Evaluation of maxillofacial fracture cases: A retrospective study

Maksillofasiyal kırık olgularının değerlendirilmesi: Retrospektif bir çalışma

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SUMMARY

Aim: The purpose of this study is to characterize the fractures in relation to age, gender, mechanism of injury, and anatomic location of fractures.

Materials and Method: Seventy-nine patients admitted to the Department of Oral and Maxillofacial Surgery of Kocaeli University Faculty of Dentistry between July 2013 and June 2018 with the diagnosis of the maxilla or mandible fracture and who have been treated, were included in our study. Data were collected regarding age, sex, etiology, time distribution, site of the fracture, treatment protocol and evaluated.

Results: A total of 79 patients with 101 fractures were included in this study. The results were achieved from 58 (73.4%) males and 21 (26.6%) females, whose ages ranged from 7 to 65 years and the mean age was 31.36±13.07. Traffic accidents (30.4%) were the major cause of etiology of the trauma and followed by violence (27.8%) and falls (17.7%). The most common fractured anatomic sites were angulus (34.6%) and parasymphyseal regions (17.8%).

Conclusion: Maxillofacial fractures result from various types of facial trauma. Traffic accident and violence are the most common etiological factors for these fractures. A deeper understanding of preventive actions to reduce falls, traffic accidents and aggression in the population can be beneficial to people in terms of quality of life.

Keywords: Maxillofacial fracture, maxillofacial trauma, etiology.

ÖZET

Amaç: Bu çalışmanın amacı kırıkların; yaş, cinsiyet, yaralanma mekanizması ve kırıkların anatomik lokasyonu ile ilişkilerinin karakterize edilmesidir.

Gereç ve Yöntem: Maksilla veya mandibula kırığı tanısı ile Temmuz 2013-Haziran 2018 tarihleri arasında Kocaeli Üniversitesi Diş Hekimliği Fakültesi Ağız Diş Çene Cerrahisi Anabilim Dalı'na başvuran ve tedavi edilen 79 hasta çalışmamıza dahil edildi. Yaş, cinsiyet, etiyoloji, zaman dağılımı, kırık yeri ve tedavi protokolleri ile ilgili veriler toplandı ve değerlendirildi.

Bulgular: Bu çalışmaya 101 kırığı olan toplam 79 hasta dahil edildi. Sonuçlar, yaşları 7 ile 65 arasında değişen ve yaş ortalaması 31,36 ± 13,07 olan 58 (%73,4) erkek ve 21 (%26,6) kadından elde edildi. Trafik kazaları (%30,4) travma etiyolojisinin en önemli nedeniydi ve bunu darp (%27,8) ve düşmeler (%17,7) izlemekteydi. En sık kırılan anatomik bölgeler angulus (%34,6) ve parasimfiz bölgeler (%17,8) idi.

Sonuç: Maksillofasiyal kırıklar çeşitli yüz travmalarından kaynaklanmaktadır. Trafik kazası ve darp, bu kırıklar için en yaygın etiyolojik faktörlerdir. Toplumdaki düşmeleri, trafik kazalarını ve saldırganlığı azaltmak için önleyici eylemlerin daha iyi anlaşılması, insanların yaşam kalitesi

açısından yararlı olabilir.

Anahtar kelimeler: Maksillofasiyal fraktür, maksillofasiyal travma, etiyoloji

INTRODUCTION

Jaw fractures are documented as one of the most common injuries of the facial skeleton. There is much research about the incidence, localizations, distributions of sex and age of maxillofacial fractures in the literature.[1-9] The most common reported cause is traffic accidents.[1-4,7] Besides road traffic accident and violence, direct/indirect trauma occurs and certain disease entities like cystic lesion, neoplasms, and metabolic diseases.[10] The etiology and incidence of maxillofacial fractures are dependent on social, cultural, economic and environmental factors and show differences between the regions experienced.[11,12] In different regions of countries, the incidence of maxillofacial trauma differs.[12] The purpose of this article is to present the results of the 79 patients with 101 fractures of the maxillofacial region and compare with the literature.

MATERIAL AND METHODS

In the study, we retrospectively analyzed 79 patients with 101 fractures in Department of Oral and Maxillofacial Surgery of Kocaeli University Faculty of Dentistry between July 2013 and June 2018. Age, sex, fracture etiology, anatomic localization, the monthly distribution of traumas and treatment methods were evaluated. Localization of the mandibular fractures was divided into the ten groups as the angel, symphysis, parasymphysis, body of the mandible, condyle, ramus, tuber, zygoma, dentoalveolar of the maxilla and mandible fractures. Etiologic factors were evaluated under the titles of traffic accidents, falls, violence, sports injuries, oral pathologies, and work accidents. Open reduction and closed reduction treatments were performed. Mini plates, reconstruction plates, mini screws, IMF arch bar, and IMF screws were placed in the treatment of open and closed reduction. Soft diet and medical treatment were administered to all patients. Data were collected from patient files in the archive and were analyzed using SPSS version 20.0 software (Chicago, IL, USA).

RESULTS

The data of 79 patients with 101 fractures were analyzed. Age, sex, fracture etiology, anatomic localization, the monthly distribution of traumas and treatment methods were examined (Table 1 and 2).

Table 1. Data of fracture cases in female patients (CR=closed reduction, OR=open reduction, GA=general anesthesia, LA=local anesthesia)

Age	Etiology	Treatment protocol	Anesthesia	Number of fractures	State of fractures	Month	Fractured regions
18	Fall	OR	LA	1	non displaced	June	Parasymphysis
18	Fall	CR	LA	2	non displaced	June	Angel, Parasymphysis
33	Fall	OR	GA	1	displaced	June	Condyle
24	Fall	CR	GA	2	non displaced	April	Symphysis, Ramus
25	Fall	CR	LA	1	non displaced	May	Symphysis
35	Fall	OR	GA	1	non displaced	April	Body of the mandible
45	Fall	OR	GA	1	non displaced	December	Angle
24	Traffic Accident	OR	GA	3	non displaced	September	Angel, Parasymphysis, Body of the mandible
62	Traffic Accident	OR	LA	2	displaced	September	Tuber, Dentoalveolar of the maxilla
40	Traffic Accident	OR	LA	1	displaced	January	Dentoalveolar of the maxilla
32	Traffic Accident	CR	LA	1	displaced	December	Condyle
44	Traffic Accident	CR	LA	1	non displaced	September	Dentoalveolar of the mandible
21	Traffic Accident	OR	LA	1	displaced	May	Dentoalveolar of the maxilla
12	Violence	OR	GA	2	non displaced	May	Parasymphysis, Body of the mandible
23	Violence	OR	GA	1	non displaced	August	Angle
32	Violence	CR	LA	1	displaced	April	Parasymphysis
33	Violence	CR	LA	1	non displaced	August	Dentoalveolar of the mandible
52	Pathology	OR	GA	1	non displaced	March	Body of the mandible
33	Pathology	OR	GA	1	non displaced	May	Symphysis
35	Pathology	OR	GA	1	non displaced	September	Body of the mandible
51	Work Accident	OR	LA	1	displaced	February	Tuber

Table 2. Data of fracture cases in male patients (CR=closed reduction, OR=open reduction, GE=general anesthesia, LA=local anesthesia)

Age	Etiology	Treatment protocol	Anesthesia	Number of fractures	State of fractures	Month	Fractured regions
22	Traffic Accident	OR	GA	2	non displaced	July	Angle, Parasymphysis
31	Traffic Accident	CR	GA	1	displaced	November	Condyle
35	Traffic Accident	OR	GA	2	displaced	December	Condyle (Right and Left)
27	Traffic Accident	OR	LA	2	non displaced	October	Body of the mandible (Right and Left)
26	Traffic Accident	OR	GA	1	displaced	December	Zygoma
17	Traffic Accident	OR	GA	2	non displaced	June	Angle, Symphysis
25	Traffic Accident	OR	GA	2	displaced	October	Angle, Parasymphysis
25	Traffic Accident	OR	GA	2	displaced	January	Angle, Parasymphysis
42	Traffic Accident	CR	LA	2	displaced	June	Symphysis, Condyle
29	Traffic Accident	CR	LA	1	non displaced	April	Angle
29	Traffic Accident	CR	LA	1	non displaced	April	Angle
18	Traffic Accident	CR	LA	1	non displaced	July	Symphysis
28	Traffic Accident	CR	LA	1	non displaced	December	Angle
24	Traffic Accident	CR	LA	1	non displaced	July	Angle
25	Traffic Accident	CR	LA	2	non displaced	September	Symphysis (Right and Left)
29	Traffic Accident	OR	GA	1	non displaced	February	Angle
27	Traffic Accident	OR	GA	2	displaced	June	Symphysis, Condyle
20	Traffic Accident	OR	LA	1	non displaced	June	Angle
59	Violence	OR	LA	1	displaced	October	Body of the mandible
28	Violence	OR	GA	2	displaced	April	Angle, Body of the mandible
24	Violence	OR	GA	1	displaced	June	Angle
37	Violence	OR	LA	1	non displaced	September	Parasymphysis
45	Violence	OR	GA	3	displaced	June	Zygoma (Right and Left), Dentoalveolar of the maxilla
35	Violence	OR	GA	2	non displaced	June	Angle, Parasymphysis
50	Violence	OR	LA	2	displaced	August	Angle, Parasymphysis
21	Violence	CR	LA	1	non displaced	June	Parasymphysis
16	Violence	CR	LA	2	non displaced	November	Angel, Body of the mandible
20	Violence	CR	LA	2	non displaced	March	Angle, Parasymphysis
21	Violence	CR	LA	2	non displaced	November	Angel (Right and Left)
19	Violence	CR	LA	1	non displaced	September	Symphysis
26	Violence	OR	GA	1	displaced	February	Angle
15	Violence	OR	GA	2	non displaced	April	Angle, Parasymphysis
31	Violence	OR	LA	1	non displaced	May	Angle
28	Violence	OR	GA	2	displaced	May	Angle
24	Violence	CR	LA	1	displaced	March	Dentoalveolar of the maxilla
30	Violence	OR	GA	1	non displaced	May	Angle
21	Fall	OR	GA	1	non displaced	November	Angle
17	Fall	OR	GA	1	non displaced	December	Angle
42	Fall	OR	GA	1	non displaced	September	Parasymphysis
54	Fall	CR	LA	1	non displaced	August	Symphysis
22	Fall	CR	LA	2	non displaced	February	Angel, Symphysis
7	Fall	CR	LA	1	non displaced	September	Dentoalveolar of the mandible
15	Fall	CR	LA	1	non displaced	December	Dentoalveolar of the maxilla
41	Work Accident	OR	GA	1	displaced	November	Body of the mandible
45	Work Accident	OR	GA	1	displaced	August	Angle
34	Work Accident	OR	LA	1	non displaced	May	Parasymphysis
32	Work Accident	CR	LA	1	non displaced	August	Symphysis
42	Work Accident	OR	LA	1	non displaced	August	Dentoalveolar of the mandible
57	Work Accident	CR	LA	1	non displaced	December	Dentoalveolar of the maxilla
23	Sport Injury	OR	GA	1	non displaced	September	Angle
20	Sport Injury	OR	GA	1	displaced	January	Condyle
18	Sport Injury	OR	GA	2	non displaced	September	Angle, Parasymphysis
37	Sport Injury	CR	LA	1	displaced	September	Condyle
21	Sport Injury	CR	LA	1	non displaced	January	Angle
63	Sport Injury	OR	LA	1	non displaced	January	Angle
41	Pathology	OR	GA	1	displaced	October	Angle
61	Pathology	OR	GA	1	non displaced	November	Parasymphysis
65	Pathology	OR	LA	1	non displaced	October	Body of the mandible

-Age and Gender Distribution

The age range of patients was 7-65 and mean age was 31.36±13.07. These values were 12-62 and 32.95 in women and 7-65 and 30.79 in men. There were 58 (73.4%) male and 21 (26.6%) female patients and M/F ratio was 2.7:1. There were no significant differences between sex and etiology (Chi-Square, p=0.113).

-Etiology

The etiologic factors were 24 (30.4%) traffic accidents, 22 (27.8%) violence, 14 (17.7%) falls, 7 (8.9%) work accidents, 6 (7.6%) pathologies, 6 (7.6%) sports injuries in this study (Table 3).

Table 3. The distributions of etiologic causes and mean age

Etiology	Number of Patients	Percent (%)	Mean Age
Traffic Accidents	24	30.4	38.65
Violence	22	27.8	34.41
Falls	14	17.7	31.39
Work Accidents	7	8.9	62.79
Pathologies	6	7.6	65.83
Sport Injuries	6	7.6	33.58
Total	79	100	31.36

The distributions of etiological factors in men and women are shown in Table 4.

Table 4. The distributions of etiological causes in male and female

Etiology	Female		Male	
	Number of Patients	Percent (%)	Number of Patients	Percent (%)
Traffic Accidents	6	28.6	18	31.0
Violence	4	19.0	18	31.0
Falls	7	33.3	7	12.1
Work Accidents	1	4.8	6	10.3
Pathologies	3	14.3	3	5.2
Sport Injuries	0	0	6	10.3
Total	21	100.0	58	100.0

The relation between age and etiology was analyzed by Kruskal-Wallis and a significance was obtained (p=0.03). The mean age of work accidents and pathological fractures were found to be significantly higher. While other etiologic causes were in the third decade, work accidents and pathological fractures were common in the sixth decade.

-Fracture Localization

The most common site of fracture is the angle of the mandible (34.6%) followed by parasymphysis (17.8%) and symphysis (11.8%). Distribution is shown in Table 5.

Table 5. The distribution of the localization of fracture

Localization	Fracture Site Case Number in Female Patients	Fracture Site Case Number in Male Patients	Case Number in Total Patients	Percent (%)
Angle	4	31	35	34.6%
Symphysis	3	9	12	11.8%
Parasymphysis	5	13	18	17.8%
Body of the mandible	5	6	11	10.8%
Condyle	2	6	8	7.9%
Ramus	1	0	1	0.9%
Dentoalveolar of the mandible	2	2	4	3.9%
Tuber	2	0	2	1.9%
Zygoma	0	3	3	2.9%
Dentoalveolar of the maxilla	3	4	7	6.9%
TOTAL	27	74	101	100%

No significance was obtained for the relationship between localization of fracture and etiology (Chi-Square, p=0.643).

-Distribution by Months

Fractures were mostly seen in September (15.2%), which was followed by June (13.9%). (Table 6).

Table 6: The distribution of the fractures according to the months

Month	Frequency	Percent (%)
January	5	6.3
February	4	5.1
March	3	3.8
April	7	8.9
May	8	10.1
June	11	13.9
July	3	3.8
August	7	8.9
September	12	15.2
October	5	6.3
November	6	7.6
December	8	10.1

A signification was detected when etiology of fracture and its distribution by months were compared (Chi-Square, p=0.009).

-Type and Number of the Fracture

There were 52 (65.8%) patients with non-displaced fractures and 27 (34.2%) patients with displaced fracture. One fracture line in 54 (68.4%) patients, 2 fracture lines in 23 (29.1%) patients, 3 fracture lines in 2 (2.5%) patients was observed. There were no significant differences between fraction number and etiology (p=0.265)

-Management of Treatments

The treatment protocol was shown in Tables 1 and 2. Twenty-nine (36.7%) patients were treated with closed reduction and 50 (63.3%) patients were treated with open reduction. 37 (46.8%) of the cases were treated under local anesthesia and 42 (53.2%) of them were treated under general anesthesia.

DISCUSSION

Maxillofacial injuries frequently affect men more than women.[13-15] Our study also suggests that men visit our department more than women do, for maxillofacial trauma. It would be related to activity in social life that results men to be exposed to traffic accidents, physical attacks, and workplace and sports accidents more frequently than women.[12,16]

The epidemiology of maxillofacial fractures varies based on many different reasons such as geographical region, cultural and lifestyle differences, and socioeconomic tendencies. The etiology of maxillofacial fractures, traffic accidents, falls, and physical attacks constitute the three most frequent etiologic causes.[13]

Gönüllü et al.[17] reported the most frequent forms of injury as falls (27.2%), traffic accidents (27.2%), and physical attacks (23.2%); and Arslan et al.[18] reported as physical attacks (39.7%), falls (27.9%) and traffic accidents (27.2%). Ortakoğlu et al.[19] reported traffic accidents (45.94%), battery (24.32%), falls (16.22%), workplace accident (10.81%), and sporting accidents (2.7%). Özgül[20] reported violence (42%), traffic accident (33%) and falls (25%) respectively. Kostakis et al.[16] reported the causes as traffic accidents (50.8%), physical attacks (26.3%), and falls (13.8%); and Boffano et al.[12] ranked them as physical attacks (39%), falls (31%), sporting injuries (11%), and traffic accidents (11%). Shankar et al.[21] reported them in the form of traffic accidents (72.7%), falls (14.1%), and physical attacks (8.6%). In our study; traffic accidents (30.4%) were the major cause of etiology of the trauma and followed by violence (27.8%) and falls (17.7%).

It was reported that traffic accidents, falls, and physical attacks were the most frequent etiologic causes for both genders.[16] Gönüllü et al.[17] reported that the most frequent forms of injury were traffic accident (27.3%) for males and falls (31.7%) for females. Our study specified in a similar manner that the most frequent etiologic reasons were traffic accident and violence (31%) for males and falls (33.3%) for females.

Maxillofacial fractures mostly occur under the age of 40.[16,17] Boffano et al.[12] reported in their multicenter study that the average age varies between 29.9 and 43.9. The mean age of our study showed patients in the third decade is the most affected age group.

Studies from variable specialties have different results about the most common fractured site in the maxillofa-

cial area. Many studies have been conducted in oral and maxillofacial surgical clinics, Otorhinolaryngology (ENT) clinics and Emergency services concerning maxillofacial fractures. It was reported in studies conducted with emergency service patients that there was a ranking in the form of the maxilla, nasal bone, zygoma, and the mandible, respectively.[18,19] Studies conducted with ENT patients reported that the most frequently broken bone is the nasal bone, and that mandible, maxilla, and zygoma fractures followed this.[22] The studies from oral and maxillofacial surgical centers reported that the most commonly fractured bone is the mandible.[12,16,23] Although each clinic determines the most frequently fractured bone differently, it is seen that similar results emerge when the clinics are evaluated amongst themselves. Our study identified a total of 101 maxillofacial region fractures in 79 patients. Similarly to the literature, it was seen that cases of a mandible fracture were most common.

Arslan et al.[18] reported that for both genders, the most frequent fracture was the corpus (28.5%) and second was the ramus (23.8%). Şakrak et al.[23] reported the mandibular fracture regions in the form of the condyle/subcondyle (24.2%), the corpus (20%), and the angle (18.4%). In this study, the most frequently fractured region for the mandible was the angle of the mandible with a rate of 34.6%. This was followed by the parasymphysis (17.8%) and symphysis (11.8%), respectively. While parasymphysis and corpus fractures are most frequently seen in females, angle fractures followed by parasymphysis fractures are the most seen in males.

Bereket et al.[24] reported that the peak months were August (15.8%) and May (13.4%) for mandibular fractures. They reported that the increase in the number of mandibular fractures in summer might be related to the visits of expats in other countries. Also, they reported that outdoor activities in our country are more crowded in summer. Sakr et al.[25] reported that the busiest month is January. Ortakoğlu et al.[19] examined the distribution of fractures according to seasons and they reported that the most common fractured cases were seen in summer season (13 patients, 35.13%), followed by fall (10 patients, 27.02%), spring (8 patients, 21.62%) and winter (6 patients, 16.22%). In our study, the highest number of cases was in September and the second in June. We thought that the increase in September could be related to the increase in the crowds and traffic intensity with the beginning of the school period in our country. Again, there could be an increase in the number of trauma cases with the rise of the crowd at the beginning of the summer.

We believe that the results of our work remain inadequate in showing the total incidence of trauma in the region because many trauma cases are associated with complex fractures and these patients generally are first referred to emergency services.

CONCLUSION

In the evaluation, diagnosis, and treatment of traumatic fractures, a better understanding of the mechanism of injury and the effects of age and sex on the anatomic region is of great clinical importance. Comprehensive studies with a broader population are needed.

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