

Frequency of Surgical Impactions of Mandibular Third Molar in Orthodontic Patients with Different Antegonial Notching

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ABSTRACT

Background: Few studies have been reported so far on the frequency of lower third molar impactions in patients with different morphological characteristics. Our aim in this study was to find out the frequency of impacted lower third molars in orthodontic patients with different antegonial notch depths.

Material and Methods: This cross-sectional research was conducted at Orthodontics Department of Dental Section, Faisalabad Medical University, Faisalabad, and de'Montmorency College of Dentistry, Lahore, Pakistan from June 2017 to June 2019. A total of 60 orthopantomograms (OPGs) of patients with impacted lower third molars were included. The depth of antegonial notch was calculated on all the selected OPGs by measuring distance between the deepest area of the notch cavity and the tangent on the inferior border of the mandible. The patients with depth of antegonial notch of 1 mm or less were labeled as having shallow antegonial notch, while those with 3 mm or more were considered as having deep antegonial notch. Percentages and mean \pm SD were calculated for different variables. Depth of antegonial notching was compared between genders using ANOVA with P-value <0.5 considered as significant.

Results: Of 60 orthodontic patients, there was an equal number of male and female patients (n=30). The average age of the patients was 25.5 \pm 4 years. Overall frequency of impactions was similar in both the genders and frequency of impacted lower third molars was found to be greater in patients with deeper antegonial notches.

Conclusion: Mandibular third molar impactions were most frequent in orthodontic patients with deep antegonial notches.

Key words: Antegonial notch, Mandibular, Orthodontics, Third molars

Authors' Contribution:

^{1,2} Conception, synthesis, planning of research and manuscript writing
Interpretation, discussion, ³⁻⁶ Active participation in data collection
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Introduction

Mandibular third molars impactions are the most common impactions. This is when they fail to erupt in the normal functional position in the oral cavity beyond the expected developmental time, until and unless treated by orthodontics or oral surgery.¹⁻² There are different

etiological factors reported in literature regarding impactions which include barriers in the form of soft and hard tissue, lack of arch perimeter, lack of retromolar space, lack of guidance, genetics, over-retention of primary teeth, and vertical facial morphology.³⁻⁷ The

vertical facial pattern can influence the eruption of mandibular third molars by altering the alveolar bone density, changing the strength of orofacial muscles and by influencing the retromolar space.^{6,7}

There are two types of mandibular growth patterns; vertical and horizontal. In the vertical growth pattern, mandible goes downward and backward, that leads to more bone deposition under the angle of mandible and more bone resorption at symphysis. This results in formation of notch at lower border of mandible which is known as pregonial or antegonial notching.⁸⁻¹⁰ Patients with deep antegonial notching are found to have disturbances of condylar and mandibular growth and it is more common with the patients having vertical growth pattern.¹¹⁻¹³ Shallow antegonial notching is usually seen in patients with horizontal growth pattern where orofacial muscular forces are strong.¹²

Different studies have been conducted so far on finding out the frequency of lower third molar impactions and its pattern in different populations.^{9,10} However few studies have been reported on the frequency of lower third molar impactions in patients with different morphological characteristics. To our knowledge, this is the first study aimed at determining the frequency of impacted lower third molars in orthodontic patients with different antegonial notch depths. This will allow the orthodontists and oral surgeons to do early interceptive management of lower third molars for avoiding future impactions.

Material and Methods

This cross-sectional study was conducted at Orthodontics Department of Dental Section, Faisalabad Medical University, Faisalabad, and de'Montmorency College of Dentistry, Lahore, Pakistan from June 2017 to June 2019. Ethical approval was obtained from IRB of both institutes. The sample size was calculated with the help of G* Power software version 3.0.10. Thirty patients were required to provide an 80% power with α of 0.05 and effect size of 0.582 calculated after obtaining the data from previous study.¹⁴ After taking informed consent, orthopantomograms (OPGs) with impacted lower third molars of 60 patients with age range of 25-35 years were included to record the depth of antegonial notches. The

third molars with completed root formation and which were not still in its normal functional occlusion position in the mandible were declared as impacted.

Both male and female patients of ages between 25-35 years with impacted lower third molars and erupted lower second molars having good readable OPGs were included in the study. Patients with hypodontia involving lower third or second molars, un-erupted lower second molars, angulated lower second molars, history of trauma, history of orthodontic or surgical treatment, craniofacial syndromes including clefts, and lower third molars with ongoing root formation were excluded from the study.

The depth of antegonial notch was calculated on all the selected OPGs by measuring distance between the deepest area of the notch cavity to the tangent on the inferior border of the mandible.^{15,16} The patients with depth of antegonial notch 1 mm or less were considered as shallow antegonial notch patients, and those with 3 mm or more were considered as deep antegonial notch patients.¹⁵ (Figure 1).



Figure 1: OPG showing antegonial notch depth

To rule out the risk of inter-examiner errors, all measurements were done by a single expert orthodontist and 25 OPGs were reevaluated later at interval of two weeks to rule out the risk of intra-examiner errors, which was found to be 7.9%. Data was analyzed, age and depth of antegonial notching was presented in form of mean and standard deviation while gender and frequency of impacted lower third molars was presented as proportions and percentages. The depth of antegonial notching was compared between both the genders using ANOVA test

and p value of <0.05 was considered as statistically significant.

Results

Out of 60 orthodontic patients, an equal number of male and female patients were present (30 in each group) which shows that overall frequency of impaction was similar in both genders. The mean age of the patients was 25.5 ± 4 years. The mean age of male patients was 25.2 ± 4.5 years, and that of female patients was 25.7 ± 4.4 years. The age and gender distribution are shown in Table I.

Gender	Frequency (%)	Mean Age (Years)
Male	30 (50)	25.2 ± 4.5
Female	30 (50)	25.7 ± 4.4
Total	60 (100)	25.5 ± 4.1

Patients with deep antegonial notches had greater number of impacted lower third molars (45%) than the ones with shallow notches (26.6%) as shown in Table II. There was no significant difference observed among male and female patients regarding antegonial notch depths in the study, please refer to table III.

Antegonial depth	Frequency of Impactions	Percentage of impactions
Normal (1-3 mm)	17	28.3
Shallow (≤ 1 mm)	16	26.6
Deep (≥ 3 mm)	27	45.0
Total	60	100.0

Antegonial depth	Male n (%)	Females n (%)
Normal(1-3mm)	8 (13.33%)	9 (15.5%)
Shallow (≤ 1 mm)	8 (13.33%)	8 (13.33%)
Deep (≥ 3 mm)	14 (23.33%)	13 (21.66%)
Total	30 (50%)	30 (50%)
P value	0.555	

Discussion

Previous studies have shown the frequency of lower third molar impactions in various patients with different craniofacial morphological characteristics,^{4,17-18} but our study is unique in observing the frequency of impacted lower third molars in orthodontic patients with different antegonial notch depths. We used OPG radiographs to find out the depth of antegonial notches, which avoided the radiation exposure of lateral cephalometric radiographs; this is in accordance with the previously conducted studies.^{15,16}

In our study the frequency of lower third molar impaction was same in both genders. These findings are similar to results of Hatem et al, who did not find any difference in sex distribution of impacted third molars in the Libyan population.¹⁹ Kumar et al too did not find predilection towards any of the genders in third molar impaction cases in Eritrean population.²⁰ However, there are studies with findings showing impacted third molars are more common in one of the two sexes. Ayaz and Rehman while studying the third molar impaction in the population of Peshawar, Pakistan found out that males were affected more than females.²¹ Similarly, Shahzad et al studied the patterns and pathologies associated with third molar impactions in Lahore, Pakistan and concluded that it was more common in females as compared to males.²²

Overall, frequency of impacted lower third molars was found to be greater in patients with deep antegonial notches (45%). This can be linked to the fact that deep antegonial notches are found more in patients with increased vertical facial pattern, which in turn leads to decreased retromolar space. The reason of decreased retromolar space is because of decreased resorption of anterior border of mandibular ramus resulting in higher number of molar impactions.²³ Skadu et al. too had similar findings when they studied the crowding of teeth in relation to growth of facial skeleton. They concluded that impaction frequency of lower third molars was greater in patients with vertical growth pattern also called dolichofacial (long faced) patients.²⁴ Nanda too while investigating patterns of vertical facial growth had similar observations about the third molar impaction.²⁵ Breik and Grubor had comparable results when they explored the incidence of mandibular third molar impactions in various

kinds of facial skeleton. They concluded that the incidence of impaction was less in brachyfacial (short-faced) patients.²⁶ They argued that these findings can be due to the reason that brachyfacial pattern leads to increased retromolar space because of increased amount of resorption of anterior border of ramus.²⁶

We believe this is one of the pioneer studies in orthodontics to explore the frequency of impacted lower third molars in relation to antegonial notch depth. This study is a useful addition to the growing body of literature, as it will help in practicing evidence-based medicine by helping practitioners in early interceptive management of lower third molar impactions. The few limitations of our study were small sample size, lack of blinding and randomization.

Conclusion

Lower mandibular third molar impactions were found to be most frequent in orthodontic patients with deep antegonial notches.

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