

# Maxillofacial trauma incidence and patterns in patients admitted to the emergency department: A three-year retrospective study

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## Abstract

**Aim:** Maxillofacial (MF) traumas are most challenging group of patients in emergency departments (ED) due to occurrence of varying degrees of injury. The aim of this study was aid to ED clinicians in establishing correct diagnosis and to aid decision making process; to identify etiology of MF trauma presented to ED and to assess comorbid injuries.

**Materials and Methods:** In this study, we retrospectively analyzed patients with MF trauma presented to ED between January, 2014 and July, 2017. The study included 73 patients among those with MF trauma admitted to ED. Data regarding age, gender, trauma mechanism, treatment modalities, presence of mandibular, zygomatic orbital base, zygomatic arch, frontal sinus and nasal sinus fracture were recorded and analysed.

**Results:** Mean age was 36.18 years (min-max: 7-81 years). It was found that MF was significantly more prevalent in men than women. In our study, traffic accidents were observed to be the most common cause just like in developing countries. 73 patients were surgically operated. 45 of the patients underwent open reduction and fixation with miniplates and screws.

**Conclusion:** Maxillofacial trauma is common in our society. The most common causes are traffic accident and falls; followed by assault, head trauma and firearm injury.

**Keywords:** Emergency department; maxillofacial; trauma

## INTRODUCTION

Maxillofacial (MF) injuries, predominantly seen among men, frequently result in morbidity and aesthetic deformation (1). Its prevalence and etiology vary according to socioeconomic and cultural structure of the community (1,2). The incidence of MF traumas is increased at third decade. Traffic accidents are the most common cause in developing countries; followed by assault, fall and sport injuries (3,4). However, assault is deemed to be the most common cause in developing countries (5,6).

There are multiple injuries and risk for airway depression in more than 60% of patients with MF trauma. Potential injuries associated to MF trauma generally involve head, face, cervical spine and eyes. In emergency departments (ED), nasal and mandibular fractures are observed most commonly; however, mid-facial and zygomatic injuries are more common in trauma centers (3).

Although the diagnosis and management of facial injuries are carried out in the ED, there are challenges in the diagnosis of MF injuries accompanied by multiple traumas.

In this study, we retrospectively reviewed patients with MF trauma admitted to our ED between January, 2014 and July, 2017. In this study, it was aimed to assess etiology, demographics, comorbid traumas and structures involved in MF.

## MATERIALS and METHODS

### Study Type

This descriptive study was performed by retrospective screening files of patients admitted to our adult ED with MF trauma between January, 2014 and July, 2017. All patients with MF trauma and demographic data such as age, gender were included to the study. Patients with concomitant trauma other than MF region and those

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with incomplete demographic data were excluded. Data regarding age, gender, trauma mechanism were recorded while the location of injury site was classified as mandibular, zygomatic, orbital floor, zygomatic arch, frontal sinus and nasal sinus.

### Statistical Analysis

Quantitative data are summarized as count and percent while numeric data are summarized as mean and standard deviation. All statistical analyses were performed by using SPSS version 16.0. The study was approved by the local ethics committee (Decision date: 21.03.2018, Decision number: 07). Informed consent was not taken from patients due to the retrospective nature of the study. The study protocol conforms to the ethical guidelines of the 1975 Declaration of Helsinki.

## RESULTS

Seventy-three patients, who referred to ED with MF trauma were enrolled in the study. Mean age was 36.18 years (min-max: 7-81). It was found that MF was significantly more prevalent in men compared to women (Table 1). There was isolated trauma in 44 patients including only one part of MF region, while multiple MF fractures were seen in 29 patients. When trauma etiology was considered, there was firearm injury in one patient (1.4%) whereas assault in 19 patients (26.0%), fall in 21 patients (28.8%), head injury in 6 patients (8.2%) and traffic accident in 26 patients (35.6%) (Table 2).

Antibiotics had given in 28 patient (38.3%) and tetanus prophylaxis started in 17 patients(23.2%) .

**Table 1. Relationship between etiology of maxillofacial trauma and gender**

Gender	Firearm injury		Violence		Fall		Head injury		Traffic accident		Total		p value
	n	%	n	%	n	%	n	%	n	%	N	%	
Male	1	1.6	18	29	15	24.2	5	8.1	23	37.1	62	100.0	0.302
Female	0	0.0	1	9.1	6	54.5	1	9.1	3	27.3	11	100.0	
Total	1	1.4	19	26.0	21	28.8	6	8.2	26	35.6	73	100.0	

**Table 2. The relationship between etiology of maxillofacial trauma and involvement type**

Involvement type	Firearm injury		Assault		Fall		Head injury		Traffic accident		Total		p value
	n	%	n	%	n	%	n	%	n	%	N	%	
Isolated	1	2.3	14	31.8	13	29.5	2	4.5	14	31.8	44	100.0	0.357
Multiple	0	0.0	5	17.2	8	27.6	4	13.8	12	41.4	29	100.0	
Total	1	1.4	19	26.0	21	28.8	6	8.2	26	35.6	73	100.0	

**Table 3. The distribution of surgical approach and treatment methods according to the maxillofacial trauma and fractures**

Treatment Approach	Patient Number (n=73)
Open Reduction and Internal Fixation (ORIF) with screw and miniplates or microplates	33
Closed Reduction of Fractures and/or Conservative Treatment	13
Intermaxillary Fixation (IMF)	12
Reconstruction with Flaps of Grafts	8
Debridement and/or Primary Repair	7

The most common cause was traffic accident; followed by fall, violence, head injury and firearm injury (Figure 1). When age was considered, it was seen that MF trauma most commonly occur at 20-40 years of age. The incidence was decreased in children and elder individuals (Figure 2).

When MF regions involved were considered, it was seen that mandible was most common site involved (34.9%); followed by zygoma (25.7%), maxilla (13.4%), orbit (9.5%), nasal region (6.2%), frontal (3.5%), ethmoid (1.7%) and sphenoid regions (0.8%) . Mandible fractures were divided

due to regions of mandible (3 symphysis (4%), 17 corpus (23%), 5 angulus (6%), 10 condyle (13%), 6 ramus (8%)). Any of patients necessitated an immediate endotracheal intubation.

The patients were examined based on their treatment approaches. 7 patients with soft tissue damage and laceration without any bone fractures were treated by debridement and primary repair. Among the total of 28 patients with mandible fractures, 15 patients underwent surgery and they were treated with open reduction and

internal fixation (ORIF). Rest of the patients with mandibular fractures (mostly involving condyle and subcondyle fractures) received intermaxillary fixation (IMF). All of the patients were followed up with recommendations of elastic bandaging and soft diet about 3-4 weeks. All of the patients with orbital floor fractures (n=3) received open reduction and internal fixation utilizing titanium mesh plate. 7 patients with isolated zygomatic arc fracture were treated by Gilles maneuver closed reduction. 9 of patients who had zygomatic bone and 5 of patients having maxilla fractures underwent surgery as they were treated by open reduction and internal fixation using miniplates/microplates and screws. 5 patients with nasal fractures were treated in Emergency Service by closed reduction and external nasal splints. 8 patients who had isolated maxillary anterior wall and alveolar bone fractures were followed with conservative treatment and advices. 6 patients with trauma in the upper face needed reconstruction with local flaps while defects of 2 patients were reconstructed with full thickness skin grafts. While 82.1% of the patients underwent operations, 17.9% were followed with conservative treatment and recommendations (Table 3).

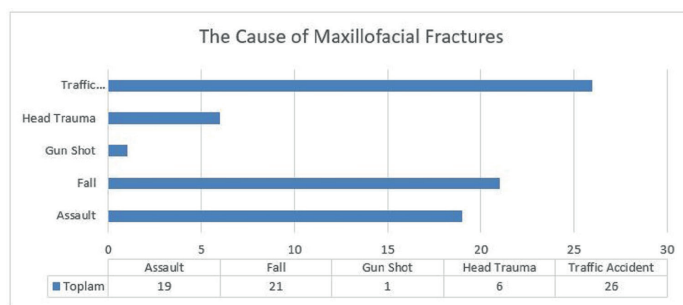


Figure 1. Etiology in maxillofacial trauma

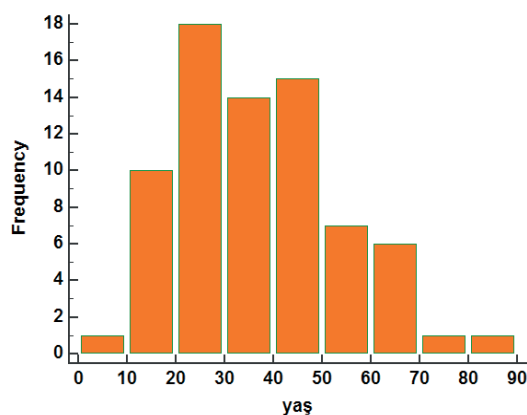


Figure 2. Age distribution

## DISCUSSION

Although male: female ratio varied across countries in MF trauma in previous studies, its prevalence is markedly higher among men than women. The male: female ratio was found as 11.2: 2 in United Arab Emirates, 3: 1 in Brazil, 4.7: 1 in Nigeria, 3: 1 in Israel, 4.5: 1 in Iran; 3.3: 1 in Korea and 3.8: 1 in Malaysia (7). In studies from Turkey,

male: female ratio was reported as 3: 1 in İstanbul and 4: 1 in Diyarbakır (8,9). In our study, it was found as 6: 1. Socioeconomic and cultural differences affect male: female ratio.

According to literature, MF traumas are most frequently seen at third decade. In our study, patients aged 20-25 years were found as age group which most frequently exposed to MF traumas. In Diyarbakır, it was found as 0-10 years of age.

In previous studies, it has been suggested that the etiology varies in MF traumas according to development level of countries. In the study by Erol et al., traffic accident and falls were most common etiology whereas violence in the study by Bamjee et al. and traffic accident in the study by Al-Khateeb et al (9-11). In the study by Schaftenaar et al., traffic accident was most common cause in MF traumas, followed by violence whereas daily living activities and sport injuries were reported to be most common cause of MF traumas with lesser frequency of traffic accident and violence in the study by Gassner et al (12). In parallel to the study by Erol et al., traffic accident and falls were determined as the most frequent causes of MF traumas; followed by violence, head injury and firearm injury also in our study.

In general, traffic accidents are leading cause in patients with MF traumas in the literature (7,12). The male: female ratio is in favor of male patients but the proportion of female patients is increasing in recent years. In our study, MF traumas were more common in male patients with comparable ratio among female patients. This may be due to increased participation of women in social life, increased number of female drivers and improved social welfare and capabilities. Fortunately, incidence of firearm injury-related MF traumas was low in our study. This indicates that our province is safe area with higher sociocultural level of population.

When isolated bone fractures are considered, mandibular, nasal, maxillary and zygomatic fractures are leading fractures affected in patients with MF, although varying ratios have been reported in the literature (7). In our study, mandible was the most commonly involved bone; followed by maxilla and zygo, nasal bone and orbit. Trauma of the lower face is usually more often compared to upper face following maxillofacial trauma (13). Another study about maxillofacial trauma reported that mandible fractures were the most common fractures with the ratio of 60% (14). As in literature, corpus was most frequently involved bone in mandibular fractures; followed by condylar fracture in our study as well as mandible fractures were the most common injury type of maxillofacial trauma, just like aforementioned. In our series, 82,1 % of all patients and 15 of 28 patients with mandible fractures were treated by open reduction and internal fixation. Hassanein reported that open reduction and internal fixation is more common in fractures of the mandible symphysis, body, angle, and ramus while the condyle and coronoid process were commonly treated with closed reduction (15).

Our experiences with maxillofacial trauma cases were quite similar to those he reported.

Midfacial fractures that do not result in excessive facial asymmetry or functional restriction are usually followed up only by observation. If zygomaticomaxillary complex fractures lead to an impaired mastication, malocclusion, trismus, hypoesthesia, etc. or aesthetical concerns, surgical treatment was almost always suggested and performed in patients whose informed consent forms were approved by themselves or relatives.

Park et al. reported that nasal fractures constituted 65% of maxillofacial fractures basing this findings on that the nose is the most exposed area on face as it has less mechanical strength in accordance with the other facial bones (16). In contrast, we observed much more rare nasal fractures in our series. Although Park et al's supports are reasonable we attributed the lower rates of nasal fracture (9.5%) in ED. This can be explained with the fact that patients with isolated nasal fracture can readily access to ENT clinics in our hospital. It is anticipated that nasal bone should be involved due to its localization at face. Maxillofacial trauma requires a multidisciplinary approach and team work. Plastic surgery, ENT, anesthesiology, ophthalmology, neurosurgery are inextricable parts of this whole during the emergency specialist is in charge of this team. As seen in this retrospective analysis, most of the patients admitted to the emergency department with maxillofacial traumas are treated by plastic surgery. Each type of maxillofacial trauma should be handled as a unique case and patients with maxillofacial trauma must be consulted by an experienced plastic surgeon without any hesitation when necessary, whether surgery is required or not.

## CONCLUSION

Our study limitations are low population numbers for statistical measurements and statistical analysis could not be performed correspondingly since this study is a retrospective study.

MF traumas are frequently encountered in our population. The most common causes were traffic accidents and falls; followed by violence, head injury and firearm injury. The rate of MF trauma increases by improving sociocultural and development level of society. This suggests that scientific and technological advances tend to increase incidence of MF trauma.

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