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A Comparative Study of the Clinical Aspects and Relationship Between Fractures of Mandibular Angle and the Presence of A Lower Third Molar

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Abstract: Several authors have reported that the presence of teeth may be one of the determinants of mandibular fractures. Fracture of the jaw plays an important role in the practice of the oral surgeon. A number of factors contribute to the strength of the mandible. These include presence of active and strong musculature, the shape and thickness of the bone, and the presence or absence of teeth.

The Deparment of Oral and Maxillofacial Surgery, Faculty of Dentistry,

Istanbul University, managed 100 patients with mandibular factures between 1991 and 1999. The male to female ratio was 5.25/1 and the majority of patients were aged between 12 and 53 years. Accidents and fights were the main causes of fractures throughout the 8-year study period. A high percentage of patients were treated by closed reduction and maxillo-mandibular fixation. The aim of this study was to correlate the incidence of mandibular fractures with the presence and the degree of eruption of lower third molar teeth. Data were analyzed by chi-square and Student's t test.

Key Words: Mandibular fracture, lower third molar

Introduction

Fracture of the jaw plays an important role in the practice of the oral surgeon.

The mandible is the most common of the facial bones to fracture. This is due to it is relatively prominent position in relation to common injuring forces (1-4).

Several authors have reported that the presence of teeth may be one of the determinants of mandibular fractures. Similarly, the incidence, treatment methods, healing rate, and post-treatment complications of these fractures also may be influenced to a greater or lesser degree by the state of dentition (5, 6).

A number of factors contribute to the strength of the mandible. These include the presence of active and strong musculature, the shape and thickness of the bone, and the presence or absence of teeth. When resistance to fracture is considered, additional variables play a role in determining the site of the fracture, including the exact point of application and the direction and severity of the impact force. There have been numerous experimental investigations into the response of the mandible to applied forces (1-4).

Loss of teeth results in a resorption of the alveolar bone and weakness in the mandible, whereas teeth, when they are present, may have a protective function in that they absorb the force of a blow and thereby prevent excessive injury to the mandible (1,2,5).

Furthermore, when teeth are absent, more of the force may be conveyed to other regions, such as the condyles (5).

Various authors have suggested that the angle of the mandible forms an area of lowered resistance to fracture (1,7).

In the words of Halozenetis, "weak regions of the mandible have not been adequately determined". However, it has been suggested that the presence of unerupted third molar teeth may lower the resistance of the mandibular angle region to fracture (8-12).

Immobilization of the fractured jaw is usually achieved by intermaxillary fixation through direct wiring or the use of an arch wire splint. External fixation, which has existed since the beginning of the 20th century, has become a highly successful approach to the treatment of fractures (2,3,6).

The aim of this study was to compare some of the clinical aspects of dentulous mandibular fractures and examine the effect of unerupted third molars on the incidence of mandibular fractures.

Materials and Methods

This study was a retrospective investigation that used patient records and radiographs as data sources.

One hundred dentulous patients with mandibular fractures treated by intermaxillary and rigid fixation at the University Hospital of İstanbul Dental Faculty during the period 1991-1999, (age-sex-matched group of 5.25-1 dentulous patients, (84 men and 16 women), average age 26 years (range, 12 to 53 years) being treated for other mandibular fractures) were the subjects used in this study. Data were analyzed by chi-square and Student's t tests. If $p < 0.05$ then statistical significance was inferred.

Results

A score of 0 for none of the crown within the ramus, 2-3 for less than half of the crown within the ramus, and 4-6 if more more than half of the crown was within the ramus were awarded. The sum of the scores gives a minimum of 0 and maximum of 6 for each unerupted third molar tooth. No bony pathologic condition was present within the study sample. No account was taken of root development or the relationship between tooth height and total mandibular height. A third molar tooth follicle with evidence of root development was classified as an unerupted third molar tooth (1).

Among patients who had fractures of the mandible, 47% exhibited unerupted third molar teeth bilaterally. Fifty-three percent of patients exhibited unerupted third molar teeth unilaterally (Table 1).

Patients exhibiting angle fractures represented 51% of all mandibular fractures in this investigation. The relationship between bilateral or unilateral unerupted and erupted lower molar teeth is shown in Table 2.

There was a significant difference in the sex distribution and in the causes of fractures between those with and without unerupted third molar teeth. Different causes and the distribution of sex and age are shown in Table 3.

Of the 53 unerupted third molar teeth, 12 were in the mesioangular position, 1 was in the distoangular position, 20 were in the vertical position, 18 were in the horizontal position, and two were in the transversal position. The distribution of them according to angle and nonangle fractures is shown in Tables 4 and 5.

The relationship between degree of impaction and angle region weakness is shown in Table 6. The distribution of age to sex and cause of fracture using the t test is shown in Tables 7 and 8.

Table 1. Sex distribution in relation to unerupted lower third molar teeth and erupted third molar teeth.

	male	female	total
erupted	41 (87%)	6 (13%)	47
unerupted	43 (81%)	10 (19%)	53

chi-square test = 0.69
df = 1
P = 0.41 (n.s.)

Table 2. The relationship between bilateral or unilateral unerupted and erupted lower third molar teeth.

	unilateral	bilateral	total
erupted	10 (21%)	37 (79%)	47
unerupted	14 (27%)	39 (73%)	53

chi-square test = 0.36
df = 1
P = 0.55 (n.s.)

Table 3. Sex distribution between reason of the fracture.

	male	female	total
accident	39 (76%)	12 (24%)	51
fight	45 (92%)	4 (8%)	49

chi-square test = 4.78
df = 1
P = 0.02 significant.

Table 4. Angle fractures versus unerupted lower third molar teeth.

	unerupted		
	bilateral	unilateral	total
angle fracture	19 (70%)	8 (30%)	27
nonangle fracture	20 (77%)	6 (23%)	26

chi-square test = 0.29
df = 1
P = 0.59 (n.s.)

Table 5. Relationship between eruption of lower third molar teeth and angle region.

	unerupted	erupted	total
angle fracture	27 (53%)	24 (47%)	51
nonangle fracture	26 (53%)	23 (47%)	49

chi-square test = 0.001
df = 1
P = 0.99 (n.s.)

Table 6. Relationship between degree of impaction and angle region fractures.

	0	2-3	4-6	total
angle fracture	20 (39%)	8 (16%)	23 (45%)	51
nonangle fracture	23 (47%)	8 (16%)	18 (37 %)	49

chi-square test = 0.49
df = 2
P = 0.78 (n.s.)

Tables 7 and 8. The distribution of age to sex and cause of fracture using a t test.

	age				
	mean ± SD	(n)	t	df	p
women	21.125 ± 6.602	(16)	2.343	98	0.02 significant
men	26.262 ± 8.271	(84)			
	age				
	mean ± SD	(n)	t	df	p
accident	25.392 ± 9.338	(51)	0.059	98	0.95 (n.s.)
fight	25.490 ± 6.96	(49)			

P = (two tailed p value)
d.f. = degree of freedom
SD = standard deviation
n.s. = not significant

Discussion

The frequency of fractures in the body of the mandible was found to be significantly higher in the edentulous than in the dentulous group. This is in agreement with the findings of Lamberg, who, in a study in Finland, found that 44% of edentulous mandibular fractures were located in the body compared to 19% of dentulous mandibular fractures (13). Similar figures have been reported by Halazonetis (obviously this is due to the weakness of the body of the dentulous mandible). However, the significantly lower incidence of angle fractures in edentulous mandibles recorded in this series seems to conflict with the findings of other authors. Angle fractures were caused mainly by assault, although this is perhaps not the case for the elderly who do not frequently get involved in fights (2,3,13,14). Wolujewicz (17) addressed the issue of buried teeth within the angle region as a predisposing factor to its weakness and concluded that there was no relationship between the state of eruption of the respective lower third molar and the incidence of angle fractures.

Oikarinen and Malmstrom (16) showed that the region of the angle was involved in more than 17% of all maxillofacial fractures in a series of 1248 cases reviewed.

Halozenetis (8) stated that angle fractures are twice as likely to occur in dentate patients compared with edentulous persons. More recently, this was confirmed by Amaratunga (5).

Neither of these last two authors made specific reference to the presence or absence of unerupted third molar teeth in fractures of the angle of the mandible.

Oikarinen and Malmstrom (16) reported a peak incidence of angle fractures in the 20 to 29 year age group.

This figure is supported by data provided by Ueno et al. and Ellis et al. and Halozenetis showed that between the ages of 12 to 29 years, 69% of single mandibular fractures occurred at the angle (1,7,9-14).

These findings are of interest in the context of the present study because patients within this age group are most likely to exhibit unerupted third molar teeth.

This investigation presents clinical evidence that unerupted third molars weaken the angle of the mandible predisposing to fracture (9,10,12).

The results of the present study suggest that a mandibular angle containing an impacted third molar teeth is weaker than the angle region without a buried tooth. In addition, bilateral unerupted third molars predispose at least one angle region to fracture significantly more than do unilateral impactions. The side of the impact is usually restricted to the side of the mandible (1,8,15). If the impact is of a high force or concentrated over a small area, then a direct fracture at the point of application will occur. If the impact is of a low force or distributed over a larger area, the stress-strain will transfer to the contralateral side causing an indirect fracture. In either scenario a mandible with bilateral unerupted third molar teeth will double the chance of fracture of the angle compared with a mandible with one unerupted third molar tooth where the maximum force may be distributed to the nonerupted third molar tooth side (1-4,9-12,14). The results also demonstrate that a significant and linear relationship exists between the degree of the impaction and susceptibility of the angle region to fracture (1-4). If the degree of impaction score represents the relative amount of bony space occupied by an unerupted third molar, then a direct relationship between the relative degree of loss of bony integrity and the weakness of that area of bone has been established. In our study, the presence of a higher degree of impactions predisposed to a higher risk of angle fractures was found; however, it was not statistically meaningful.

Concise criteria exist for extraction of unerupted third molar teeth. However, the question of whether to remove unerupted third molar teeth as a preventive measure against fracture of the mandible has never been fully adressed (1,13,16).

The policy of routine extractions in young patients with deeply buried third molars who are at high risk of fracture is a question of major epidemiological and cost-benefit concern (1).

In conclusion, the results of the present investigation may provide data to support the commonly held view that unerupted third molar teeth present an area of potential weakness of the mandible and predispose the angle region to fracture.

The presence of third molar teeth exposes the mandibular body to fracture and this may be the reason for many complications like infections and delayed healing. Road traffic accidents accounted for the largest number of fractures, and the body of the mandible was the most commonly involved site. In most epidemiological studies, road traffic accidents were the commonest single factor (15,17,18). In our study, the number of fractures of the mandible caused by fights and accidents was higher in males than in females.

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