore, the rising incidence necessitates coordinated public health strategies focused on violence prevention, urban safety, and community awareness, alongside strengthening pre-hospital care systems and ensuring access to specialized trauma services.

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