



The Influence of Unerupted Lower Third Molars on the Occurrence of Mandibular Condylar Fractures

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Abstract

Background and Aims: Condylar region of the mandible is the most vulnerable site to fracture due to its anatomical weakness. It has been noted that mandibular third molars may reduce the occurrence of condylar fractures. This study was conducted to verify this hypothesis.

Materials and methods: A retrospective study was conducted on 398 patients, older than 18 years, with 464 mandibular fractures. The panoramic radiographs of 182 patients with condylar fractures were examined for the presence of unerupted mandibular third molars.

Results: Condylar fracture was two times greater in those with missing or completely erupted mandibular third molars as compared to those with unerupted ones ($p < 0.001$). Displaced and dislocated condylar fractures were significantly less in those with unerupted third molar, as compared to those without unerupted ones ($p < 0.001$). Presence of unerupted lower third molar significantly reduce the degree of displacement or dislocation of condylar fractures ($p < 0.001$). Unerupted mandibular third molar position also influence the occurrence of condylar fracture. Most fractures occurred in Class I, Class A and mesioangular impactions.

Conclusion: unerupted mandibular third molars significantly reduced the occurrence of condylar fractures.

Key words: unerupted mandibular third molars, condylar fractures

Introduction

The mandible is one of the most susceptible of the facial bones to fracture; this is due to its relatively prominent position in relation to common injuring forces¹. Mandibular fractures follow a pattern, common to many injuries, in that young males are predominantly affected.² The reported rate of occurrence of mandibular fractures is 11.5 per 100,000 people per year³.

Many investigators have reported that patients with unerupted

mandibular third molars were more likely to have an angle fracture than those patients without unerupted mandibular third molars. This has been attributed to the decreased cross-sectional area of bone at the mandibular angle that contains the unerupted third molars.⁴⁻⁶ An inverse relationship was seen for condylar fractures: patients with impacted mandibular third molars were less likely to have a condylar fracture than those without impacted ones.⁷⁻⁹

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Whether incompletely erupted lower third molars without clinical symptoms should be surgically removed remain controversial¹⁰. However, several authors^{4, 11} recommended extraction of them in adolescents and young adults who frequently play contact sports because of the associated high incidence of mandibular angle fractures.

As the mandible is fractured more often at the condyle rather than at the angle in the absence of unerupted third molars, it may not be advantageous to extract the unerupted third molars as a protective measure against mandibular angle fracture, because the treatment of condylar fractures is more difficult and challenging than that of angle fractures.^{12, 13}

The objective of this retrospective study was to determine the relationship between the occurrence of mandibular condylar fractures and the presence and absence of unerupted mandibular third molars.

Materials and Methods

This study undertook a retrospective review of all mandibular fractures in patients older than 18 years of age, who were treated at the maxillofacial unit of Zahrawi teaching hospital in Mosul from January 2000 to November 2008. Within this period 398 patients, older than 18 years, were treated for 464 mandibular fractures.

Data were collected from the patients' records and radiographs for the following information: age, sex, causes of fractures, the presence and state of eruption of mandibular third molars and the locations of mandibular fractures. The locations of mandibular fractures and the eruption condition of mandibular third molars were observed by means of conventional radiographs and medical records.

A condylar fracture was defined as a fracture with the fracture line extending over the sigmoid notch. The condylar fractures were categorized into three types: non-displaced, displaced and dislocated fractures.

To evaluate the influence of incompletely erupted mandibular third molars on condylar fractures, the patients were divided into two groups: those with incompletely erupted third molars and those without incompletely erupted mandibular third molars. The later group included those with fully erupted or missing mandibular third molars.

By using panoramic radiographs of 231 patients with incompletely erupted mandibular third molars, their positions were analyzed according to the Pell and Gregory classification system. The horizontal position of mandibular third molars was grouped on the basis of the amount of space available between the anterior border of the vertical ramus and the second molars as follows: class 1, adequate space available; class 2, inadequate space available; and class 3, located all or mostly within the vertical ramus. The vertical position was categorized on the bases of the highest position of the mandibular third molars' crowns as follows: class A, level with or above the occlusal plane; class B, between the cervical line of the adjacent second molar and the occlusal plane; and class C, below the cervical line of the adjacent second molar.

The angulation of the unerupted mandibular third molars relative to the adjacent second molar was divided into four groups, according to winter's classification¹⁴, as follows: Horizontal, mesioangular, vertical and distoangular.

Results

During the study period 398 patients, older than 18 years, were treated for 464 mandibular fractures. The distribution of the sites of mandibular fractures is given in table (1). The most common site of mandibular fracture was at the condylar region (39.22%), followed by angle and parasymphysial region (20.4% and 17.03% respectively).

Table (2) shows the distribution of 182 patients with condylar fractures according to the patient's age and sex and the aetiology of fractures, as well as whether unerupted third molars were present or not. Of the 182 patients with condylar fractures, 158 were males and 24 were female patients. The largest subgroup of age was the group aged 23-27 years, followed by that aged 18-22 years. The most common cause was road traffic accidents and missile injuries. Seventy-one (30.7%) of 231 patients with incompletely erupted third molars suffered the condylar fracture, and 111 of 233 patients (47.6%) without incompletely erupted mandibular third molars suffered the condylar fracture. This difference was statistically significant ($p < 0.001$).

Table (4) shows the influence of unerupted mandibular third molars on the degree of displacement of condylar fractures. Of 12 patients with dislocated condylar fracture, 11 (91.67%) was associated with absent unerupted third molars, whereas only one patient (8.33%) was associated with unerupted tooth. Regarding condylar fracture with displacement, 85.29% was noted in the group without unerupted mandibular third molars and only 14.7% was associated with unerupted mandibular third molars. 58.82% of nondisplaced condylar fractures was associated with unerupted mandibular third molars and

only 41.18% was associated with absence of unerupted mandibular third molars. This difference was highly significant ($p < 0.001$).

Table (5) shows the influence of tooth position on the occurrence of condylar fractures. Most condylar fractures were associated with Class I and class B as well as vertical impactions. Although occlusal position significantly influences the occurrence of condylar fractures, the ramus position and angulation failed to reach a significant level.

Discussion

The condylar region of the mandible is one of the most common susceptible sites to fracture. In the present study more than 39% of mandibular fractures were noted at the condylar region. A biomechanical study by Kober et al¹⁵ showed that this area is the weakest against the impact acting on the mandible, especially at the anterior region. The impact forces that cause condylar fractures transmit to the mandibular angle on the same side, which is biomechanically stronger than the condyle.

Clinical investigations have implied that unerupted mandibular third molar is a risk factor for mandibular angle fractures.⁴⁻⁷ The reason for the higher risk of angle fractures in cases with unerupted mandibular third molars is thought to be that the mandibular angle is weakened by the decrease in bony space caused by presence of the tooth.

In the present study, mandibular condylar fractures were more than two times greater in those without unerupted mandibular third molars as compared to those with unerupted ones. Our findings come in agreement with other previous studies in that incompletely erupted mandibular third molars are preventive factors against condylar fractures.⁷⁻⁹ This study

revealed that the risk of condylar fractures was also dependent on unerupted third molar position. The highest occurrence of condylar fracture was in class I and position A, as well as vertical impactions.

Clinically, patients with mandibular angle fractures generally do not experience severe postoperative complications. In contrast, condylar process fractures have a risk of functional disorders, such as malocclusion and decreased mandibular mobility¹⁶

Several authors^{4,11,17,18} have suggested extraction of unerupted mandibular third molars in young sports-men as preventive measures against mandibular angle fractures, especially in contact sports. However, this treatment policy may possibly alter the biomechanical strength of the mandible and increases the risk of condylar fractures.

In terms of the precise reduction and fixation of mandibular fractures, difficulties are often encountered in repositioning the condylar fragments and performing accurate placement of the plates and screws¹⁹; in addition, there is the possibility of facial nerve injury.^{20, 21} On the other hand, excellent reduction and stable fixation in angle fractures are easily performed because the access and visibility to the angle fractures, for plating, is much better. Thus, it might not be appropriate to strengthen the mandibular angle region and to make the mandible more vulnerable to condylar fractures by removing the unerupted third molars, because the treatment of condylar fractures is more challenging than that of angle fractures.

Conclusion

The presence of unerupted lower third molar greatly reduces the

occurrence of mandibular condylar fracture. In addition, if fractures occur it showed less degree of displacement in patients with unerupted lower third molars.

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Table (1): Distribution of 464 mandibular fractures in patients over 18 years old.

Incompletely erupted lower third molar	Site of mandibular fracture no. (%)							
	Symphysis	Parasymphysis	Body	Angle	Ramus	Coronoid	condyle	Total
Present	27 10.98%	54 21.95%	19 7.72%	72 29.27%	3 1.22%	0 0.0%	71 28.86%	246
Absent	29 12.07%	25 11.47%	28 12.8%	21 9.63%	2 0.92%	2 0.92%	111 50.92%	218
Total	56 12.07%	79 17.03%	47 10.13%	93 20.04%	5 1.08%	2 0.43%	182 39.22%	464

Table (2): Distribution of 182 patients with condylar fracture according to patients' age and sex and aetiology of fractures.

Age (years)	Unerupted mandibular third molars no.(%)		Total
	Present	Absent	
18-22	14 (43.75%)	18 (56.25%)	32 (100%)
23-27	19 (46.34%)	22 (53.66%)	41 (100%)
28-32	8 (36.36%)	14 (63.64%)	22 (100%)
33-37	7 (38.89%)	11 (61.11%)	18 (100%)
38-42	7 (35%)	13 (65%)	20 (100%)
43-47	5 (35.70%)	9 (64.30%)	14 (100%)
48-52	4 (33.33%)	8 (66.67%)	12 (100%)
53-57	2 (18.57%)	5 (71.43%)	7 (100%)
58-62	4 (36.36%)	7 (63.64%)	11 (100%)
>62	1 (20%)	4 (80%)	5 (100%)
Gender			
Male	64 (40.51%)	94 (59.49%)	158 (100%)
Female	7 (29.17%)	17 (70.83%)	24 (100%)
Aetiology			
traffic accident	24 (38.71%)	38 (61.29%)	62 (100%)
Missiles	28 (41.18%)	40 (58.82%)	68 (100%)
Fall from height	8 (44.44%)	10 (55.56%)	18 (100%)
Sport	7 (35%)	13 (65%)	20 (100%)
Assault	3 (30%)	7 (70%)	10 (100%)
Industrial	1 (25%)	3 (75%)	4 (100%)

Table (3): Influence of unerupted lower third molars on condylar fractures.

Condylar fracture	Incompletely erupted third molars no. (%)			P-value
	Present	Absent	Total	
Present	71 (30.7%)	111 (47.6%)	182 (93.2%)	<0.001
Absent	160 (69.3%)	122 (52.4%)	282 (60.8%)	
Total	231 (100%)	233 (100%)	464 (100%)	

$\chi^2=13.9$, d.f.. =1

Table (4): Influence of unerupted lower third molars on condylar displacement.

Unerupted third molar	Condylar fractures no. (%)				P-value
	undisclosed	displaced	dislocated	total	
Present	60 (58.82%)	10 (14.7%)	1 (8.33%)	71 (39%)	<0.001
Absent	42 (41.18%)	58 (85.29%)	11 (91.67%)	111 (61%)	
Total	102 (56.05%)	68 (37.36%)	12 (6.59%)	182 (100%)	

Fisher exact test, d.f. =2

Table (5):Influence of unerupted lower third molars' position on condylar fractures.

Unerupted third molars	Condylar fractures no. (%)			P-value
	Present	Absent	Total	
Class I	44(34.92%)	82(65.08%)	126(100%)	0.284*
Class II	23(26.74%)	63(73.26%)	86(100%)	
Class III	4(21.05%)	15(78.95%)	19(100%)	
Class A	39(28.89%)	96(71.11%)	135(100%)	0.029**
Class B	31(34.07%)	60(65.93%)	91(100%)	
Class C	1(20%)	4(80%)	5(100%)	
Mesioangular	22(23.91%)	70(76.09%)	92(100%)	0.205***
Vertical	27(39.71%)	41(60.29%)	68(100%)	
Distoangular	14(31.11%)	31(68.89%)	45(100%)	
Horizontal	8(30.77%)	18(69.23%)	26(100%)	

*Not significant, $\chi^2=2.517$, d.f. =2

** Significant, Fisher Freeman Halton test

*** Not significant, $\chi^2=4.585$, d.f. =3