Evaluation of effect of third molars on lower anterior crowding

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Abstract

Background: Increase in crowding in mandibular arch with increasing age is a significant clinical problem. The etiology of this phenomenon has been a topic of debate for several decades. The purpose of this study was to test, whether there is any correlation between presence of mandibular third molar and lower anterior crowding.

Material and Methods: The study was conducted on orthodontic study models and orthopantomogram obtained from 90 subjects with an average age 21.01±4.13 years. The subjects were divided into 3 groups (30 subjects each) based on the eruption status of mandibular third molars which included; (i) Erupted Third Molar Group, (ii) Erupting Third Molar Group, (iii) Agenesis of Third Molar Group . Carey's analysis was performed for each model and statistical analysis was done.

Results: No significant differences in amount of crowding were found among three groups.

Conclusions: The lower anterior crowding is a very common feature of a completed permanent dentition. No statistically significant difference in the amount of crowding is present when subjects with erupted, erupting and agenesis of third molar are compared.

Keywords: Lower anterior crowding, Mandibular third molars.

Introduction

It is a well established fact that human dentition is in a continuous dynamic state which keeps on changing throughout life which is particularly noticeable in mandibular anterior teeth. According to Little et al[1] this process continues till third decade or beyond. The effect of third molar's presence on lower anterior crowding has been investigated for almost over 140 years[2]. Bishara et al[3,4] studied the changes in the lower incisors from 12 to 45 years of age. They concluded that there was an increasing tooth size-arch length discrepancy as age progresses. The mean changes were 2.7 mm in males and 3.5 mm in females. These changes can be related to a consistent reduction in arch length that occurs with age. Similar reports have been provided by Lundstrom[5] and Sinclair and Little.[6] On the other hand according to Weinstein[7], Björk and Skieller[8] and Siatkowski[9], there is a tendency for lower incisors to retrocline with increase in age may be the reason for increased crowding. Siatkowski suggested that the lower incisors might move due to the forces of tongue and lip musculature. Till date there is no single study that could establish relationship between the lower third molars and incisor crowding.

Aims and Objectives

The aim of the present study was to determine the measurements of mandibular dental arch for the purpose of assessing the potential influence of third molars on lower anterior crowding.

Material and Methods

The study group consisted of 90 subjects with an average age 21.52±4.05 years. The criteria for inclusion to the study:

- minimum age of 17 years;
- complete lower dental arch till second molars
- no previous orthodontic treatment done;
- good condition of the lower teeth without any artificial dental crowns;
- good quality Orthopantomograms and plaster models available.

The orthopantomogram and study models were used to assess the eruption status of third molar. And based on the information, sample was divided into following 3 equal groups:

1. Erupted Third Molar Group (30 subjects)
2. Erupting Third Molar Group (30 subjects)
3. Agenesis of Third Molar Group (30 subjects)

Crowding was measured on the study model for 12 teeth using stainless steel digital caliper with an accuracy upto 0.01 millimeter. The maximum mesiodistal width of tooth crown was measured and related to the dental arch length. The difference between the two values gave the space deficiency in the mandibular arch. To avoid the measurement error, 30 study models were randomly selected to be analyzed by the same investigator again at different time-points. Successive errors in measurement were negligible with respect to the present study. Tukey's HSD test was used in conjunction with ANOVA test to find means of the amount of crowding.

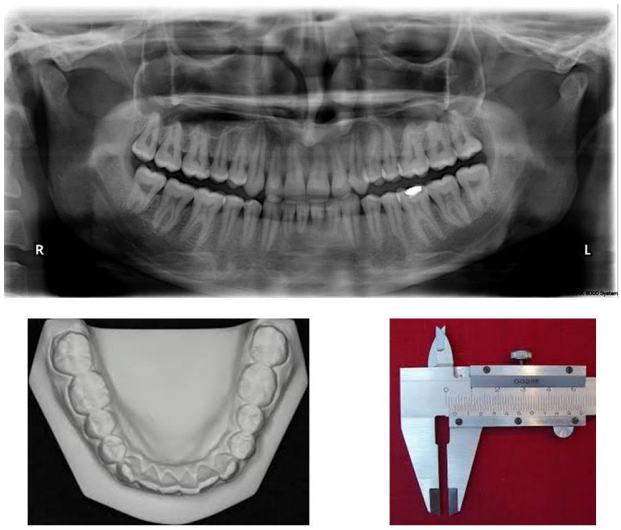

Fig. 1: Materials used for the study

Results

Crowding was observed in all three groups (mean =1.494±2.136 mm). But the amount varied among the groups, with maximum amount of crowding seen in group 2 with the mean value of 2.083±2.0472 mm while group 1 and group 3 had lesser amount of crowding with mean values of 1.233±2.552 mm and 1.167±1.662 mm respectively. (Table 1)

Table 1: Amount of space discrepancy in three groups

Group	N	Mean	Std. Deviation	Std. Error
1	30	1.233	2.5520	.4659
2	30	2.083	2.0472	.3738
3	30	1.167	1.6626	.3036
Total	90	1.494	2.1365	.2252

Also the space discrepancy was analyzed within the groups. Group 2 was found to have maximum number of subjects (80% subjects) having crowding, while in group 1 and 3 the ratio was only 56.7% each. But the differences were non-significant. (Table 2)

Table 2: Percentage distribution of crowding among three groups

Group		Frequency	Percent
1	no crowding	5	16.7
	crowding present	17	56.7
	spacing	8	26.7
	Total	30	100.0
2	no crowding	2	6.7
	crowding present	24	80.0
	spacing	4	13.3
	Total	30	100.0
3	no crowding	9	30.0
	crowding present	17	56.7
	spacing	4	13.3
	Total	30	100.0

Discussion

In the present study, some amount of crowding was (mean 1.494±2.136 mm) observed in almost 70% of total sample. The results were found to be in concordance with the observation of Antanas et al[10]. There was an increased arch length discrepancy in subjects with erupting third molars as compared to the erupted or agenesis of third molar group. Asanami and Kasazaki[11] suggested the reason behind this being the forces generated by the erupting third molars Although there were more number of subjects (80%) having lower anterior crowding, in whom third molars were erupting, but the observations were statistically non- significant. The number of subjects having crowding were same (56.7%) in erupted third molar group and in agenesis of third molar group but the number of subjects without any crowding were maximum in agenesis of third molar group.

Since there was no significant difference between the means of space discrepancy among the groups, third molars cannot be held completely responsible for the crowding in lower anterior region. Broadbent[12] was one of the first authors who suggested that presence of third molars have no influence on crowding in lower anterior region. Factors such as late mandibular growth, as suggested by Subtenly[13] and Sakuda[14], might bring the lower anterior teeth into a different soft tissue environment. They claimed that as the mandible grows, the pressure exerted by lips is greater than the pressure from tongue which can result in lower anterior crowding.

According to Laskin et al[15] hormonal changes occurring during adolescence and pregnancy may cause increased plasticity of the bone tissue. Bone loss as a result of increasing age or periodontal diseases might allow the teeth to drift under pressure which they could have resisted previously. Some evidences suggest that the periodontal conditions might also affect the stability of the lower anterior teeth. Proffit[16] suggested that slight imbalance is generally present between the forces exerted by the tongue and lip musculature, which is overcome by the periodontal membrane's active metabolism. Sidlauskas[10] and Richardson[17] did not consider the pressure exerted by the erupting third molars capable of causing crowding. Ihlow et al[18,19] explained the lower incisor crowding from a biomechanical aspect. They suggested that each dental contact acts as a joint and dental arch represents a linked chain of joints. These joints are made up of convex-convex surfaces that are in a mechanically unstable position under compression. Therefore, as depicted by the results of present study third molars alone cannot be responsible for the crowding of lower anterior teeth. Further studies can be done with a larger sample size with consideration of different factors associated with lower anterior crowding.

Conclusions

From the present study the following can be concluded:

1. The crowding in lower anterior teeth is a common feature of a completed permanent dentition.
2. No statistically significant differences in the amount of crowding is present when subjects with erupted, erupting and agenesis of third molar are compared.
3. Extraction of lower third molars for the purpose of relieving lower anterior crowding cannot be justified.

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