



The prevalence of maxillary fractures in trauma patients referred to Shahid Rajaei hospital in Shiraz from 2011 to 2021

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ABSTRACT

Introduction: Maxillofacial fractures are one of the most common fractures in the body due to trauma. Maxillary fractures, especially Lefort fractures, are common fractures. The aim of this study is to evaluate the prevalence and etiology of Lefort fractures in patients referred to Shahid Rajaei Hospital during 2011 to 2021.

Materials and Methods: In this cross-sectional study, 2700 patients who referred to the maxillofacial surgery department of Shahid Rajaei Hospital in Shiraz between 2011 to 2021 due to trauma and fractures of the jaw and face were examined. 903 cases were related to patients with upper jaw fracture and were included in the study. The demographic information of the patients, including age, sex, cause of trauma, and also the type of fracture, were extracted from their records. The etiology of maxilla fracture was divided into three groups: vehicle accidents, violence and interpersonal conflict, and accidents during work and sports. Finally, in order to analyze the data, it was done through statistical tests.

Results: 65% of patients were male and 35% were female. The average age of people was 38.5 years. Lefort I fracture was reported in 25% of patients, Lefort II fracture in 31% and Lefort III fracture in 11% of patients. 46% of patients had fractured maxilla due to vehicle accidents, 26% of patients due to interpersonal violence, and 27% of patients due to accidents during work and sports.

Conclusion: The prevalence of Lefort fracture in men is significantly higher than in women. In our society, injuries caused by road accidents, especially car accidents, are the most common causes of Lefort fractures. The most common type of Lefort fracture is Lefort II fracture. Of course, the cause of injury has an important effect on the pattern of injury.

Keywords: Trauma; Lefort fracture; Maxilla fracture.

Introduction

Midface fractures affect the maxilla, zygoma and ethmoid naso-orbital complex [1]. Lefort fractures comprise about 10 to 20% of facial fractures, including Lefort 1, 2, and 3 fractures. Lefort 1 fracture occurs when horizontal pressure is applied to the maxilla and breaks the maxilla through the sinus and along the floor of the nose. The forces that enter in a high-

er direction cause a Lefort 2 fracture, in which the maxilla and the nasal complex are separated from the orbit and zygoma structures. Lefort 3 occurs when the force enters so much higher that the naso-orbital ethmoid complex, zygoma and separate the maxilla from the base of the skull. Every year, due to road accidents and accidents with motor vehicles, interpersonal conflicts, accidents at work, etc. [2],

a large number of people who are usually young suffer trauma in the head and face area. Maxilla fractures are one of the most common fractures resulting from facial trauma. Fractures of the upper jaw area are about 20 to 60% of fractures following injuries to the head and face. The frequency of these fractures varies from country to country due to cultural differences and different factors causing injury. Jaw and facial fractures are common after trauma. The high probability of these fractures is related to the prominent and central position of the facial bones, which are often exposed to traumatic force [3]. Normally, maxilla fractures and trauma are seen in younger people and men and in societies that are at a lower level economically and culturally. The peak incidence of jaw and facial injuries is related to the age groups of 21-30 years old due to various and many activities of this age group such as travel, sports, careless driving and physical violence, etc.[4].

The male to female ratio is reported between 1.2 and 1.11 in the articles. Among the common complications of maxillofacial fractures are facial asymmetry, deformity, loss of chewing and visual function, and the need for long-term treatment in the injured. Lefort fractures comprise about 10 to 20% of facial fractures, including Lefort 1, 2, and 3 fractures [5]. Considering that fracture of the upper jaw is a very important issue that has a great impact on both beauty and health and quality of life, identifying the frequency of maxillary fractures and their causes can provide the necessary information for formulating intervention strategies with the aim I wish the injuries and complications caused by it would be provided for the policymakers of the health system. In this study, we aim to investigate the prevalence of maxillary fractures and determine the cause of these fractures in trauma patients referred to Shahid Rajaei Hospital between 2011 and 2021 [6].

Method and Materials

This study was carried out after being approved by the ethics committee of the Shiraz Faculty of Dentistry with the ethics ID IR.SUMS.DENTAL.REC.1401.048 and obtaining consent from the patients. In this cross-sectional study, the files of 2700 patients who referred to the Maxillofacial Surgery Department of Shahid Rajaei Hospital in Shiraz between 1390 and 1400 due to trauma and fractures of the jaw and face were examined. After examining the files, the file of the target group, i.e. the patients in whom maxilla fracture was seen, was separated. Among these 2700 cases, 903 cases related to patients with maxillary fracture were included in the study. The exclusion criteria of this

study include patients who have incomplete hospital records and patients who have severe anomalies, as well as patients who have specific syndromes. Demographic information of the patients, including age, sex, cause of trauma, and type of fracture were extracted from their files, and the information of all age groups and both sexes were analyzed and separated. The etiology of maxilla fracture was divided into three groups: vehicle accidents, violence and interpersonal conflict, and accidents at work and sports. Finally, in order to analyze and analyze the data, descriptive indices of abundance (percentage) and mean, standard deviation and range of changes and to analyze the data from chi-square tests at a significance level of 0.05 using statistical software version 25 SSPS was used.

Results

In this 10-year study, the files of 2700 patients who were referred to Shahid Rajaei Hospital due to trauma were examined. There were 903 patients with maxilla fracture, whose demographic information, etiology of trauma and type of fracture were analyzed. The age of these people was between 6 and 71 years, and the average age of these people was 38.5 years. The most common age group with upper jaw fracture was 17 to 36 years, which included 605 people (66%). Of these, 586 were men (65%) and 317 were women (35%). As a result, trauma occurs 1.86 times more often in men than in women. Among these patients, 105 cases of alveolar process fracture with tooth loss were reported.

Fractures of zygoma and orbit were reported in 186 patients. Lefort I fracture was reported in 228 patients (25%), Lefort II fracture was reported in 282 (31%) patients, and Lefort II fracture was reported in 102 patients (11%) (Chart 1-4) (Table 1-4). Etiology of trauma in these patients are: vehicle accidents, interpersonal violence and conflict, accidents during work and sports (Chart 4-2) 420 (46%) people suffered maxilla fractures as a result of vehicle accidents, of which 33 (3.6%) were due to a bicycle accident and 69 (7.6%) were due to a motorcycle accident and 318 (35 percent) suffered a fracture of the upper jaw due to a car accident. 240 people (26%) suffered from trauma and fracture of the upper jaw due to conflicts and interpersonal violence, and 243 people (27%) suffered from maxilla fracture due to accidents during work and sports. (Table 2-4). There was a significant relationship between the frequency of fractures of different points of the maxilla with the age of the patients. ($p=.038$, in other words, maxilla trauma and fracture are more common in the age group of 18 to 26 years than other age groups. Also,

there is a significant relationship between the frequency of fractures of different points of the maxilla and gender. There was no significant relationship between

the frequency of fractures of different points of the maxilla with the cause of trauma.

Table 1-1. Frequency of fractures of different points of the maxilla.

Percent	Number	Fractures of different areas of the Maxilla
11.6%	105	Alveolar process fracture
20%	186	Zygoma and Orbit fractures
25%	228	Lefort I fracture
31%	282	Lefort II fracture
11%	102	Lefort III fracture

Table 1-2. Frequency of etiology of maxillary fractures.

Percent	Number	Etiology of trauma
57%	318	car Vehicle accident
7.6%	69	motorcycle
35%	33	bike
26%	240	Interpersonal violence
27%	243	Accident during work and sports

Discussion

Every year, a large number of people suffer trauma in the jaw and face following accidents such as road accidents. Due to the prominent position of the face compared to other parts of the body, trauma in this area is extremely common. Following trauma to the jaw and face, various parts, including the maxilla, may be fractured. Fractures may occur in different parts of the maxilla, including cheekbones, dental areas, and Lefort fractures [7]. Lefort fractures are a pattern of complex facial injuries caused by direct blows to the face. In the Lefort fracture, the maxilla breaks in a horizontal line from the upper area of the alveolar process. In the Lefort II fracture, the maxilla and nose are separated from the orbit and zygoma structures. In the Lefort III fracture, the maxilla, zygoma, and also the nasoorbital complex of the ethmoid are separated from the base of the skull [8]. In the present study, the average age of the patients was reported to be 38.5 years, but the most common age group of the patients was the age group of 17 to 36 years. This rate is similar to the studies of Khan and BC Patel [9] and GH oliveria [10]. The reason for this average age can be attributed to carelessness and adventure in these ages, so that people in this age group have accidents and traumas after doing dangerous and exciting work. In this study, the ratio of men to women with facial trauma and fracture was reported as 1.86. This result is similar to the

studies of CP Sawhney [11], RH Haung [12], and KB Nair [13], in their studies, men suffered facial trauma and fractures about 2 times more than women. This difference between the number of women and men involved in trauma can be attributed to the fact that men drive at higher speeds and with less caution than women. Also, men do heavier work than women, including working at heights and working with heavy tools and machinery, as a result, they are more exposed to work accidents than women. Also, conflicts and violence are more in men than in women, as a result, the trauma caused by it is more in men [14].

In this study, the most common fracture in the maxilla was Lefort II fracture (31%), followed by Lefort I fracture (25%). The prevalence of other maxillary fractures are, respectively, zygoma and orbit fractures (20%), alveolar appendage fractures (11.6%) and Lefort III fractures (11%). In Adekey's study, the most common type of maxillary fracture was Lefort II fracture. The difference in the location and anatomy of fractures is related to various factors, such as the intensity of the impact, the direction of the impact, as well as the type of objects and the speed of impact.

The etiology of trauma in this study was divided into three categories:

1. Vehicle accidents.
2. Accidents during work and sports.

3. Interpersonal conflict and violence.

The most common cause of trauma was reported to be vehicle accidents (47 percent), most of which were caused by car accidents. In the next order, motorcycle accidents (7.6%) and finally bicycle accidents (3.6%) were the causes of trauma. This result was similar to the studies of JK Moffitt [15], NK Sharma [16], and T Lizula [17], based on their results, the most common etiology of trauma was called road accidents. This result was contrary to the results of AK Ikeda's studies. In his study, the main causes of trauma were fights and conflicts, as well as incidents during work and conflicts with animals. The reason for this difference can be attributed to the fact that AK Ikeda [18] conducted his study in rural areas, and in those areas, due to their cultural differences, there may be more conflicts and also due to differences in lifestyle and existence. Wild animals in those areas, as well as less access to vehicles, are other causes that lead to more trauma than road accidents. In our study, 27% of the causes of trauma were related to work and sports accidents, which is similar to the studies by RB Bell, J. Souza, and DV Ngoc

Also, 26% of the traumas happened due to conflicts and interpersonal violence. There was a significant relationship between the frequency of fractures of different points of the maxilla with the age of the patients. ($p=0.038$, in other words, maxilla trauma and fracture are more common in the age group of 18-36 years than other age groups. This result is similar to the studies of G Drossi and YH Niroua. The reason for this issue is It is that at a young age, due to the fact that people tend to do dangerous things, the incidence of trauma is also higher. Also, there is a significant relationship between the frequency of fractures of different points of the maxilla with gender. ($p=0.04$ and trauma and fracture of the maxilla are more common in men than in women. This finding is similar to the studies of S Jaibor [19], Fd Varis [20], and Sh Patt [21]. The reason for this issue, as mentioned before, is related to the fact that men are more exposed to accidents than women and trauma happens more often in them. There was no significant relationship between the frequency of fractures of different points of the maxilla with the cause of trauma.

Conclusion

The prevalence of Lefort fractures is significantly higher in men than in women. In our society, injuries caused by road accidents, especially car accidents, are the most common causes of Lefort fractures. The most

common type of Lefort fracture is Lefort II fracture. Of course, the cause of injury has an important effect on the pattern of injury.

Conflict of Interest

There is no conflict of interest to declare.

References

- [1] Aksoy, E., E. Ünlü, and Ö. Sensöz, A retrospective study on epidemiology and treatment of maxillofacial fractures. *Journal of Craniofacial Surgery*, 2002. 13(6): p. 772-775.
- [2] Covington, D.S., et al., Changing patterns in the epidemiology and treatment of zygoma fractures: 10-year review. *The journal of trauma*, 1994. 37(2): p. 243-248.
- [3] De Feo, V. and R.M.U. Soria, Medicinal plants and phytotherapy in traditional medicine of Paruro Province, Cusco Department, Peru. *Pharmacology Online*, 2012. 1: p. 154-219.
- [4] Erol, B., R. Tanrikulu, and B. Görgün, Maxillofacial fractures. Analysis of demographic distribution and treatment in 2901 patients (25-year experience). *Journal of Cranio-Maxillofacial Surgery*, 2004. 32(5): p. 308-313.
- [5] Finn, R.A., Treatment of comminuted mandibular fractures by closed reduction. *Journal of oral and maxillofacial surgery*, 1996. 54(3): p. 320-327.
- [6] Fraioli, R.E., B.F. Branstetter IV, and F.W.-B. Deleyannis, Facial fractures: beyond le fort. *Otolaryngologic Clinics of North America*, 2008. 41(1): p. 51-76.
- [7] Juncar, M., et al., An epidemiological analysis of maxillofacial fractures: a 10-year cross-sectional cohort retrospective study of 1007 patients. *BMC oral health*, 2021. 21(1): p. 1-10.
- [8] Kain, R. and S. Arya, Camel bite: an uncommon mode of maxillofacial injury, its mechanism and fatality: case series and review of literature. *National journal of maxillofacial surgery*, 2015. 6(2): p. 172.
- [9] Kamath, R.A., et al., Maxillofacial trauma in central karnataka, India: an outcome of 95 cases in a regional trauma care centre. *Craniofacial trauma & reconstruction*, 2012. 5(4): p. 197-204.

- [10] Katpar, S., et al., Maxillofacial Trauma Spectrum At Civil Hospital Karachi: A Report From Largest Tertiary Care Public Sector Teaching Hospital In Sindh Province. *Cell*, 2015. 333: p. 2274401.
- [11] Kelly, K.J., et al., Sequencing LeFort fracture treatment (Organization of treatment for a panfacial fracture). *The Journal of craniofacial surgery*, 1990. 1(4): p. 168-178.
- [12] Khitab, U., et al., Occurrence and characteristics of maxillofacial injuries-A study. *Pakistan Oral & Dental Journal*, 2010. 30(1).
- [13] Kim, H.S., S.E. Kim, and H.T. Lee, Management of Le Fort I fracture. *Archives of Craniofacial Surgery*, 2017. 18(1): p. 5.
- [14] Laine, F.J., W.F. Conway, and D.M. Laskin, Radiology of maxillofacial trauma. *Current problems in diagnostic radiology*, 1993. 22(4): p. 148-188.
- [15] Lee, K.C., S.-K. Chuang, and S.B. Eisig, The characteristics and cost of Le Fort fractures: a review of 519 cases from a nationwide sample. *Journal of Oral and Maxillofacial Surgery*, 2019. 77(6): p. 1218-1226.
- [16] Majambo, M., et al., Prevalence of oral and maxillofacial injuries among patients managed at a teaching hospital in Rwanda. *Rwanda Journal of Health Sciences*, 2013. 2(2): p. 20-24.
- [17] Malik, S., et al., Orofacial trauma in rural India: A clinical study. *Chinese journal of traumatology*, 2017. 20(4): p. 216-221.
- [18] Moffitt, J.K., et al., Factors associated with surgical management for pediatric facial fractures at a level one trauma center. *Journal of Craniofacial Surgery*, 2019. 30(3): p. 854-859.
- [19] Motamedi, M.H.K., Primary management of maxillofacial hard and soft tissue gunshot and shrapnel injuries. *Journal of Oral and Maxillofacial Surgery*, 2003. 61(12): p. 1390-1398.
- [20] Nair, K.B. and G. Paul, Incidence and aetiology of fractures of the facio-maxillary skeleton in Trivandrum: a retrospective study. *British Journal of Oral and Maxillofacial Surgery*, 1986. 24(1): p. 40-43.
- [21] Ngoc, D.-V., et al., Evaluation of Bite Force After Treatment of Le Fort Fractures by Internal Fixation and Mandibulomaxillary Fixation. *Medical Archives*, 2021. 75(5): p. 371.

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