ORIGINAL RESEARCH

RELATIONSHIP OF MAXILLARY AND MANDIBULAR BASE LENGTH WITH DENTAL CROWDING IN CLASS II MALOCCLUSION

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ABSTRACT :

Objective: To assess the effect of dental crowding on the cephalometric parameters particularly maxillary and mandibular base lengths in Angle's class II malocclusion.

Materials and Methods: Pre-treatment study model of seventy patients with class II malocclusion were collected and divided into two groups according to mild and moderate crowding and compared for maxillary and mandibular base length. study model analysis and cephalometric analysis were carried out to measure space discrepancy and cephalometric parameters respectively and then statistically analysed with the help of Student's t-test.

Results: Subjects with complete class II malocclusion with moderate to severe mandibular crowding have statistically significant smaller apical base lengths as compared to the subjects with less crowding. Maxillary and mandibular apical base lengths are inversely related to severity of crowding.

Conclusions: Study revealed and supported the concepts that decreased maxillary and mandibular effective lengths are an important factor which is associated with dental crowding in patients with complete Class II malocclusion.

KEYWORDS: Crowding, Class II malocclusion, Apical base length.

INTRODUCTION :

Dental crowding has been the chief complain for most of the patients to visit an orthodontist to achieve an ideal smile. It is one of the most common types of malocclusion worldwide. Dental crowding is identified as a difference between tooth size and arch size that causes teeth to rotate, impact or otherwise erupt in improper positions. Although, it is established that dental crowding can be the result of changes in human evolutionary trends as well as certain hereditary and environmental factors, the importance of investigating the various clinical characteristics that contribute to it should be emphasized during the overall orthodontic treatment planning. These factors could be of skeletal, dental or soft tissue origin. These include tooth size, tooth shape, dental arch dimensions, oral and perioral musculature, mandibular and maxillary body lengths and direction of growth of jaws etc.[1] The association between dental crowding and tooth size has been examined by many researchers, but discrepancies were present between their conclusions. It is hypothesized that tooth size is not the only determining factor for dental crowding. In an investigation performed by Howe et al. crowded and non- crowded groups were compared using study models and it was concluded that arch dimensions greatly contribution to dental crowding than tooth size. Other researcher found the same correlation between arch dimensions and dental crowding.[2,3] Additionally, some cephalometric features are associated with a greater amount of dental crowding. Sakuda et al.[4] found that patients with crowding in the permanent dentition had a smaller mandibular body length. Leighton and Hunter[5] found smaller mandibular body length in patients with severe crowding in the mixed and permanent dentition. Identification of the existing contributing factors of dental crowding will help us in employing appropriate treatment strategy as well as achieving stable post treatment results. In general,

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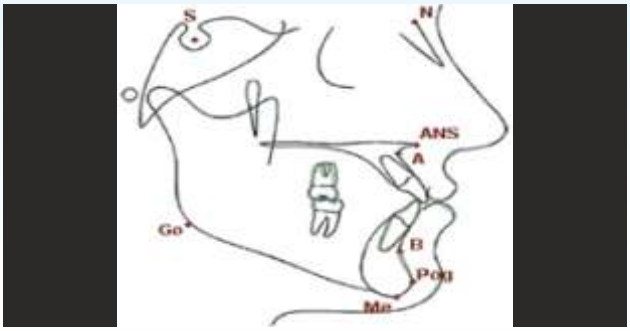
subjects with Class II malocclusion have lesser mandibular length than subjects with normal occlusion and Class I malocclusion.[6-10] However, the relationship between the apical base length and anterior crowding in Class II malocclusion needs much more detailed study in different human races and has not been studied. Therefore, the aim of this study was to assess maxillary and mandibular base length correlation with the amount of dental crowding in local population with complete class II malocclusion and the results obtained can help us in determining treatment protocols for malocclusion with specific etiologies.

MATERIAL AND METHODS :

The Sample of seventy Bihari patient with permanent dentition up to first molars (ages 18-25 years) with bilateral Class II molar relationship and all teeth fully erupted to the occlusal plane were included in the study. Patients with mesiodistal loss or excess of tooth material as a result of caries and restorations, abnormal dental conditions such as impaction, transposition and congenitally missing teeth, prosthetic replacement, previous or ongoing orthodontic treatment, transverse discrepancies such as cross-bite or scissor bite were excluded from the study. The sample was divided in two study groups according to pretreatment mandibular anterior crowding. Group 1 consisted of twenty five patients with more than 3 mm crowding and Group 2 had fourty five patients with crowding of less than 3mm.

Arch length discrepancy (ALD) was calculated as the difference between the arch perimeter and the sum of total tooth materials. The space available was measured as the arch perimeter from the mesial aspect of the permanent first molar to its antimere with a brass wire. Similarly, space required was measured as the sum of the individual tooth widths starting from the mesial aspect of the first permanent molar to its antimere using a digital vernier caliper with sharpened points. Negative values indicate crowding and vice versa. Standardized lateral cephalograms were obtained from all selected subjects. Lateral cephalograms were traced and cephalometric analysis was performed (Fig.1). Linear and angular measurements were taken from all the samples and subjected to statistical analysis.



S- Sella, N- Nasion, ANS- Anterior Nasal spine, Pt A, Pt B. Pog- Pogonion, Go-Gonion, Me- Menton. Gn- Gnathion, Co - Condylion

Fig 1. Cephalometric tracing with landmarks

STATISTICAL ANALYSES :

Spearman's RANK correlation test was applied to see the relationship between mandibular and maxillary base length and dental crowding. The mean value of the each and every parameter, used in cephalometric analysis, was also compared between two group statistically by means of student's t-test to find out any significant difference between the two groups. All the data was tabulated and the difference between the two groups was analysed statistically by student's t-test. P value of < 0.05 was considered significant.

RESULT :

Smaller maxillary and mandibular apical base lengths was found in subjects with moderate to severe dental crowding (?3mm) compared to those with mild (<3mm) crowding (Table 1)

Mandibular Crowding	5.13	1.65	0.54	0.89	4.59	.oo1
Co-A(mm)	81.82	4.52	86.14	5.27	24.32	.006
Co-Gn(mm)	103.46	5.01	108.00	6.04	24.54	.0016
Maxiilary Crowding (mm)	8.68	3.88	3.25	3.69	5.43	.0001
	Mean	SD	Mean	SD	Difference	P Value

Inter group Comparison Concerning the Amount of Crowding and Apical Base Lengths (t-tests) (Table-1)

DISCUSSION :

It is generally said that an accurate clinical diagnosis leads clinician towards path of to successful treatment. So, in the same way orthodontic diagnosis has given highest priority to provide stable and good results and is based on anatomical, physiological and biological factors and also on the aesthetic judgment of the orthodontist. An assessment of the amount of crowding or spacing is one of the primary steps in orthodontic diagnosis and treatment planning. Amount of the discrepancy between arch length and tooth size in the incisor region often dominates the consideration for or against premolar extraction. The groups studied here included only patients with a complete bilateral Class II molar relationship, allowing Class II malocclusions to be clearly characterized. Group was selected according to the severity of mandibular crowding. Group 1 consisted of patients with more than 3 mm mandibular crowding, while Group 2 consisted of patients with less than 3 mm mandibular crowding. Both group were compared and results showed that subjects with moderate to severe dental crowding had smaller maxillary and mandibular effective apical base lengths compared with subjects without crowding or less dental crowding (Table 1). So, a weak to moderate inverse correlation was found between the amount of crowding and the apical base length of the maxilla and mandible. Based on the results of the present study, it can be speculated that midface and mandibular effective lengths (Co-A and Co-Gn) would correlate to a given range of mandibular dental crowding. Previous study conducted by Janson et al. showed similar findings, but in their study malocclusion was not specified. Therefore, effective lengths of the apical bases can be inversely associated to the amount of dental crowding independent of the type of malocclusion.

It is interesting to note that although the groups were selected according to mandibular crowding, the group with severe crowding also showed significantly greater maxillary crowding. This seems reasonable because there was significant correlation between the maxillary and mandibular effective lengths and crowding. Therefore, it can be concluded that severely crowded subjects are more likely to present shorter effective apical base lengths and that the shorter the base lengths the greater the likelihood for crowding. This is especially applicable to subjects with complete Class II malocclusion, but it can be extrapolated to other types of malocclusions based on similar studies.[11-13]

CONCLUSION :

The results of the present study reveal that significantly smaller apical base length is present in the subjects with complete class II malocclusion with moderate to severe mandibular crowding compared to the subjects with less crowding so it can be concluded that significant inverse correlations exist between degree of crowding and maxillary and mandibular apical base lengths.

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