



Original Article

## Stab and sharp-penetrating injuries presented to a forensic medicine clinic: A five-year retrospective analysis

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### Abstract

**Aim:** Sharp and sharp-penetrating injuries constitute an important group of trauma cases that require rapid, systematic, and objective evaluation in both forensic and clinical settings. This study aims to contribute to the regional literature by analyzing the demographic, clinical, and forensic characteristics of cases presenting to a forensic medicine outpatient clinic due to sharp and/or sharp-penetrating instrument injuries.

**Materials and Methods:** A total of 167 cases who presented to the Forensic Medicine Outpatient Clinic of Ordu University Training and Research Hospital between 2017 and 2022 were evaluated retrospectively. Demographic characteristics, injury patterns, etiological factors, and forensic classifications were analyzed. Multivariable logistic regression analysis was performed to identify factors associated with surgical intervention, and Poisson regression was used to assess annual trends.

**Results:** Of the cases, 83.2% were male, and the mean age was 33.3 years. Injuries occurred most frequently in the summer months, particularly in July, and Wednesday had the highest rate of presentations among the days of the week. The most common cause was interpersonal violence (75.4%), and knives constituted the vast majority of instruments used (98.5%). Under Articles 86–87 of the Turkish Penal Code, 37.1% of cases were classified as “requiring more than simple medical intervention.” The surgical intervention rate was 13.2%. Multivariable analysis showed that penetrating thoracic injury (OR=27.9; 95% CI: 4.26–183.0;  $p<0.001$ ) and muscle-tendon damage (OR=31.1; 95% CI: 6.52–148.7;  $p<0.001$ ) significantly increased the likelihood of requiring surgery. Additionally, a statistically significant upward trend in annual case numbers was identified (IRR=1.34/year; 95% CI: 1.24–1.45;  $p<0.001$ ).

**Conclusion:** Sharp-penetrating injuries were predominantly observed in young men and were mostly driven by interpersonal violence. The need for surgical intervention was primarily determined by anatomical depth and associated tissue damage. The increasing annual trend in case numbers highlights the necessity of closely monitoring regional violence dynamics and developing targeted preventive strategies.

**Keywords:** Sharp-penetrating injuries, interpersonal violence, forensic trauma

### INTRODUCTION

Sharp and sharp-penetrating instrument injuries constitute a significant category of trauma cases that require specialized evaluation in both clinical and forensic settings. These injuries may occur as a result of interpersonal violence, criminal behavior, accidents, self-harm attempts, and various sociocultural conflicts [1,2]. The easy availability of sharp objects in daily life, particularly knives and glass materials, contributes to their

frequent use in traumatic events and makes them a common cause of emergency department admissions [3–5].

In forensic medicine practice, the evaluation of such injuries involves not only clinical recovery but also the legal processes that follow. Determining the characteristics of the injury—including its anatomical location, depth, involvement of vital structures, and the need for medical or surgical intervention—requires an objective and systematic approach [2,4]. These features play

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a critical role in defining the forensic nature of the incident, classifying the potential offense, and preparing the medico-legal report. Therefore, a standardized and structured assessment is essential for both judicial authorities and healthcare systems.

National literature indicates that sharp and sharp-penetrating injuries constitute a consistent and significant portion of forensic cases across various regions of Türkiye [1,3–6]. Studies from different centers show that these injuries frequently affect young adults, that interpersonal conflicts are among the most common mechanisms, and that such cases represent an important issue for both public health and forensic law enforcement systems. International publications likewise report that sharp-force injuries represent a substantial proportion of both assault-related and self-inflicted harm, highlighting the need for multidisciplinary evaluation [7,8].

Obtaining regional data on sharp-penetrating injuries is important for identifying trauma distribution patterns and risk profiles, improving healthcare service planning, optimizing medico-legal reporting practices, and supporting violence-prevention strategies. Furthermore, data obtained from forensic medicine outpatient clinics offer field-specific insight, as they reflect the actual presentation profile encountered by both hospital and judicial systems. However, in the Black Sea Region, especially in studies focusing on outpatient-based sharp and sharp-penetrating trauma profiles, current research remains limited.

This study aims to retrospectively evaluate the demographic, clinical, and forensic characteristics of cases presenting to a forensic medicine outpatient clinic due to sharp and sharp-penetrating instrument injuries and to contribute to the existing literature.

## MATERIAL AND METHOD

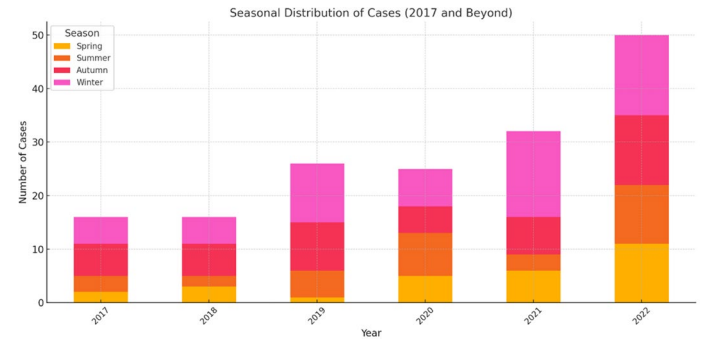
This study is based on a retrospective file review of cases presenting to the Forensic Medicine Outpatient Clinic of Ordu University Training and Research Hospital between 01.01.2017 and 31.12.2022 due to sharp and/or sharp-penetrating instrument injuries. Demographic data, incident characteristics, injury findings, and medico-legal reporting information were recorded. Cases with missing data and those whose trauma mechanism did not involve a sharp or sharp-penetrating instrument were excluded.

Data were analyzed using IBM SPSS Statistics for Windows, Version 22.0. Descriptive statistics were calculated, and categorical variables were evaluated using the Chi-Square test. A logistic regression model was employed for multivariable analyses. A p-value <0.05 was considered statistically significant. This study was approved by the Non-Interventional Clinical Research Ethics Committee of Ordu University (Date: 12.05.2023, Decision No: 142).

## RESULTS

A total of 167 cases were evaluated, of which 83.2% were male (n=139) and 16.8% were female (n=28). The mean age of the

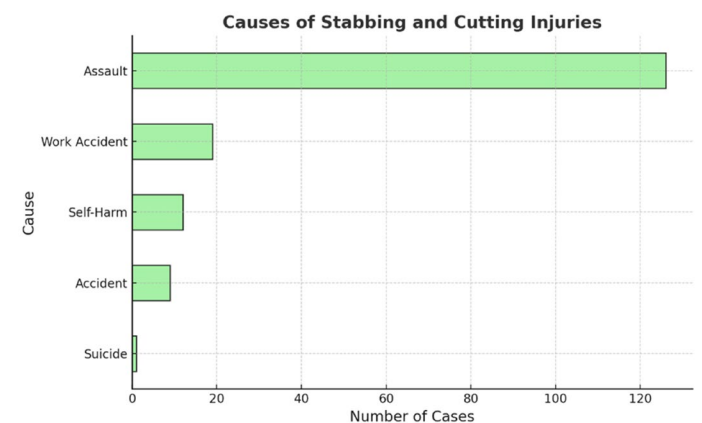
victims was calculated as  $33.34 \pm 13.52$  years (minimum=6, maximum=72 years). When the monthly distribution of the cases was examined, the highest number of cases occurred in July (13.17%, n=22), while the lowest number was recorded in April (2.40%, n=4). Seasonal analysis showed that sharp-penetrating injuries were most frequently observed in the summer (35.33%, n=59), whereas the lowest number of cases occurred in the spring (16.77%, n=28) (Figure 1).



**Figure 1.** Seasonal distribution of sharp and sharp-penetrating injury cases by year (2017–2022)

The distribution by days of the week revealed that sharp-penetrating injuries occurred most commonly on Wednesdays (18.56%, n=31). The fewest cases were identified on Sundays (12.57%, n=21).

Of the cases, 75.4% (n=126) occurred as a result of assault. Other causes included occupational injuries (11.4%, n=19), self-harm (7.2%, n=12), accidents (5.4%, n=9), and suicide attempts (0.6%, n=1) (Figure 2).



**Figure 2.** Distribution of causes of sharp and sharp-penetrating injury cases

In 80.24% of the cases (n=134), the injuries were caused by sharp-penetrating instruments, while 19.76% (n=33) were caused by sharp instruments. Among sharp-penetrating instruments, the most frequently used tool was a knife (98.5%, n=132), whereas among sharp instruments, glass objects were the most common (84.85%, n=28). According to Articles 86–87 of the Turkish Penal Code, 62.9% of the cases (n=105) were classified as “manageable with simple medical intervention,” while 37.1%

(n=62) were reported as “not manageable with simple medical intervention.” Additionally, 88.6% of the injuries (n=148) were determined not to pose a life-threatening risk, whereas 11.4% (n=19) were considered life-threatening. Among the 167 cases, 13.2% (n=22) underwent surgical intervention. In the 24 cases requiring hospitalization, the mean length of stay was calculated as  $5.25 \pm 3.21$  days. Regarding penetration into body cavities, 6.6% of the cases (n=11) involved thoracic penetration, followed by abdominal penetration in 3.6% (n=6). Muscle or tendon injury was detected in 12.0% of the cases (n=20). A single wound was identified in 56.3% of the cases (n=94), whereas 33.5% (n=56) sustained between two and five wounds.

In 70.1% of the cases (n=117), the injuries were limited to a single anatomical region, whereas 29.9% (n=50) involved multiple regions. Among single-location injuries, the most frequently affected areas were the left hand (11.1%, n=13), right hand (9.4%, n=11), and left thigh (7.7%, n=9). In multi-region injuries, the left thigh (n=11), left hand (n=10), and left arm (n=9) were the most commonly involved sites. Knives were identified as the injuring instrument in 73.7% of the cases (n=123), while glass was responsible in 12.0% (n=20). The mean wound length was calculated as  $2.95 \pm 2.67$  cm, with a range of 0.1 to 25.0 cm.

Bivariate analyses revealed a strong association between life-threatening injury and the need for surgical intervention ( $\chi^2=42.0$ ,  $df=1$ ,  $p<0.001$ ). A significant relationship was also found between body-cavity penetration categories and surgery ( $\chi^2=55.7$ ,  $df=3$ ,  $p<0.001$ ). Surgical intervention rates were significantly higher in cases with muscle–tendon injury ( $\chi^2=23.4$ ,  $df=1$ ,  $p<0.001$ ). Instrument type distribution differed significantly by sex ( $\chi^2=6.87$ ,  $df=2$ ,  $p=0.032$ ); knife-related injuries were notably more common among males, whereas glass-related injuries were relatively more frequent among females.

In multivariable logistic regression, penetrating thoracic injury (OR=27.9; 95% CI: 4.26–183.0;  $p<0.001$ ) and muscle–tendon injury (OR=31.1; 95% CI: 6.52–148.7;  $p<0.001$ ) were identified as independent predictors of surgical intervention. Time-trend analysis demonstrated a significant increase in annual case numbers (IRR=1.34/year; 95% CI: 1.24–1.45;  $p<0.001$ ).

## DISCUSSION

In this study, the proportion of male cases was 83.2%, with a mean age of 33 years, paralleling previous research indicating that sharp-penetrating trauma predominantly affects men and is concentrated among young adults. In this regard, a study conducted in Manisa similarly reported that 94.5% of such cases were male and that most victims were between 20 and 39 years of age [9]. Likewise, Batbaş et al. found that 81.6% of fatal sharp-penetrating injuries occurred in men [10].

This pattern may be explained by increased social interaction and outdoor activities during the summer months, which can contribute to higher rates of violence. Indeed, another study from Manisa reported that medico-legal cases occurred most

frequently during the summer, particularly in July [11]. The peak observed on Wednesdays in our dataset is a unique finding; further analyses are needed to determine whether this distribution is influenced by local social or environmental factors. For example, a study examining emergency department admissions in another region also identified Wednesday as the most frequent day for presentations, suggesting a possible association with mid-week social dynamics [12].

The finding that 75.4% of cases resulted from assault is consistent with reports from various regions of Türkiye, where interpersonal violence has been identified as the leading cause of sharp-penetrating injuries. Supporting this, Güloğlu et al. emphasized that the vast majority of sharp-penetrating trauma cases in Southeastern Anatolia were the result of interpersonal violence [13]. The exceptionally high proportion of knife-related injuries in our study (98.5%) aligns with international literature reporting knives as the most commonly used weapon in assault-related sharp-force trauma. For instance, an analysis of 1,315 penetrating injuries in Sweden between 1987 and 1994 found that knives constituted the primary weapon in the overwhelming majority of cases [14]. The relatively higher frequency of glass-related injuries among women is an important finding, suggesting a potential association with domestic accidents or environmental factors.

In this study, only 11.4% of cases were classified as life-threatening, which may be explained by the fact that outpatient forensic clinic admissions typically involve relatively less severe injuries. However, the rates of thoracic and abdominal penetration were consistent with those reported in the literature. Previous research has similarly indicated that sharp-penetrating injuries often involve vital regions such as the chest and abdomen. For example, Ambade and Godbole, in their study from India, found that the thorax was the most common site of injury among victims killed with sharp instruments [15]. The strong association between these injuries and the need for surgical intervention in our study is a notable finding. Supporting this, a study from Manisa reported that 40.8% of cases had injuries involving intrathoracic organs or major vessels, underscoring the potential severity of such trauma [9]. Additionally, in logistic regression analysis, penetrating thoracic injury (OR=27.9) and muscle–tendon damage (OR=31.1) emerged as the strongest predictors of surgical intervention. These results suggest that anatomical depth and the integrity of functional tissues are key criteria in determining the need for surgical consultation in clinical practice. The high magnitude of these associations also carries important implications for medico-legal reporting, particularly in assessing the severity of injury.

The Poisson time-trend analysis demonstrated a 34% annual increase in case numbers (IRR=1.34/year), indicating a marked rise in regional violence dynamics. National trauma epidemiology data likewise show an increase in interpersonal violence and sharp-penetrating injuries in recent years. For instance, judicial statistics indicate that the number of individuals convicted of

violent offenses such as intentional injury in Türkiye increased from 17.222 in 2011 to 71.885 in 2020, a dramatic rise reflecting the substantial escalation of interpersonal violence over time [16]. This finding serves as a critical indicator for regional security policies, community-based violence prevention strategies, and planning of forensic healthcare services. Importantly, the observed annual increase in sharp and sharp-penetrating injury cases carries direct forensic implications, as it translates into a growing medico-legal reporting workload, increased demand for standardized injury assessment, and a greater need for resource planning within forensic medicine services.

The proportion of injuries classified as “not manageable with simple medical intervention” under Articles 86 and 87 of the Turkish Penal Code was 37.1% in our study. In a study conducted at Dicle University on medico-legal reports, approximately 48% of injuries were reported to be of a nature that could not be resolved with simple medical intervention [3].

## CONCLUSION

Considering the limited availability of outpatient-based sharp-penetrating trauma data in the Black Sea Region, our study fills an important gap and provides a valuable regional reference dataset. The use of methods such as multivariable analysis and time-trend modeling further enhances the contribution of our findings to the literature.

This study identified the regional distribution, clinical severity, and key factors determining the need for surgical intervention in cases of sharp and sharp-penetrating injuries. Parameters such as thoracic penetration and muscle–tendon damage emerged as strong independent predictors of surgery, offering important guidance for both clinicians and judicial authorities. The increasing trend in case numbers over time highlights a dynamic that warrants close monitoring in terms of regional violence prevention and public health policy development.

### Conflict of Interests

*The authors declare that there is no conflict of interest in the study.*

### Financial Disclosure

*The authors declare that they have received no financial support for the study.*

### Ethical Approval

*This study was approved by the Ordu University Non-Interventional Research Ethics Committee, Türkiye (Date:12.05.2023, Decision No:142).*

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