

SEVERITY OF LOWER ANTERIOR ARCH CROWDING AND ANGULATIONS OF IMPACTED THIRD MOLAR

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ABSTRACT

Objective: To find out the association of lower anterior arch crowding with the angulations of impacted mandibular third molar.

Materials and Methods: Data for this cross-sectional study was collected from the Panoramic radiographs and dental casts of the patients meeting the inclusion criteria. The mandibular impacted third molars were classified based on Winter's classification and lower anterior arch crowding was classified using the little's irregularity index. A statistical analysis was performed using both descriptive and inferential statistics. Mean $\pm$ standard deviation was used for numerical data. Chi square test was used to observe any association between the variables.

Results: A significant association was found between severity of lower anterior crowding and angulation of mandibular third molar impaction (p value 0.01). Out of total 83 cases, 40 (48.2%) were vertical impactions in which mild crowding of incisors was more prevalent (56.0%), also in 28 (33.7%) cases which were of mesioangular impaction type, also showed increased prevalence of mild crowding (40%).

Conclusion: There was a significant association of mandibular incisor crowding with angulations of impacted third molars.

Keywords: Third molar angulation, impaction, mandibular arch, crowding, irregularity index

INTRODUCTION

The mandibular incisor crowding has been discussed in the literature over the years.¹ Among the multiple etiological factors, some authors strongly relate the influence of third molar impactions on mandibular incisor crowding, while the others disagree.²

Broadbent in his study suggested that inability of the mandible to achieve its full growth potential may be contributing factor to the impaction of the third molars and can result in lower anterior crowding.³ Proffit supported the idea that incisor crowding may be lessened by early removal of second molars, which presumably would relieve pressure from

third molars.⁴ Approximately 65% of orthodontists and oral surgeons supported that the cause of lower anterior crowding was impacted third molars.⁵

Third molars are considered an important cause of mandibular incisor crowding in teenage and young adult populations.⁶

On the other hand, some studies oppose the idea of any influence of third molars on the crowding of anterior teeth. A study done by Michela et al. discussed the conflicting evidences between the anterior crowding and third molar impactions and concluded that preventive extractions of third molars were not useful to prevent anterior crowding.⁷ Southard in his study concluded that no force was generated in eruption process; to significantly affect mandibular incisor crowding.⁸ Karasawa also negated any influence of molar on incisor alignment.⁹

Gokce et al. concluded that no relationship exist

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between angulation of third molar impaction and the amount of anterior crowding.¹⁰

Despite of vast research done on this topic, there is still no clear answer to the question of whether impacted third molar teeth cause anterior dental arch crowding. Considering all these conflicting evidences, relationship between the existence of lower third molars and anterior crowding cannot be concluded. Therefore, the aim of our study was to relate the severity of mandibular incisor crowding with the angulations of impacted mandibular third molars.

Studies on association of lower incisor crowding with angulations of impacted third molar are rare. As the crowding severity affects the overall treatment plan to resolve it and subsequent relapse prevention, it is very important to understand and try to solve this dilemma.

MATERIALS AND METHODS

This cross sectional, descriptive study was conducted in the Orthodontic department of Khyber Medical University-Institute of Dental Sciences, (KMU-IDS) Kohat. Approval for the study was taken from institutional ethical committee. Ref No: (ERC/KIMS/2020/02). Data of all cases in record meeting the inclusion criteria, from January to September 2020 was taken. Dental casts and panoramic radiographs of patients with age range of 15-25 years were selected. Lower anterior crowding was evaluated on casts and mandibular third molar impaction was categorized on panoramic radiographs. Case records with any extractions, missing teeth, dental anomalies or having history of any systemic diseases, and jaw discrepancies were excluded. Total of 83 cases, 39 males and 44 females met the inclusion criteria.

Lower incisor crowding was classified consistent with Little's incisor irregularity index.¹¹ The horizontal linear displacement (A+B+C+D+E) of anatomic contact points of each mandibular incisor from the adjacent anatomic point was measured with the vernier caliper (Figure 1). All five displacements were summed up together and classified into no (0mm), mild (1-3mm), moderate (4-6), severe (7-9mm) and very severe (>10mm) crowding categories. Third molar impaction was classified into vertical, distoangular, mesioangular, horizontal, and others (buccolingual /inverted) based on Winter's classification.^{12,13} All the measurements were taken

by the same observer using the same gadgets. A statistical analysis was performed using statistical package for the social sciences, version 22. Both descriptive and inferential statistics were calculated. Mean $\pm$ standard deviation was used for numerical data. Chi square test was used to observe any association between the variables. A p-value less than or equal to 0.05 ($p \leq 0.05$) was considered statistically significant.

RESULTS

Out of total of 83 participants with a mean age of 20 years, std. dev = 2.76 (Graph 1) were included in the study.

Vertical impactions were 48.2%, in which mild anterior crowding was more prevalent (56.0%). In 28 (33.7%) cases which were of mesioangular impaction type, also showed increased prevalence of mild crowding (40%). Distribution of lower incisor crowding with each impaction type is shown in table 1.

There was a significant association between severity of lower incisor crowding and the angulation of mandibular third molar impaction with p value of 0.01.

DISCUSSION

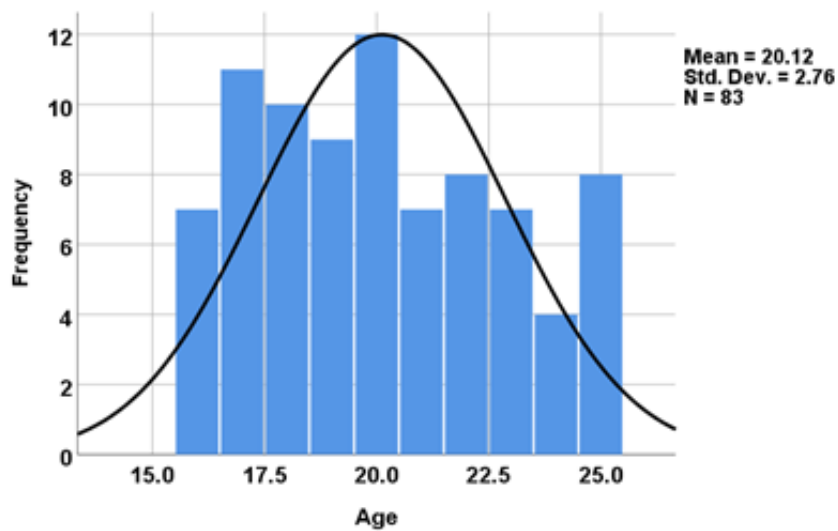
According to the results of our study, vertical impactions occupied the highest percentage. Mild crowding was more prevalent in the vertical impaction group. In a similar study done by Tan Chun Wei et al. found that all positions of the impacted third molar were accompanied by crowding, with mesioangular impaction most prevalent (68.52%).¹⁴ But in their study they did not relate it with the severity of crowding. Sheneman in a study of 49 patients, who had undergone treatment for crowding, compared three groups of subjects, i.e. with bilateral eruption, bilateral impaction, or developmental absence of third molars and found that presence of third molars was related to severe incisor crowding, which was not observed when the teeth were absent.¹⁵ But the kind of impaction was not specified in their study. In the present study severe crowding was present in 9.6% patients with mesioangular, horizontal and vertical impaction groups. Richardson observed first molar drift and incisor crowding in subjects with retained third molars. The study concluded that third molar impaction was one of the causative

Table 1: Distribution of lower incisor crowding with mandibular third molar impaction

Crowding Impaction	No	Mild	Moderate	Severe	Very severe	Total
Vertical	13	14	9	3	1	40
	46.4%	56.0%	42.9%	37.5%	100.0%	48.2%
Mesioangular	6	10	8	4	0	28
	21.4%	40.0%	38.1%	50.0%	0.0%	33.7%
Distoangular	0	1	1	0	0	2
	0.0%	4.0%	4.8%	0.0%	0.0%	2.4%
Horizontal	0	0	3	1	0	4
	0.0%	0.0%	14.3%	12.5%	0.0%	4.8%
Others (buccolingual /inverted)	9	0	0	0	0	9
	32.1%	0.0%	0.0%	0.0%	0.0%	10.8%
Total	28	25	21	8	1	83
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%



Fig 1: Little's irregularity index=A+B+C+D+E



Graph1: Age statistics of the sample

factors because anterior crowding was found more frequently in patients with third molar impaction than in subjects in whom the teeth were correctly positioned within the dental arch.¹⁶ Our results are in agreement with their study. Zachrisson in his study stated that lower anterior crowding was caused by insufficient space for the developing third molar tooth and resultant mesially directed force is the reason for incisor crowding in adolescent and young adults.¹⁷

According to Niedzielska, deficient space in the dental arches, can lead to anterior crowding; however, when sufficient space is available, these teeth can erupt in the normal position and do not cause any changes in the angulation and position of other teeth.¹⁸

Our results are in contradiction to the study done by Yuh Hasegawa et al. who evaluated the influence of third molar space on angulation and dental arch crowding and found no significant correlation between the angulations of third molar with anterior crowding.¹⁹ A study done by Gokce et al, that angulation of the third molars had no effects on the degree of lower anterior crowding. In their study third molar angulation was measured in reference to the (a) base of mandible, (b) occlusal plane, and (c) second molar inclination respectively.¹⁰ Harradine et al reported a negative correlation between the impacted third molars and anterior lower crowding.²⁰ A study done by Ruta et al. also concluded that although second molars moved back with bilateral third molar removal, it had no obvious effect on lower anterior arch crowding.²¹ Their results are not in agreement with the results of our study.

CONCLUSIONS

Our study concluded significant association between that the severity of lower anterior crowding and the angulations of impacted third molars.

Study limitations

The study has potential limitations like small sample size and uneven distribution of impacted molars in different categories. Further researchers are recommended to base the same study on a larger sample size and equal distribution of impacted molars in different categories to get more accurate results.

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