

Prevalence of condylar fractures in patients who referred to oral and maxillofacial surgery department of Al-Zahra Hospital in Isfahan, Iran, during 2005-2016

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Original Article

Abstract

BACKGROUND AND AIM: Mandibular condyle fractures are the injuries to the head and face in various accidents, especially traffic accidents, which have a significant impact on the quality of life, jaw bone function, and beauty. The present study aimed to determine the prevalence of condylar fractures in patients who referred to Department of Oral and Maxillofacial Surgery in Al-Zahra Hospital in Isfahan, Iran, during 2005-2016.

METHODS: In this cross-sectional study, all patients with a maxilla fracture who were admitted to and treated at Al-Zahra Hospital in Isfahan from March 2005 to March 2016, were included. The data were collected through reading medical records. The prevalence of mandibular condyle fractures, demographic factors and epidemiological characteristics of patients, and performed diagnostic and therapeutic measures were recorded. Finally, the data were entered into SPSS software and analyzed using Fisher's exact test and chi-square test.

RESULTS: During 2005 to 2016, a total of 908 patients with jaw fractures were admitted to and treated in the hospital, of whom 214 (23.7%) patients were with mandibular condyle fractures, 121 (56.5%) with subcondylar fractures, 42 (19.6%) with bilateral fractures, 35 (16.4%) with condylar neck fractures, and 16 (7.5%) patients with condylar head fractures. Besides, the most common cause of fractures was traffic accidents with a frequency of 53.7%. The frequency distribution of dental involvement was significantly different in terms of the cause of fracture ($P < 0.050$); however, no significant difference was found in terms of the fracture site ($P = 0.070$).

CONCLUSION: According to the results of the present study, the prevalence of mandibular condyle fractures was more than 20%, which was associated with dental involvement in some patients. In addition, dental involvement had a significant relationship with the cause of fracture. Considering the effect of mandibular condyle fractures on the patients' quality of life, it is necessary to raise the level of public awareness about the causes and factors affecting maxilla fractures, especially condylar fractures, pay careful attention to initial examinations of traumatic patients, and do essential therapeutic measures for these patients.

KEYWORDS: Maxillary Fractures; Mandibular Condyle; Oral Surgical Procedures

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Condylar fractures are one of the most common types of mandibular fractures¹ and their prevalence in different backgrounds has been reported to be more than 20%.² Unilateral condyle fractures are 3 times more common than bilateral types.³ In adults, traffic accidents have been the leading cause of

symphysis and mandibular fractures¹ and other causes of these types of fractures have been reported to be falls from heights and beatings.⁴ The etiology of these fractures has been different in various cultures and societies and has varied according to environmental and economic factors.⁵ Different types of condylar fractures include subcondylar

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fractures (37.5%), intracapsular fractures (35.6%), and condylar neck fractures (26.9%).^{6,7} Diagnosis of condylar fractures is based on clinical findings including pain, swelling, trismus, and malocclusion, and appropriate radiographic findings such as orthopantomogram (OPG) and computed tomography (CT) scan.⁸

These fractures are different from fractures in other areas of the mandible in terms of therapeutic principles. In the treatment of this fracture, the goal is to return the function of the temporomandibular joint (TMJ) and prevent the occurrence of ankylosis in the joint, not its anatomical repair. Due to the negative and significant effects on physical and mental health of the individual and numerous socio-economic effects, facial trauma is one of the main problems of public health in society. The costs of hospital treatment and admission, the use of hospital resources, and the adverse economic consequences associated with these fractures have also been significant.⁹

Knowing the causes, frequency, and severity of maxillofacial fractures as well as condylar fractures specifically can help researchers apply useful treatments for these fractures.¹⁰

Due to the increasing development of medical science and knowledge of traumatology, access of physicians and surgeons to new tools and methods of diagnosis and treatment of condylar fractures throughout the country, and referral of patients for treatment even in very simple cases from small towns to large cities, it is necessary to provide accurate statistics on the prevalence of fractures in the condylar area in different parts of the country for educational and treatment plans related to them. Al-Zahra Hospital in Isfahan, Iran, is also one of the largest and most reputable centers for the treatment of patients with fractures of the jaw and face, where many patients are treated every year. Despite various studies on mandibular fractures, limited studies have been conducted specifically on the prevalence

of condylar fractures. In addition, it is necessary to repeat the research on the types of fractures of the jaw and face in medical centers of these types of fractures at different times to determine and report the changes in their etiology. Therefore, the aim of this study was to investigate the prevalence of condylar fractures in patients who referred to the Department of Oral and Maxillofacial Surgery of Al-Zahra Hospital in Isfahan during 2005 to 2016.

Methods

In this cross-sectional study, the samples included the registered files of patients with mandibular condyle fracture among all patients with mandibular fractures who referred to and treated at Al-Zahra Hospital in Isfahan from 2005 to 2016. These files were 214 cases, all of which were included in the study by census method.

After obtaining the approval of the Ethics Committee of Isfahan University of Medical Sciences (Ethical code: IR.MUI.REC.1395.3.570), demographic and clinical information including gender, level of education, age, cause of injuries, area or areas involved in fracture or injury, fracture site in condyle, complications of injuries, underlying systemic problems, type of surgical intervention, and post-treatment complications were registered. To determine the post-treatment complications of condylar fractures, patients were contacted by telephone and asked about the presence of complications and, if necessary, were called to the clinic for examination.

It should be noted that when recording information in the checklist, the patient file code was entered to keep the patients' personal information confidential.

Finally, the collected information was analyzed using Fishers' exact test and chi-square test by SPSS software (version 23, IBM Corporation, Armonk, NY, USA). The results were presented as frequency (percentage) or mean and standard deviation (SD). Significance level was considered at $P < 0.05$.

Table 1. Comparative evaluation of the demographic characteristics of patients and type of fractures in the condyle

Variables	Total	Subcondylar fractures (n = 121)	Condylar neck fractures (n = 35)	Condylar head fractures (n = 16)	Bilateral fractures (n = 42)	P
Sex						0.841
Men	173 (80.8)	100 (82.6)	28 (80.0)	13 (81.3)	32 (76.2)	
Women	41 (19.2)	21 (17.4)	7 (20.0)	3 (18.8)	10 (23.8)	
Age (year)	27.69 ± 16.11	26.79 ± 15.36	29.97 ± 18.34	37.50 ± 9.24	24.64 ± 8.57	0.120
< 10	12 (5.6)	9 (7.4)	3 (7.1)	0 (0)	0 (0)	
10-19	52 (24.3)	32 (26.4)	6 (17.1)	2 (12.5)	12 (28.6)	
20-29	77 (36.0)	40 (33.1)	18 (51.4)	4 (25.0)	15 (35.7)	
30-39	36 (16.8)	21 (17.4)	5 (14.3)	2 (12.5)	8 (19.0)	
40-49	17 (7.9)	9 (7.4)	2 (5.7)	4 (25.0)	2 (4.8)	
> 49	20 (9.4)	10 (8.3)	4 (11.4)	4 (25.0)	2 (4.8)	
Occupational status						0.310
Student	75 (35.1)	46 (38.0)	9 (25.7)	3 (18.8)	17 (40.5)	
Worker	71 (33.2)	39 (32.2)	12 (34.3)	6 (37.5)	14 (33.3)	
Self-employed	33 (15.4)	22 (18.2)	4 (11.4)	1 (6.3)	6 (14.3)	
Retired	5 (2.3)	2 (1.7)	1 (2.9)	2 (12.5)	0 (0)	
Employee	9 (4.2)	4 (3.3)	2 (5.7)	1 (6.3)	2 (4.8)	
Unemployed	7 (3.3)	3 (2.5)	2 (5.7)	1 (6.3)	1 (2.4)	
Housekeeper	14 (6.5)	5 (4.1)	5 (14.3)	2 (12.5)	2 (4.8)	
Education status						0.363
Illiterate	8 (3.7)	4 (3.3)	2 (5.7)	0 (0)	2 (4.8)	
Primary school	78 (36.5)	41 (33.9)	14 (40.0)	6 (37.5)	17 (40.5)	
Middle school	46 (21.5)	26 (21.5)	7 (20.0)	4 (25.0)	9 (21.4)	
Secondary/ high school	55 (25.7)	36 (29.8)	6 (17.1)	1 (6.3)	12 (28.6)	
University	27 (12.6)	14 (11.6)	6 (17.1)	5 (31.3)	2 (4.8)	

Data are presented as mean ± standard deviation (SD) or number and percentage

Results

In the present study, out of 214 patients with condylar fractures, 121 (56.5%) had subcondylar fractures, 42 (19.6%) had bilateral fractures, 35 (16.4%) had condylar neck fractures, and 16 (7.5%) had condylar head fractures. In addition, 173 (80.8%) cases were men and 41 (19.2%) were women with a mean age of 27.69 ± 16.11 years. Statistically, age, gender, level of education, and occupational

status of these patients did not differ between various types of fractures ($P > 0.05$) (Table 1).

The causes of mandibular condyle fractures were traffic accidents in 115 cases (53.7%), falls from heights in 45 cases (21.0%), quarrels in 25 cases (11.7%), sports accidents in 5 cases (2.3%), work-related accidents in 13 cases (6.1%), and other causes in 1 case (5.1%). Besides, 18.7% of these patients had dental involvement (Table 2).

Table 2. Comparative evaluation of the frequency distribution of dental involvement and the cause and location of condylar fracture

Variables	No dental involvement (n = 40) [n (%)]	Dental involvement (n = 174) [n (%)]	P
Condylar fracture site			0.070
Subcondylar fracture	20 (50.0)	101 (58.0)	
Bilateral fracture	12 (30.0)	30 (17.2)	
Condylar neck fracture	8 (20.0)	27 (15.5)	
Condylar head fracture	0 (0)	16 (9.2)	
The cause of fracture			
Traffic accidents	15 (37.5)	100 (57.5)	0.034
Falls	17 (42.5)	28 (16.1)	< 0.001
Quarrels	5 (12.5)	20 (11.5)	0.788
Sport	0 (0)	5 (2.9)	0.586
Work-related	3 (7.5)	10 (5.7)	0.713
Others	0 (0)	11 (6.3)	0.224

According to the results, the frequency distribution of dental involvement was significantly different in terms of the cause of fracture ($P < 0.05$), but no significant difference was found in terms of the fracture site ($P = 0.070$) (Table 2).

The mean time interval between fracture and surgery was 1.31 ± 1.63 days with a range of 0-8 days and the mean length of hospital stay was 1.59 ± 0.93 days. Treatment in 25.2% of cases was intermaxillary fixation (IMF) and arch bar, in 65.9% of persons under fixation surgery with the use of mini-plates in the oral and maxillofacial area, and in 8.9% other cases (such as screw, Osteovit). Fourteen cases (6.5%) had postoperative complications, including occlusion offset (61.1%), sensory impairment (5.6%), and mouth opening limitation (11.1%) (Table 3).

Table 3. The frequency distribution of time interval from occurring fracture to surgery, type of treatment, length of hospital stay, and complications of condyle fracture

Variables	Value
Time interval from occurring fracture to surgery (day)	1.31 ± 1.63
The first day	55 (25.7)
The day after the accident	138 (64.5)
Two days or more	21 (9.8)
Length of hospital stay (day)	1.59 ± 0.93
Two days	56 (26.2)
Three days	18 (8.4)
Four days and more	5 (2.3)
Type of treatment	
IMF and arch bar	54 (25.2)
Mini-plate	141 (65.9)
Others	19 (8.9)
Imaging type*	
CT scan	163 (76.2)
OPG	129 (60.3)
Reverse town	26 (12.1)
Complications of treatment	
Occlusion offset	11 (61.1)
Sensory impairment	1 (5.6)
Mouth opening limitation	2 (11.1)

Data are presented as mean \pm standard deviation (SD) or number and percentage

*More than one type of imaging has been performed for some patients.

IMF: Intermaxillary fixation; CT: Computed tomography; OPG: Orthopantomogram

to Al-Zahra Hospital due to maxilla fractures between 2005 and 2016, were included; 214 cases (23.6%) had mandibular condyle fractures. The age group of 20-29 years was the most common age group of patients with mandibular fracture. In addition, the prevalence of fractures in men was 4 times higher than that in women, and men had a higher mean age. This is because young men are more at risk for fractures of the mandibular condyle, such as work-related accidents, fights, and traffic accidents. In the previous study that data were extracted from the hospital episode statistics database held by the West Midlands National Health Service (NHS) Executive, the age group of 20-29 years was the most common age group in mandibular condyle fractures.⁵ In addition, in studies conducted by Zhou et al. in China⁸ and Amaratunga in Sri Lanka,¹¹ the young age group (15-34 years) was the most common age in patients with condylar fractures. Moreover, in the study conducted by Natu et al. in Finland, a higher prevalence of mandibular condyle fractures was reported in men.¹²

In terms of occupational status and education level, students and people with primary education were, respectively, the most common occupational and educational groups in mandibular condyle fractures. In this regard, in addition to the effect of injury, children's mandibular bone is more sensitive than that of adults.

On the other hand, the most common cause of fracture was traffic accidents with a frequency of 53.7% and the least common cause was sports accidents with a frequency of 2.3%. In many previous studies conducted in India and China, traffic accidents have been the most common cause of mandibular condyle fractures.^{13,14} In another study performed in India, fighting or falling from heights was reported as the most common causes of fractures.¹⁵ It seems that less observance of safety principles such as negligence in the use of helmets and seat belts by drivers, non-use of pedestrian lanes and special stairs by pedestrians, negligence in

Discussion

In this study, 908 patients who were admitted

observing traffic laws, and the impact of alcohol abuse are some reasons that have accounted for the increase of etiological factors in the mandibular condyle fracture.¹⁶ In addition, it should be noted that etiological factors may be difficult to detect, because the diagnosis is often based on the information provided by the patient; a clear example is the conflict between husband and wife, which in most cases, women will not report such family conflicts in accordance with the principle of secrecy, and try to show that other etiologic factors such as falls from heights or falling down are involved in the occurrence of fractures, in the sense that in women and children, the predominant cause was falls from heights or falling down.

According to the results of the present study conducted in Iran and India, the most common sites of condylar fractures were subcondylar region with a frequency of 56.5%, which is consistent with the results of many other studies, so that in some studies, subcondylar fractures of mandibular condylar was reported to be above 30%.^{17,18}

In addition, previous studies performed in Brazil and Canada have shown that the effect of the etiology of fracture on the fracture site depends on the amount of energy applied to the mandibular condyle as well as the site of impact. Moreover, the resistance of different parts of the mandibular condyle is different and it seems that there is the least resistance to fracture at the angle of the condyle.^{19,20} However, in the present study, no relationship was found between the cause of the fracture and the location of the fracture, and only the cause of the fracture was significantly related to dental involvement.

In fact, engagements and dental injuries in mandibular condyle fractures also depend on the angle and severity of the injury as well as the location of the impact, and damage to the teeth usually occurs in traffic accidents where more energy is applied to the jaw and facial bones.¹⁶ Therefore, it is necessary for patients with mandibular condyle fractures to be examined for dental injuries, and to ensure the

absence of dental injuries, patients should undergo dental radiography.

Finally, 6.5% of patients had postoperative complications, the most common of which was occlusion offsets. The type of complications in most patients depends on the severity of the injury, the area of injury, the individual characteristics of the patient, and the technique and skill of the surgeon. In any case, mandibular fracture repair surgery, like any other surgery, has a series of general complications. In order to prevent complications, patients should be carefully cared for after the operation and actions that lead to aggravation of the injury increase the risk of infection or create problems in surgical repair. In this case, the most important measures can be postoperative training and postoperative nursing care.

Incompleteness of hospital records and difficult access to patients to eliminate existing deficiencies were among the limitations of the present study that led to exclusion of a number of patients from the study.

Conclusion

According to the results of this study, mandibular condyle fractures are very common in maxilla fractures and this type of fracture is more common in young age groups and in men. Traffic accidents were the most important factor. The most common fracture site was the subcondylar region. On the other hand, there was a significant difference between the etiology of fracture and dental involvement. Therefore, due to the high prevalence and impact of mandibular condyle fractures on patients' quality of life, it is suggested that the level of public awareness about the causes and factors affecting maxilla fractures, especially condyle fractures, should be improved and in the initial examinations of trauma patients, condylar fractures should be carefully considered and the necessary treatment measures should be taken for these patients.

Conflict of Interests

Authors have no conflict of interests.

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