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"The Relationship Between Mandibular Third Molars and Angle Fractures"

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Objectives-The purpose of this study was to assess the relationship between the existence and stage of the mandibular third molar's (M3) eruption and mandibular angle fractures.

Methods-We looked at the panoramic radiographs and medical records of 615 patients who had mandibular fractures. Each patient's degree of impaction and whether it was present or absent were evaluated in relation to the incidence of mandibular angle fracture. Age, sex, the method of damage, the number, and the location of mandibular fractures were also recorded. A student t test and a chi-square statistic test were used to assess the data.

Results-The presence of an unerupted M3 was observed to significantly increase the incidence of mandibular angle fracture ($P < .05$). Angle fractures occurred in 127 (29.8%) of the 426 patients with an M3. Twenty-five (13.2%) of the 189 individuals lacking an M3 suffered from angle fractures.

Conclusions-According to the study's findings, a mandibular angle with an impacted M3 is more likely to fracture in the event of an impact than an angle without an M3.

Introduction

The mandible has two articular cartilages and two nutrition arteries, giving it the appearance of a bent long bone even though it is a membrane bone during the embryonic stage. The strongest and most rigid part of the face skeleton is this arch of corticocancellous bone, which extends forward and downward from the base of the skull. However, because of its prominent and exposed position, it fractures more frequently than the other face bones.[1] One The fibrous framework of collagenous connective tissue, which offers tensile stability to counteract disruptive pressures, and inorganic salts, which give strength to withstand compression, make up the outer cortical plates. Trabeculae, which are positioned at right, form the pattern of the inner cancellous bone. Trabeculae, which are positioned at right angles to one another and oriented to support the cortical bone in stress locations, make up the inner cancellous bone. Their quantity and arrangement are determined by their function[2]. Maybe the thick alveolar component of the mandible serves just to accommodate teeth in the dentulous stage. It is clear from examining the cross-sectional anatomy of the mandible that the superior border is thicker or larger and the inferior border is thinner or smaller.The mandible's thickest and most stress-bearing bone is still

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the basilar bone[3]. The osseous anatomy, the forces produced by the masticatory muscles, the occlusal loading pattern, the precise point of application, and the direction and magnitude of the impact force.[4] All of which are crucial in identifying the fracture site—all have an impact on the actual stress patterns that take place in the human mandible.[5] The response of the mandible to applied stresses has been the subject of numerous experimental studies.[6–8] The most crucial element in preventing mining where fractures occur is the teeth. In the same way as unerupted teeth are significant, partially erupted wisdom teeth indicate areas of relative vulnerability.One Areas containing teeth are involved in almost half of mandibular fractures.[9]. About 30% of mandibular fractures that occur during altercations are mandibular angle fractures, making them common injuries.[10] It has been suggested that the presence of the mandibular third molar (M3) is the reason for the higher frequency of mandibular angle fractures in comparison to other locations.[11–13] According to several writers, the mandibular angle creates a region with reduced fracture resistance. In their study of dry isolated vervet monkey mandibles, Reitzik et al.[7] evaluated the forces required to fracture the angle region when the M3 was buried within the bone vs when it had erupted. Wolujewicz[14] investigated the problem of hidden teeth in the angle region as a risk factor for its weakness and came to the conclusion that the occurrence of angle fractures was unrelated to the condition of eruption of the corresponding lower third molar.

Although Tevepaugh and Dodson[15] did not verify the connection between M3 position and angle fracture, they did show that patients with cracked mandibles and M3s are 3.8 times more likely to develop an angle fracture than patients without M3s. This study set out to evaluate the connection between angle fractures and the location and existence of the M3.

Table I. Study variables stratified by M3 presence

		M3 present		
Variable	*Total No.*	*Yes*	*No*	*P value*
Sample size	615	426	189	.00
Age				
Mean (y)	33.2	32.5	36.7	
SD (y)	11.4	11.9	12.9	
Sex				
Male	488	342	146	
Female	127	84	43	
Type of injury				.0001
RTA	372	283	89	
Falls	121	72	49	
Fights	94	53	41	
Others	28	18	10	

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Table II. Study variables stratified by angle fracture status

Variable	*Total No.*	*Angle fracture*		*P value*
		Yes	*No*	
Sample size	615	152	463	.003
Age				
Mean (y)	33.2	35.5	31.8	
SD (y)	11.4	13.2	12.7	
Sex				
Male	488	103	385	
Female	127	49	78	
Type of injury				.0065
RTA	372	74	298	
Falls	121	41	80	
Fights	94	30	64	
Others	28	7	21	

PATIENTS AND METHODS

Radiographs and patient records served as the data sources for this retrospective analysis. Between January 2023 and September 2025, 615 consecutive patients with mandibular fractures who visited the oral and maxillofacial surgery department Rama dental college,hospital and reserch centre mandana kanpur. Mandibular angle fractures and the existence or absence of M3s were the main study factors.

First, the presence of M3s was assessed using panoramic radiography. Their position and angle were evaluated if they were. Sixteen impacted M3s were categorized as mesioangular, distoangular, vertical, or horizontal using a variation of Winter's classification.[16]

The Shiller method was used to measure the angulation of a third molar.[17]The angles were categorized as follows: horizontal more than ±71°, mesioangular and distoangular ±11° to 70°, and vertical ±10°. Archer was able to identify the relative depth of an M3.[18]The tallest portion of

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the M3 on level A was either above or on the same level as the neighboring second molar's (M2) occlusal plane.

The M3's highest point on level B was above the M2's cervical line but below the occlusal plane. The M3's highest point on level C was below the M2's cervical line. Archer assessed the relationship between the tooth and the mandibular ramus and the M2.[18]The distance between the ramus and the M2 may be enough, too little, or not at all to accommodate the mesiodistal diameter of the M3's crown.

The following standards were used to assess the clinical state of lower M3s: 1. Unerupted: the dental mucosa has not yet been penetrated by the tooth 2. Occlusal surface partially visible due to incomplete eruption 3. Erupted: either a more advanced eruption or the entire occlusal surface was exposed. In order to identify whether a mandibular angle fracture was present, a mandibular angle fracture was defined as a fracture posterior to the second molar tooth that extended from any point on the curve formed by the inferior border of the body and posterior border of the mandibular ramus to any point on the curve formed by the junction of the body and the ramus in the retromolar area.[19]. Age, sex, mechanism of injury, and mandibular fractures were among the characteristics for which data were gathered. Road traffic accidents, falls, fights, sports injuries, and other incidents were categorized as mechanisms of injury. The majority of the data was accessible for 615 of the 685 patients that made up the qualifying sample. The study excluded 70 out of 685 patients for the following reasons: patients had bony pathologic lesions; patients had an unerupted M3 with incomplete root formation (eventual eruption was uncertain); or patients had incomplete information (panoramic radiographs, for example). The computer program SPSS for Microsoft Windows, Release 6.0 (Chicago Ill), was used to analyze the data. P values below.05 were deemed statistically significant in the chi-squared test.

Table III. M3 position and angle fracture risk

	Angle fracture			Relative	
Position	*Yes*	*No*	*Total*	*risk*	*P value*
Mesioangular	36	165	201	1	.00001
Vertical	59	79	138	2.4	
Distoangular	20	30	50	2.2	
Horizontal	12	25	37	1.8	
Total	127	299	426		

Table V. Patients with M3 and angle fracture

	Angle fracture			Relative	
Position	*Yes*	*No*	*Total*	*risk*	*P value*
Erupted M3	29	181	210	1	.000
Partially erupted M3	35	100	135	1.9	
Unerupted M3	63	18	81	5.6	
Total	127	299	426		

Table IV. M3 position with the type of impaction for unerupted M3

Position	Angle fracture Yes	No	Total	Relative risk	P value
Mesioangular	16	14	30	1	.0007
Vertical	19	1	20	1.8	
Distoangular	17	1	18	1.77	
Horizontal	11	2	13	1.6	
Total	63	18	81		

Table VI. Patients with M3s and angle fractures

Variables	Angle fracture Yes	No	Total	P value
Occlusal position				.000
Level A	29	181	210	
Level B	58	110	168	
Level C	40	8	48	
Ramus position				.000
Level 1	43	202	245	
Level 2	51	89	140	
Level 3	33	8	41	

RESULTS

With a mean age of 33.2 years, the patients' ages ranged from 17 to 75 years. There were 713 mandibular fractures among the 615 patients. Of the patients, 21% were female and 79% were male. Road traffic accidents were the most frequent mechanism of injury (60.5%), followed by falls (19.7%), conflicts (15.2%), and sports and other activities (4.6%). Tables I and II show that 426 patients (69.2%) had M3s.

According to the M3s' angular position, 42.3% of the teeth were mesially inclined, 34.3% were vertical, 14% were distoangular, and 9.4% were horizontal. Of the 426 teeth, 210 (49%) had their occlusal surfaces on level with or above the adjacent M2's occlusal plane (level A), 135 (32%) had their occlusal surfaces below the adjacent M2's occlusal plane but above its cervical line (level B), and 81 (19%) had their occlusal surfaces below the M2's cervical line (level C). 102 individuals (17%) with multiple mandibular fractures were included in the study sample.

The number of patients with mandibular angle fractures was 152 (24.7%). Angle fractures occurred in 127 patients (29.8%) out of the 426 patients with M3s. Twenty-five patients (13.2%) with angle fractures were among the 189 patients without M3s. Accordingly, angle fractures were 2.25 times more common in patients with M3s than in those without ($\chi2$= 19.35,df=1,P=.0001<.05. Using a chi-squared statistics test, it was discovered that the unerupted M3 group had a considerably higher incidence of angle fractures than the erupted M3 group ($\chi2$= 115.7,df= 2,P=.00 <.05). The degree of impaction and the angle region's vulnerability to fracture were shown to be significantly correlated ($\chi2$= 17.05,df= 3,P=.0007 <.05).

DISCUSSION

It is evident that unerupted M3s were present in the majority of individuals who suffered fractures from traffic accidents. The comparatively high incidence of unerupted M3s in this group is likely due to the fact that the majority of these patients were young. The results of this series indicate that the angle region without a buried tooth is less prone to fracture than the mandibular angle with an affected M3 (Tables III, IV, and V).

These findings are in line with and explicable in terms of the Huelke et al. hypothesis regarding the distribution of stress and strain inside the mandible.[6].The mandible will fracture at the site of impact if a strong force is applied to a small portion of the jaw, but the mandible will fracture at its weakest spot if a low force or a greater area is affected.

Wolujewicz[14] studied the problem of buried teeth in the angular region as a risk factor for their weakening and came to the conclusion that angle fracture incidence was unrelated to the condition of eruption of the corresponding M3. Our findings show that the degree of impaction and the angular region's vulnerability to fracture have a strong and linear relationship (Tables V and VI).

Amartunga verified Halazonetis[5]'s claim that dentate patients have a twice as high risk of angle fractures as edentate individuals.[20] Numerous predisposing factors, including as the site, force, and direction of impact, systemic disease, bone pathologic condition, and the presence of impacted teeth, have been hypothesized to affect the sites of mandibular fractures.[13,15,19] M3s have been linked in numerous reports to an increased incidence of mandibular angle fractures.[11–13, 21] The study's findings support previous findings, however the angle becomes much weaker when an unerupted M3 is present, fracturing with only 60% of the force required to do so when the M3 erupts.[7.] The study's findings suggest that patients with M3s are more susceptible to angle fractures depending on their tooth position or angle.
An angle fracture may be more likely to occur in patients with a level C, level 3 impacted M3 than in those with a level A, level 1 M3. Our findings support the association between angle fracture and M3 position, which differs from those of Tevepaugh and Dodson and Wolujewicz[14.15] According to the study's findings, patients between the ages of 20 and 29 have the highest incidence of angle fractures. This is consistent with the number that Ellis et al. and Oikarinen and Malmostrom[22] reported.[10.] The study's findings show that vertical and distoangular impactions enhance the incidence of angle fracture and that unerupted M3s render the mandibular angle more prone to fracture.

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