Relationship between dental arch WIDTHS and mandibular plane angle in untreated adults With Skeletal class II malocclusion

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Abstract

Objective: To investigate the arch width in untreated Class II subjects with average and high mandibular plane angles.
Study Design: Cross sectional comparative study.
Place and Duration of Study: The study was conducted in the orthodontics department of Armed forces institute of Dentistry Rawalpindi from Sep 2008 to March 2009.
Patients and Methods: Pretreatment dental casts and cephalograms of skeletal class II patients with complete set of permanent dentition except third molars reporting to the OPD of Orthodontic department were selected. Records of 60 patients (30 high angle, 30 normal angle) were randomly selected out of the 240 records studied. Intermolar and intercanine widths were measured in millimeters using digital calipers. Mandibular plane angle was measured from cephalometric tracings using the SN Mandibular plane (GoGn SN) angle as used in Steiner's analysis.
Results: The mean intermolar width for the normal angle group was 49.18 ± 2.69 mm and 48.56 ± 4.44mm for the high angle group. The mean intercanine width for the normal angle group was 34.41 ± 2.33mm and for the high angle group it was 33.13 ± 2.60mm. Independent t test failed to show any significant ($p > 0.05$) difference in the IMW between normal and high angle patients. However a significant ($p < 0.05$) difference was observed in the intercanine width of the normal and high angle groups.
Conclusion: In our study there was no significant difference of intermolar width whereas significant difference of intercanine width was found between normal and high angle cases.

Keywords : Inter canine width, Inter molar width, Mandibular plane angle, skeletal Class II

Article

INTRODUCTION

Changes in size and shape of the facial bones are determined by sutural, cartilaginous, periosteal and endosteal bone remodeling.1 An important role in the remodeling process is played by soft tissues relating to the bones and functional needs1-5.

Variation in arch width is seen in individuals with different facial forms. Arch width of short faced individuals is greater than that of the long faced individuals. Long faced individuals may present with a narrow arch. Many studies have shown the influence of jaw muscles on facial form. Finn6 reported that maximum biting force in the molar region was greater in brachyfacial (short-face) subjects than in dolicofacial (long face) subjects. Proffit et al7 found that long-face adults have significantly less occlusal force during maximum-effort, simulated chewing and swallowing than do subjects with normal vertical facial dimensions.

Clinicians often pay much attention to the inclination of the mandibular plane, because it is a major determinant of the vertical dimension of a face (long, average, or short). A person with a steeper mandibular plane to cranial base (larger MP-SN angle) often has a long anterior facial height, a smaller ratio of posterior to anterior facial height, and a short mandibular ramus height. Conversely, a person with a flat mandibular plane (smaller MP-SN angle) has a short anterior facial height, a larger ratio of posterior to anterior facial height, and a long mandibular ramus height.8-11

If every individual has a different arch width and arch form, using individualized arch wires according to each patient's pre-treatment arch form and width is suggested during orthodontic treatment to increase the stability of the result. Thus the purpose of this study was to investigate the arch width (intermolar and intercanine distance) in untreated (Class II malocclusion) subjects with average and high MP-SN angles.

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patients and methods

duration:

This study was conducted at, Orthodontics department, Armed forces Institute of dentistry Rawalpindi, from 25-09-2008 to 28-03-2009.

Pretreatment dental casts and cephalograms of skeletal class II patients reporting to the OPD of orthodontic department were selected. Records of only class II patients with complete set of permanent dentition except third molars were selected from the waiting list. Patients with a history of orthodontic treatment or craniofacial syndrome were excluded from the study. Based on these criteria a total of 60 records (30 high angle, 30 normal angle) were randomly selected out of the 240 studied. Using the dental casts, the following measurements were recorded.

* Maxillary intermolar width was the linear measurement between the mesiobuccal cusp tips of the right and left maxillary first molars.

* Maxillary intercanine width was the linear measurement between the tips of the right and left maxillary cuspids.

All intermolar and intercanine widths were measured in millimeters using digital calipers.

Lateral cephalometric radiographs were used. Mandibular plane angle was measured from cephalometric tracings using the SN Mandibular plane (GoGn SN) angle as used in Steiner's analysis (Figure).

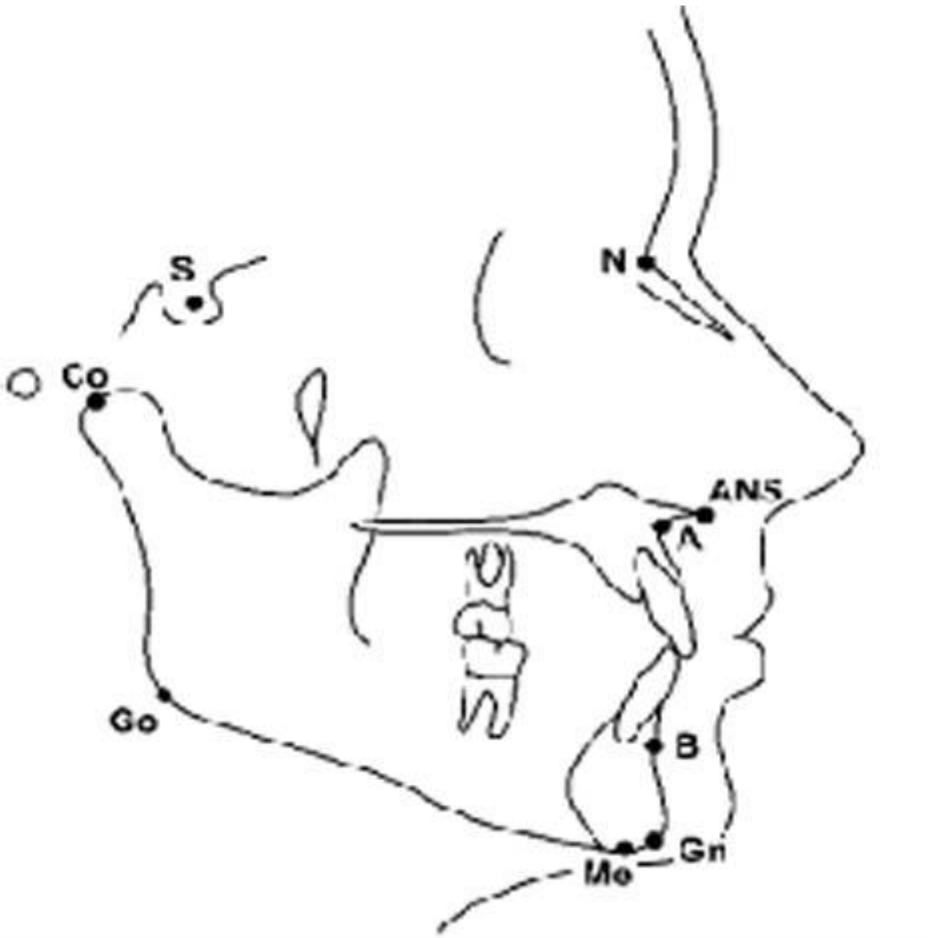

Figure: Steiner's mandibular plane

Data analysis was done using SPSS version 14. Independent t-test was used to compare the Intercanine and intermolar width between normal angle and high angle. A p value of < 0.05 was considered statistically significant.

RESULTS

The mean intermolar width for the normal angle group was 49.18 ± 2.69 mm and 48.56 ± 4.44mm for the high angle group (Table).

Table: Descriptive statistics and p values

	Normal angle		High angle		p-value
	Mean	SD	Mean	SD	
IMW	49.18	2.69	48.56	4.44	0.51
ICW	34.41	2.33	33.13	2.60	0.048*

*P value < 0.05 is significant IMW (inter molar width), ICW(intercanine width)

The difference was insignificant (p>0.05) The mean intercanine width for the normal angle group was 34.41 ± 2.33mm and for the high angle group it was 33.13 ± 2.60mm. There was significant difference in intercanine width of both the groups (p < 0.05)

DISCUSSION

Our study showed no significant difference of intermolar width whereas significant difference of intercanine width was found between normal and high angle cases. Inter canine width decreased with an increase in the mandibular plane angle. Many studies show the variation in arch width with the change in mandibular plane angle.

Christie12 evaluated orthodontic records of 82 white adults (43 women, 39 men) with normal untreated occlusions and found that short-face men had greater maxillary and mandibular widths than normal men. However, no differences in width were found between short-face and normal women. They did not provide data on long-face subjects because the sample size was too small (only 4). Our study included the records of 60 patients and a decrease in intercanine width with the increase in mandibular plane was seen. However our study did not take gender differences into consideration.

Weijs and Hillen13 and van Sprosen et al14 found that the cross-sectional areas of the temporalis and masseter muscles correlated positively with facial width. They suggested that the jaw muscles affect facial growth and partly determine the final facial dimensions. Kiliaridis15 also suggested that the increased loading of the jaws from masticatory muscle hyperfuction might lead to increased sutural growth and bone apposition, resulting in increased transversal growth of the maxilla and broader bone bases for the dental arches. Tsunori et al16 reported that, when compared with average and long-face persons, short-face subjects had larger intermolar widths and greater buccal cortical bone thicknesses in the molar area of the mandible. They suggested a possible link between the development of the maxillofacial complex in the vertical and transverse dimensions and measures of increased muscularity.

CONCLUSION

In our study there was significant difference of intercanine width between normal and high angle cases. Inter canine width decreased with an increase in the mandibular plane angle. No significant difference of intermolar width was observed.

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