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A five-year retrospective evaluation of maxillofacial trauma cases examined in the forensic medicine outpatient clinic

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Abstract

Maxillofacial trauma represents a significant portion of forensic evaluations in outpatient clinics. This retrospective study aimed to evaluate the demographic characteristics, etiological factors, injury patterns, and medicolegal outcomes of maxillofacial trauma cases admitted to the Forensic Medicine Outpatient Clinic of Ordu Training and Research Hospital between 2018 and 2023. A total of 699 forensic cases were analyzed. The majority of patients were male (77.3%) with a mean age of 35.7±16.6 years. Most commonly reported causes were physical assault (53.2%), domestic violence (17.2%) and traffic accidents (14.7%). The most common soft tissue injuries were ecchymosis (45.1%) and abrasions (44.9%). The most common bone fracture was the nasal fracture 63.3%. Multiple fractures were detected in 20.3% of patients. A statistically significant relationship was identified between physical assault and both nasal and multiple bone fractures ($p<0.01$). Life-threatening injuries were documented in 2.3% of patients. Permanent facial scarring was noted in 2.0% of cases, and organ loss was reported in 1.2%. These findings reveal that measures against interpersonal violence in particular need to be increased.

Keywords: Wounds and injuries, forensic medicine, interpersonal violence, public health, trauma severity indices

Introduction

Trauma refers to an unforeseen event outside the victim's control. Among the different types of trauma, physical injuries are the most prevalent. Trauma has been identified as one of the leading causes of death in individuals under the age of 40 [1]. Due to its prominent position, the face is particularly susceptible to these types of injuries. Oral-maxillofacial trauma accounts for approximately 7.4% to 8.7% of all medical emergencies holds a significant place among all trauma cases [2,3]. In polytrauma cases, the incidence may reach up to 30% [4,5]. Additionally, the incidence and epidemiological features of maxillofacial trauma can vary between different regions and countries depending on their cultural and socio-economic factors. In developing countries, the incidence tends to increase [6]. These injuries can affect not only the skin but also the deep soft tissues, underlying bone structures, and the vital organs in the surrounding area. As a result of such

trauma, patients may experience severe facial deformities and significant functional losses. Fractures in the maxillofacial region can cause significant deformities depending on their location, such as midfacial deformities, sensory disturbances, malocclusion, impaired mandibular movement, and ocular dysfunction [7]. Conditions such as respiratory tract obstruction, secondary infections, and shock due to severe bleeding may occur and can be life-threatening. Additionally, taking into account the social and cultural problems they cause, oral-maxillofacial injuries are considered one of the global burdens of disease [8]. The treatment of these traumas is also highly challenging. It involves not only the aesthetic aspect but also the function of the injured structures, potentially leading to serious psychological issues in patients [9]

We think epidemiological studies in this field are crucial for identifying new frequencies and patterns of these injuries, which are valuable for planning possible preventive strategies. Hence,

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our study aimed to provide a detailed analysis of the injury characteristics in maxillofacial trauma cases involving forensic medicine patients, contributing to the existing literature in this field.

Material and Methods

In this study, the medical records of patients who presented to the Forensic Medicine outpatient clinic due to maxillofacial trauma between 2018 and 2023 and for whom a final forensic report was issued were retrospectively evaluated. Sociodemographic data such as age and gender, type of traumatic event, fractured bones, soft tissue injuries, and the conclusions of the reports were examined.

The obtained data were analyzed using IBM SPSS Statistics version 22. In addition to descriptive statistics, the means and standard deviations of quantitative data were calculated. The chi-square test was used for the classification of categorical data. A p-value of <0.05 was considered statistically significant.

The study was approved by the Clinical Research Ethics Committee (26.05.2023/154) of the Ordu University Faculty of Medicine.

Results

Between 2018 and 2023, a total of 4,830 forensic reports were issued in our department, of which 14.4% (n=699) involved maxillofacial trauma cases. Of these cases, 77.3% (n=540) were male and 22.7% (n=159) were female. The youngest case was an infant under one year old, and the oldest was 89 years old. The mean age was calculated as 35.7±16.6 years. The distribution of the origins of maxillofacial traumas is shown in Table 1. The highest number of cases (10.4%) occurred in June. The monthly distribution of cases is shown in Figure 1.

Table 1. Types of trauma causing maxillofacial injury

Trauma type	Percentage (%)	Sample size (n)
Assault	53.2	372
Domestic violence	17.2	120
Traffic accident	14.7	103
Injury with an object considered a weapon	8.6	60
Home accident	4.7	33
Work accident	1.3	9
Self-harm	0.3	2

Table 3. Distribution of cases according to the forensic trauma severity score

	Domestic violence N (%)	Assault N (%)	Home accident N (%)	Traffic accident N (%)	Injury with weapon N (%)	Work accident N (%)	Self-harm N (%)
Life-threatening	1 (0.1)	7 (1.0%)	2 (0.2)	5 (0.7)	1 (0.1)	-	-
Not life-threatening	119 (17.0)	365 (52.2)	31 (4.5)	98 (14.0)	59 (8.5)	9 (1.2)	2 (0.2)
Not treatable by simple medical intervention	29 (4.1)	139 (19.8)	13 (1.8)	44 (6.2)	27 (3.8)	2 (0.2)	2 (0.2)
Treatable by simple medical intervention	91 (13.0)	233 (33.3)	20 (2.8)	59 (8.4)	33 (4.7)	7 (1.0)	-

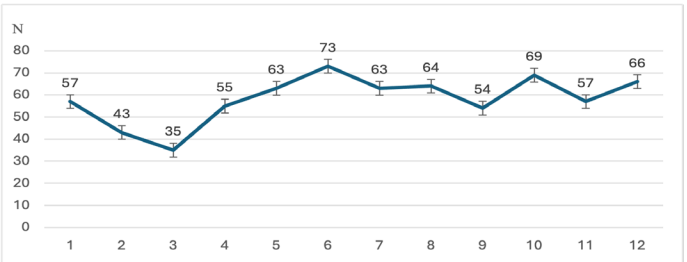


Figure 1. Monthly distribution of cases with maxillofacial trauma

In 24.5% (n=171) of cases, fractures in the maxillofacial bones were observed. The distribution of these fractures is presented in Table 2. Notably, 50% (n=55) of nasal bone fractures were comminuted and/or depressed. It was found that 81% of nasal bone fractures occurred statistically significantly during physical assaults ($\chi^2=16.9$, $p<0.01$). Cases involving multiple maxillofacial bone fractures were also significantly associated with physical assaults ($\chi^2=16.9$, $p<0.01$).

Table 2. Distribution of maxillofacial bone fractures

Bone fractures	Percentage (%)	Sample size (n)
Isolated nasal bone	63.3	109
Isolated maxilla bone	5.8	10
Isolated orbital bone	3.0	5
Isolated zygomatic bone	3.0	5
Isolated mandible bone	2.3	4
Isolated frontal bone	2.3	4
Isolated ethmoid bone	-	-
Multiple bone fractures	20.3	35
Total	100	172

Hospitalization after trauma was recorded in 6% (n=42) of the participants. The shortest hospital stay was 1 day, and the longest was 22 days, with a mean duration of 5.1±4.9 days. A total of 3.4% (n=24) of the trauma victims underwent surgery due to trauma-related injuries.

Life-threatening injuries were reported in 2.3% (n=16) of cases. Furthermore, 36.6% of cases involved injuries that could not be treated with simple medical intervention. Maxillofacial traumas resulting from traffic accidents were statistically significantly more likely to result in injuries requiring more than simple medical care ($\chi^2=16.9$, $p<0.01$). Distribution of cases according to the forensic trauma severity score is presented in Table 3.

In 6.2% of the cases (n=44), patients were called back for a follow-up examination six months later to assess permanent facial scarring, as required by the Supreme Court jurisprudence. In 1.1% (n=8), patients were scheduled for re-examination 6 to 12 months later to evaluate possible loss or reduction of organ function. In total, 2% (n=14) of cases were found to have permanent facial scarring, and 1.2% (n=9) had injuries that resulted in the loss of organ.

Regarding physical examination findings of soft tissue injuries: ecchymosis was the most common finding at 45.1% (n=315), followed by abrasions at 44.9% (n=314), swelling at 35.1% (n=245), incised wounds at 22.3% (n=156), lacerations at 20.3% (n=142), subconjunctival hemorrhage at 6.7% (n=47), hematoma at 4.4% (n=31), and burns at 0.4% (n=3). In addition, 4.3% (n=30) of the cases had dental fractures, with multiple tooth fractures reported in only four cases—all of which were due to traffic accidents. The distribution of soft tissue findings observed during physical examination is presented in Table 4.

Table 4. Distribution of soft tissue findings

Findings	Percentage (%)	Number (n)
Ecchymosis	45.1	315
Abrasion	44.9	314
Swelling	35.1	245
Incised wound	22.3	156
Laceration	20.3	142
Subconjunctival hemorrhage	6.7	47
Hematoma	4.4	31
Burn	0.4	3

Discussion

In our study, maxillofacial trauma was observed predominantly in male patients, and physical assault appeared to be the primary cause, followed by domestic violence. Ecchymoses and abrasions were the most frequently noted soft tissue lesions, and nasal bone fractures were the most common type of bone injury. Although only a small number of patients required hospitalization or surgery, there were still cases with serious consequences, such as life-threatening conditions, permanent scarring, and organ loss. These findings reflect the real-world impact of maxillofacial trauma and suggest that current preventive efforts, especially in areas with high rates of interpersonal violence, may be insufficient.

Literature review indicates differences in the causes of maxillofacial injuries across regions and populations, influenced by cultural norms, social environments, and legal regulations. Traffic accidents appeared to be the most frequent cause of trauma, which is consistent with existing literature [10-12]. This association is more pronounced in Asia and less frequent in Europe [11,13], likely due to stricter road laws implemented in recent years. Conversely, in developed countries, assault is reported as the leading cause of maxillofacial injuries [14-17]. Similarly, studies from Türkiye have reported assault as the leading cause of maxillofacial injuries. According to the study by Balandız et al. [18] assault was identified as the most common cause of injuries in civilian individuals, representing 50% of the

cases, while traffic accidents accounted for 36%. In our study, traffic ranked first among the aetiological causes with a rate of 53.2%, which aligns with findings from the literature. Traffic accidents, with a rate of 14.7%, follow domestic violence as the second most common cause. The noticeably lower incidence of traffic accidents compared to the literature can be explained by the study population's greater presence in rural areas, which are less exposed to heavy urban traffic.

In instances where physical aggression was the cause, the literature reveals that domestic violence is the one of the most common form, with women being the primary victims and their partners—typically the victim's husband or boyfriend—often the perpetrators [19]. Injuries to the face and head have been found to constitute 50% to 75% of injuries in abused children, and are frequently reported in women and the elderly [20,21]. Domestic violence imposes costs, including medical care and services such as police and counseling support. In addition, it generates societal problems, such as the erosion of human capital and a reduction in the overall quality of life. In our study, domestic violence emerged as the second most prevalent etiological factor. This highlights the need to reevaluate strategies to reduce domestic violence.

Males were found to outnumber females in cases of maxillofacial injuries, with male-to-female ratios reported to range from 2.1: to 11:1 [1]. It has been proposed that this may be due to the predominance of male drivers and the potential underreporting of assaults involving females. In this study, 77.3% of all maxillofacial trauma cases involved males, indicating a higher incidence in men compared to women, which is consistent with findings from previous studies. In our study, the mean age was observed to be 35.7 years. When compared to similar studies reporting a patient age range of 25–30 years [18,22], our patient population appears to be slightly older.

The maxillofacial region is anatomically divided into three main sections: the upper face, which includes the frontal bone and frontal sinus; the midface, consisting of the nasal, ethmoid, zygomatic, maxillary, and palatine bones; and the lower face, which constitutes the mandible and temporomandibular region. Maxillofacial trauma can affect various areas, including the cranial vault, the upper third of the face (which encompasses the orbits), the mandibular region, the middle third of the face, involving structures such as the nasal bones, zygomatic bones, and maxilla, as well as the teeth and their associated structures. In our study, among isolated fractures, the most commonly fractured bone was the nasal bone (63.3%), followed by the maxillary bone (5.8%). In addition, patients with multiple fractures accounted for 20.3% of cases. A review of the literature reveals that mandibular fractures are the predominant type. It is claimed that the mandible, as the most prominent bone in the face, is often left unprotected when drivers do not wear helmets [23,24]. Nevertheless, other studies have reported contradictory findings. In some studies, midfacial fractures have been observed more frequently [25]. When examining the subtypes of midfacial fractures, maxillary fractures are more commonly seen, although there are series where

zygomatic fractures are predominant [26-28]. Regions where nasal fractures are observed more frequently than maxillary and mandibular fractures appear to be quite limited, including some studies conducted in Türkiye [18,29]. In the literature, the higher frequency of nasal fractures has been linked to neglect of seatbelt use, which leads to direct collisions of the nasal bones with the steering wheel. However, our findings clearly indicate that the main cause of this trend is the more frequent impact on the nasal bones in assault cases.

Conclusion

This study offers a comprehensive evaluation of the etiology, frequency, and severity of maxillofacial trauma in patients in a forensic medicine outpatient clinic. The predominance of cases among males and the high incidence of assault-related injuries emphasize the need for targeted prevention efforts, including the development of new public health policies aimed at reducing interpersonal violence.

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

The study was approved by the Clinical Research Ethics Committee (26.05.2023/154) of Ordu Ordu University Faculty of Medicine.

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