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RESEARCH ARTICLE

Angular Changes in Impacted Mandibular Third Molars in Young Adults

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ABSTRACT

Background
This retrospective study aimed to evaluate vectoral alteration of impacted mandibular third molars (IMTMs) over time in patients aged 15–32 years.

Materials and methods
Angulation values of the IMTMs of 87 patients were evaluated and compared using three different references at three different time points. Angulation values of IMTMs for each reference point at each time interval were compared. Data were analyzed using chi-squared test, Mann-Whitney U test, and Kruskal-Wallis test.

Results
A significant change ($p < 0.05$) in angulation over time (either increase or decrease) was observed in the measured IMTMs at all three reference points. However, no significant result was found in terms of the direction of this change in any group.

Conclusion
The angle between the IMTM axis and different reference points may change over time. However, estimation of the magnitude or direction of angular change does not seem to be possible.The decision to recommend extraction or retention of asymptomatic IMTM should be made by considering the patient's expectations, needs and the physician's experience.

Keywords: angle, eruption, impaction, panoramic radiograph, radiology.

INTRODUCTION

Third molars have the highest rate of impaction of all teeth [1-3].Mandibular third molars are the second most commonly impacted teeth, after maxillary third molars[4]. Impaction of third molars can occur due to lack of space around them, unfavorable changes in angulation, or a combination of these two factors. Although the etiology of third molar impaction has not been fully explained, there is a strong belief that a lack of space is the primary factor[5, 6].

Third molars should be removed when they are associated with any pathological condition such as pericoronitis, cystic lesions, tumors, dental caries, periodontitis, periapical infection, or root resorption of adjacent teeth. It has been estimated that 54% of mandibular third molars are removed prophylactically, without presenting any subjective symptoms [4, 7].

It can be hypothesized that, while erupting, the angulation of third molars does not change over time. However, it is important to know the alteration of third molar angulation and the relationship with the second molar over time, if not removed at the first diagnosis. Thus, necessity of prophylactic extraction should be determined.

The aim of this retrospective study was to evaluate vectoral alteration of impacted mandibular third molars (IMTM) over time in patients aged 15–32 years.

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MATERIALS AND METHODS

The study population consisted of 87 patients (57 female and 30 male) referred to Hacettepe University Faculty of Dentistry between 2010 and 2020. The study was approved by the Ethics Committee of Hacettepe University (GO 20/765). The patients were divided into three age groups: 16–19 years, 20–23 years, and > 23 years. Patients' panoramic radiograph records were retrieved from the archives of Hacettepe University Department of Oral and Maxillofacial Radiology and were reviewed.

In this retrospective study, a tooth was considered affected if it had not fully erupted to the assumed normal functional position in the occlusal plane.

Patients who had more than one panoramic radiograph obtained at different time points and had impacted mandibular third molars in all radiographs were included in this study. Patients with a history of unilateral or bilateral mandibular molar or premolar extractions were excluded. To evaluate the angulation of an impacted mandibular third molar, the reference regions were defined as the longitudinal axis of the second molars, mandibular occlusal plane, and the line tangent of the basis of mandible (Figures 1, 2, 3). The angle between the axis of the IMTM and each reference point was measured and recorded. Two observers performed all measurements. Observers performed measurements on two panoramic radiographs taken at different time points for each patient. The difference between the angles was measured (Figures 4A, 4B).

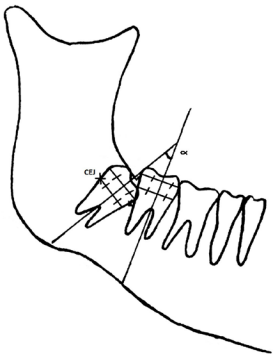

Figure 1: Angle measurement between the axis of impacted mandibular third molar and longitudinal axis of second molar.

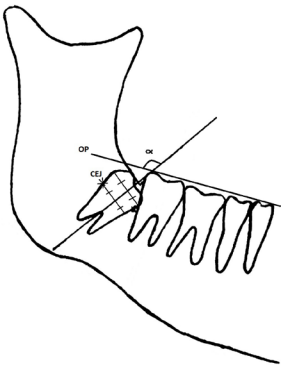

Figure 2: Angle measurement between the axis of impacted mandibular third molar and mandibular occlusal plane.

Figure 3: Angle measurement between the axis of impacted mandibular third molar and the line tangent of basis of mandible.

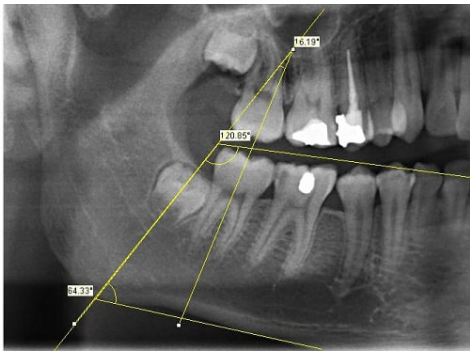

Figure 4A: Angle measurements between the axis of impacted mandibular third molar and each reference points of a 16 year old male patient.

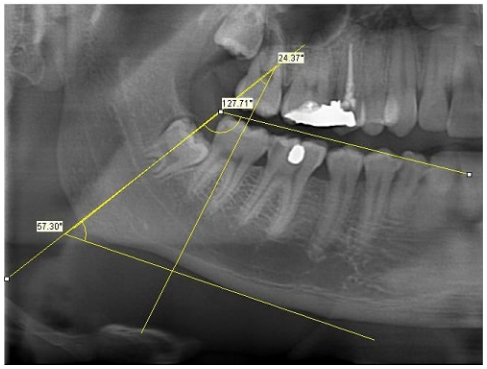

Figure 4B: Angle measurements between the axis of impacted mandibular third molar and each reference points of the same patient 2 years later.

The collected data were evaluated for correlations among age group, sex, and angle difference between the first and second measurements using SPSS Software for Windows with a confidence interval of 95%. The p-value less than 0.05 ($p < 0.05$) was considered as statistically significant. (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0.

Armonk, NY: IBM Corp).

An intraclass correlation coefficient (ICC) was used to assess the consistency between observers. A chi-square test, Mann-Whitney U test, Kruskal-Wallis test, and Spearmen correlation coefficient were used to determine the factors affecting the change in angulation difference depending on the type of variable.

RESULTS

Of the 87 patients included in the study; 65.5 % were female and 34.5 % were male, aged 15–32 years (mean, 19.6 ± 3.2 years). No significant difference was found among age groups and between sex ($p > 0.05$).

The absolute value of angle change was found to be statistically significant ($p = 0.00$, %95 Confidence Interval) regardless of whether the change was an increase or a reduction. Both increases and reductions in the angle between the third molar axis at each reference point were observed over time. However, no significant direction of change was identified in any of the groups studied. There was no observed correlation between the primary angle measurement (greater than or less than 45°) and the magnitude of angle change over time.

ICC (Intraclass Correlation Coefficient) revealed no significant difference between the measurements of the two observers.

DISCUSSION

Limited information is available regarding the variations of the eruption pattern of third molars in individuals aged 15–32 years. The long-term sequelae of impacted third molars are still not clear [8]. Time of eruption of third molars showed considerable variation among populations ranging from 14 to 24 years [9]. The most common surgical intervention in dentistry is the extraction of third molars in young adults; most patients are over the age of 20 years [7, 10]. Although indications for the removal of symptomatic third molars are well established, a convincing case for the prophylactic removal of unerupted, asymptomatic, disease-free third molars has not yet been reported [11]. Hence, it is important to know the alteration in third molar angulation and the relationship with the second molar over time if not removed immediately. According to the American Association of Oral and Maxillofacial Surgeons (AAOMS) Third Molar Multidisciplinary Conference, it has still not been determined whether individuals who undergo extraction of impacted third molars have better outcomes when compared with patients who retain such teeth, among patients with asymptomatic, disease-free third molars [8]. Similarly, a review on the Cochrane Collaboration of the surgical removal of asymptomatic affected wisdom teeth by Mettes TG et al. (2012) concluded that "no evidence was found to support or refute prophylactic removal of asymptomatic impacted wisdom teeth in adults [12].

Age is a common factor in determining when an asymptomatic third molar should be extracted. The rationale is that early extractions are easier, less traumatic, and reduce the likelihood of complications. Age is not a predisposing factor for increased complications, but with increasing age, there is an increase in health risk factors, which influence postoperative recovery [13-16]. According to our results, no significant difference in the angulation of IMTM was found among age groups. It should also be remembered that radiographic position is not the only determinant of whether a third molar should be removed surgically. Factors such as symptoms, infection, caries, and the potential for damage to adjacent teeth and other structures must also be considered.

Studies of occlusal stability reveal that third molars in mesioangular or horizontal positions may have an impact on mandibular incisor crowding and on the stability of orthodontic treatment [2, 17, 18]. Based on this idea, prevention of late incisor crowding has also been proposed as a reason to justify the removal of impacted third molars. However, other studies report that third molars have no effect on mandibular incisor crowding [19, 20]. Hence, this idea is still controversial.

Unilateral or bilateral mandibular molar or premolar extraction has been shown to have a favorable effect on the angulation of third molars [21-23]. Therefore, patients with a history of unilateral or bilateral mandibular molar or premolar extraction were excluded from our study.

The incidence of pathologic conditions associated with impacted third molars and the need for their prophylactic removal are controversial [24].

Few studies have examined the change of angulation of affected third molars. Impacted teeth that remain static, with no change in position or angulation over time, are considered rare [25]. These changes take place over a wide time frame and the change in angulation may be positive or negative. However, some studies report that third molars improve their angulation and position relative to the occlusal plane, and become upright or fully erupt over time [12, 26, 27]. Thus, close monitoring of asymptomatic impacted third molars in young adults, instead of prophylactic removal, has been suggested.

The results of our study consistently revealed that the positions of IMTMs change over time and this change was statistically significant. Both increases and decreases in the angle between the third molar axis and each reference point were observed over time. However, no statistically significant result was found in terms of the direction of the change in any group.

CONCLUSIONS

Angulation of IMTM changed over time. However, the direction of the alteration was unpredictable. The magnitude of the alteration could not be correlated with the tooth's initial position. The angle between the third molar axis and different reference points may change over time. However, it is not possible to estimate the magnitude and direction of angular

change of third molars over time. The effect of angular change of an IMTM may also interact with anatomical structures such as the mandibular canal. A limitation of this study is that the effect of this alteration was not evaluated as a part of the measurements.

As the IMTM's position, development, and relationship with adjacent anatomic structures over time is unpredictable and varies for each individual, the decision to recommend extraction or retention of asymptomatic IMTM should be made by considering the patient's expectations and needs and the physician's experience.

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Conflict of Interest

The authors declare that there is no conflicts of interest.

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