Presence of Mandibular Third Molars as a Risk Factor for Lower Anterior Crowding-A Retrospective Study

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ABSTRACT

Lower anterior crowding is a well established phenomenon, the cause of which had been debatable over the years. The cause of this could be multifunctional such as tooth size, arch form discrepancies with one of the most common causes being the third molar impactions – mesial drifting of the third molars causing lower anterior crowding. Differential mandibular growth theory. According to this theory, when mandibular growth outpaces maxillary growth, forces from the maxillary arch and labial soft tissues cause uprighting of the mandibular incisors. This uprighting, or lingual movement, results in crowding by forcing the incisors to occupy a smaller arch perimeter. Differential mandibular growth is common in late adolescence and may continue at a slow rate into adulthood. Over the years various studies have been done, a few concluding staging the reason for lower anterior crowding, while others concluding the opposite . This study evaluated the prevalence of lower anterior crowding and its correlation with third molars .Evaluation of 537 patients with lower anterior crowding and the presence of third molars impaction. Excel tabulation was done and SPSS results were generated. The study was able to evaluate and notice that third molars were one of the most important predisposing Factors leading to lower anterior crowding. We were able to conclude from the current study that in 70.39% of the patients had lower anterior crowding due to the presence of third molars and their crowing. There was a statistically significant relationship between age of the patient with lower anterior crowding and the presence of this molar (Pearson Chi Square value- 4.091⁴, P =0.043). Gender of the patient did not influence the association of lower anterior crowding with the presence of third molars Pearson Chi Square value- 0.393⁵, p value- 0.531 (statistically insignificant).

Keywords: Crowding, Impaction, Lower anteriors, Mesial drift, Multifactorial, Third molar

INTRODUCTION

In orthodontics, the most controversial role of the third molars is whether they can contribute to the development of malocclusion or relapse after orthodontic treatment, particularly in the anterior segment of the dental arch. While
this topic has been discussed and presented in various studies, it is an issue that remains unresolved [1,2]. Lower anterior crowding over the years has been a subject of constant debate and subject of interest of many concerning its etiology and development.

Vast literature had been found on the ongoing debate of the same cause of aetiology. From various previous studies it has been seen that third molars may lead to lower anterior crowding, while erupting it transmits an anterior component of force down the arch and concentrating on the lower anterior region causing malocclusion and rotation of the lower anterior teeth [3][4]. On a study conducted by Niedzielska et al [5], he concluded that when there is sufficient space for the development of third molars, by this the tooth takes up the normal position in the dental arch and it thereby does not cause any lower anterior crowding, and the presence of insufficient space aggravating dental crowding. In another study conducted it was suggested that since theirs is reduction in the lower dental arch perimeter caused by reduced interdental space, absence of interdental contacts and hence cause rotation and malocclusion of teeth leading to lower anterior crowding caused by the third molar.

Years of study have failed to identify a single primary cause of late incisor crowding. The etiology for lower anterior crowding is multifactorial. There are two main theories discussed leading to lower anterior crowding: first theory explains that it is caused by mesial movement of posterior teeth, and the other theory explains lingual movement of anterior teeth.

The third molar theory proposes that erupting third molars push against the mandibular arch, forcing posterior teeth forward and crowding the incisors. Though this theory might be highly favourable to dentists as extraction of third molars will help in controlling the lower anterior crowding. Unfortunately Multiple studies have found no clinically significant reduction in the incidence of incisor crowding following third molar extractions [6].

Anterior teeth moving linguually theory is best understood by the equilibrium theory of tooth position. It proposes that astable dentition exists in a state of balance where the net resting pressure of the tongue, lips, cheeks and periodontium is zero. If this balance is disrupted, the teeth will move until a new state of equilibrium is reached. The differential mandibular growth theory is one of the most important theories that explains lower anterior crowding. According to this theory, when mandibular growth outpaces maxillary growth, forces from the maxillary arch and labial soft tissues cause uprighting of the mandibular incisors. This uprighting, or lingual movement, results in crowding by forcing the incisors to occupy a smaller arch perimeter. Such Differential mandibular growth is common in late adolescence and may continue at a slow rate into adulthood [7].

Though there was a lot of literature supporting the phenomenon of impacted third molars causing lower anterior crowding a few articles proved otherwise. In a study conducted by Trakiniene et al [8], it was seen that there was no statistically significant differences reported in terms of lower dental arch crowding between the groups with erupted, unerupted, and agenesis of third molars. They concluded that there is no evidence to implicate third molars as etiologic factors in the lower anterior dental arch crowding [8,9]. Another research conducted by Karasawa et al, [10] found no statistically significant association between the presence of lower third molars and anterior mandibular teeth crowding.

In another study conducted by Harradine et al [6], to evaluate the effect of the third molar and lower anterior crowding relapse in the patient undergoing orthodontic treatment and the difference was not statistically significant. He concluded that it was clinically significant and removal of third molars to prevent or reduce late incisor crowding could not be justified. In other studies done in orthodontics it was seen that the severity of mandibular Incisor crowding increased during adolescence and in adulthood in patients undergoing orthodontic treatment and those not treated in patients with premolar extraction. In a study conducted by Little et al,[11] it was seen that 90% of the extraction cases undergoing orthodontic treatment ended up with lower anterior crowding. In a study conducted by Kaplan et al,[12] it was seen that presence of third molars did not produce a significant lower anterior crowding when there was seating retention from the completed orthodontic treatment. From a study conducted by Song et al, [13] he concluded from his review of 40 articles that there was no reliable research evidence to support the prophylactic removal of disease free impacted third molars.
Because of the ongoing state of controversy on the hypothesis of impacted third molars causing lower anterior crowding. The purpose of this study was to evaluate and compare the same idea in patients with lower anterior crowding and evaluate for third molars.

Numerous studies have been conducted in our university on various orthodontic bonding adhesives [14–16] mini-implants being used for anchorage in orthodontic treatment [17–21], the negative effect of obstructive sleep apnea on detention [22], analysis of recycled brackets [23], a newly developed apparatus for measuring orthodontic force [24], clinical reports [25–28], but there are not sufficient epidemiological studies with the data present. The idea of this study was stemmed from the current interest in our community.

MATERIALS AND METHODS

Study Setting
The study was conducted with the approval of the Institutional Ethics Committee [SDC/SIHEC/2020/DIASDATA/0619-0320]. The study consisted of one reviewer, one assessor and one guide.

Study Design
The study was designed to include all dental patients of ages between 18-25 years with lower anterior crowding. The patients who did not fall into these inclusion criteria were excluded.

Sampling Technique
The study was based on a non probability consecutive sampling method. To minimise sampling bias, all case sheets of patients who had lower anterior crowding was reviewed and included.

Data Collection and Tabulation
Data Collection was done using the patient database with the timeframe work 01 June 2019 and 31 March 2020. About 585 case sheets were reviewed and those fitting under the inclusion criteria were included. Cross verification was done with the help of Photographs and radiographic evidence. To minimise sampling bias all data were included. Data was downloaded from the college data storing software and imported to Excel, Tabulation was done. The values were tabulated and analysed.

Statistical Analysis
Descriptive statistics were performed using SPSS by IBM on the tabulated values. Chi-Square test was performed and the p value was determined to evaluate the significance of the variables it was used to evaluate the association between the age and gender with the prevalence of third molars in patients with lower anterior crowding. The results were obtained in the form of graphs and tables.

RESULTS AND DISCUSSION

It was seen out of 585 patients, 378 patients had third molar impactions, hence causing lower anterior crowding from this we see that 159 patients who had lower anterior crowding did not have third molar impactions and hence making us rule out that third molar impactions are the absolute cause for lower anterior crowding.

The research also helped us see that on the basis of age, 18-21 years age group had the most frequency of lower anterior crowding and on further evaluation we see that third molar impactions were present in many of the patients of this age group, hence making us take into consideration that third molars are the cause of lower anterior crowding. As discussed earlier in a few articles, relationships between third molars and late crowding were longitudinal, and there was a slight increase in crowding and statistically significant. This was also seen in other studies conducted by Bergsotm and Jensen 1960. While a few other studies conducted by [12,29] did not see any significant change and cause of lower anterior crowding with third molars being the predisposing factor.
A few studies especially the one conducted by Richardson et al [2], stated that though third molars extractions did not show a significant improve in lower anteriors crowding, but the extractions of second molars showed a significant improvement in lower anteriors crowding and there seemed to be decrease in the crowding of arch. While a few studies conducted to evaluate post orthodontic treatment relapse, Kahl et al [30], reported that there was a small but statistically significant relationship with post treatment increase in crowding which was an average of 1.3mm greater in the presence of third molars. In a study conducted by Kahl et al [30], reported that there was medial movement of first molars of about 1.5 mm greater in patients with retained third molars.

Based on the gender based distribution we were able to see that there was no statistically significant difference between females and males with relationship to lower anterior crowding and third molars. The females presented with lower anterior crowding than males.

Later anterior crowding of the lower incisor teeth is frequently observed concurrently to the eruption of the third molars including the clinicians presuming a cause – and – effect relationship between the 2 events. One of the most frequently and widely discussed theories is that the mesio component of the forces generated by the erupting third molars , transmitting force down the dental arch causing mesial migrations of the teeth and this culminating in the area of lower anterior teeth and henceforth causing crowding, malocclusion. In a study conducted by Thilander et al [31], found a very small increase in crowding with third molars present but no clinically significant effect. Similar conclusion was drawn by Ades et al [32]. In a study conducted by 6 he reported that the study did not show any statistically significant correlation between third molar position and lower anterior crowding where he divided the study group into 3 groups from which he noticed that the erupted third molars group showed more crowding than the unerupted third molars group.

In a study conducted by Richardson divided the study group into 2 groups of patients – one with impacted third molars and the other with the non impacted group for 5 years, showed that the subjects in the impacted group had considerably more crowding both anteriorly and the molar region. Niedzielska et al [5] added a new component in the discussion. This indicates that patients with retained third molars have higher risk of tooth crowding in relation to Ganss ratio. Ganss ratio is the ratio between the third molar width and the retromolar space, meaning that when such space is sufficient the presence of the third molars does not cause tooth crowding; conversely, when such space is reduced the presence of the third molars can cause tooth crowding.

Several studies concluded that the long term belief that erupting third molars can cause crowding of the lower incisors after orthodontic alignment that it must be questioned , in a study conducted by Ades et al [32], he was able to conclude that there was no difference in alignment of incisors in the those with bilaterally , impacted , erupted , extracted third molars . In another study conducted by Harradine et al [6], he concluded that there was significantly less interarch space in non extraction cases but there Was no significant crowding present to conclude on the same . Laskin et al [33], reported that 65% of the orthodontists and oral surgeons approved of the idea that unerupted third molars produces an anteriorly directed force and it should be removed to prevent development of crowding in Mandibular incisors. Despite the absence of a clear relationship between the mandibular incisor crowding and third molar presence, extraction of those teeth has been performed in order to prevent abnormal orthodontic condition [29]. From the literature we were able to see that research conducted by Al-Balkhi et al [34], who reported that third molars did not cause crowding of the mandibular anterior teeth when interproximal contacts were removed. The hypothesis is that the mesial force of the erupting molars cannot be transmitted through the teeth in absence of interproximal contacts, thus preventing anterior tooth crowding.

From our study conducted we were able to see that the presence of third molars strongly concluded that this acts as a predisposing factor and leads to crowding in the lower anteriors.

CONCLUSION

Within the limits of the study it can be concluded that third molars strongly contributed to the crowding in the lower anteriors. We were able to conclude that there was a direct association between the source and cause. It was seen that the 18–21 years age group had a higher number of patients with lower anterior crowding with third molars impacted as the cause. Females had higher predilection to lower anterior crowding as a result of third molar impaction than males. Despite the vast body of literature present addressing the same. The question of whether third molars
molars should be extracted or not to prevent crowding – still remains controversial. Future scope of the study could aim at the betterment in stricter conditions of patient selection and reduce bias.

**AUTHOR CONTRIBUTION**
All authors contributed equally to the work.

**CONFLICT OF INTEREST**
The authors would like to declare that there is no conflict of interests.

**REFERENCES**


Figure 1: The graph represents the association between the lower anterior crowding and the impaction of the mandibular third molar of the patient. X axis represents the third molars. Y axis represents the total number of patients with lower anterior crowding. From this graph we were able to infer that 70.39% (Red) of patients with lower anterior crowding had third molars.
Figure 2: The graph represents the association between the age and presence of third molars in patients with lower anterior crowding. X axis - represents the age; Y axis - represents the percentage of patients with lower anterior crowding. It can be inferred from this graph that 40.78% of lower anterior crowding patients in the age group 18-21 years (red) had their third molars, which was also confirmed by Chi square test which showed statistical significance, hence proving there was an association between age and presence of third molars in patients with lower anterior crowding (Pearson Chi Square value- 4.091, \( p = 0.043 \), \( p < 0.05 \)).
Figure 3 - The graph represents the association between the gender and the presence of third molars in patients with lower anterior crowding. X axis represents Gender distribution; Y axis represents the percentage of patients with lower anterior crowding. It can be inferred from this graph that females had higher predilection to lower anterior crowding due to the presence of third molars (Red) than males. However, Chi square test did not show any statistical significance with Pearson Chi Square value - 0.393, p value - 0.531, p value >0.05, hence there is no association between gender and the presence of third molars and lower anterior crowding.