ORIGINAL ARTICLE

DENTAL ARCH WIDTHS IN CLASS I NORMAL OCCLUSION AND CLASS II DIVISION 1 MALOCCLUSION

[1]CH REHAN QAMAR, BDS, FCPS (Orthodontics)
[2]MARRYAM RIAZ, BSc, BDS
[3]SARAH MUKHTAR AWAN, BDS

ABSTRACT

The purpose of this study was to compare dental arch widths Class II division 1 malocclusion with normal Class I occlusion subjects. The Intercanine, Interpremolar and Intermolar widths were measured on 100 dental casts (50 class I and 50 class II / 1 malocclusion subjects). The data was developed on SPSS 16 for windows. Independent-samples t-test was applied for comparison of the groups. Lower Intercanine width was larger in class II / 1 malocclusion and Intermolar width was significantly increased in class I normal occlusion group. Interpremolar width between the two groups did not reveal any significant difference. Lower Intercanine width was significantly larger in class II / 1 and Maxillary Intermolar width was significantly narrower in class II / 1 malocclusion subjects.

Key words: *Dental arch width, Class II div 1 malocclusion, Transverse dimensions*

INTRODUCTION

Class II is a common type of malocclusion that show evidence of a variety of skeletal and dental configurations in transverse, sagittal and vertical planes of space.[1,2] Dental class II malocclusion presents with distal relationship of lower teeth to upper and is categorized as Class II division 1 and division 2 types depending upon the inclination of incisors. Among these, the Class II/I malocclusion is more common.[3-6] The dental arch width is of considerable interest to orthodontists for diagnoses and treatment planning as it affects the space available, dental esthetics and stability of the dentition.[7,8] The literature confirms a significant difference among the dental transverse dimensions among class I, class II/1.[9,10] Numerous investigators evaluating transverse dimensions have reported that maxillary arch was narrower in patients with Class II/1 malocclusion, and an expansion was needed as a part of treatment.[11] Numerous other studies advocate that deficient growth in transverse plane of the maxilla and the sagittal growth of the mandible appeared to cause the typical Class II occlusion.[11-13] The dental arch widths determined for other regions might be inadequate for application to different racial or ethnic groups and may exhibit variations. The present study was carried out to determine the difference between dental arch widths of class I and class II/1 malocclusion in our region for a better understanding in regard to diagnosis and treatment planning.

METHODOLOGY

The study was carried out on 100 dental casts of patients with age range 16-20 years. (50 class I normal occlusion and 50 Class II/1, both genders). Demographic data of patients was recorded and the measurements were taken using vernier scale. Following criteria was used:Class I normal occlusion: All teeth present except third molars, class I canine and molar relation, no or minor crowded arches Class II div 1 malocclusion: All teeth present except third molars, class II canine and full cusp class II molar relation, over jet more than 5 mm, proclined upper incisors. The following measurements were used in this study;

Maxillary cast

1 Maxillary Intercanine width (UC-C): Distance between the cusp tips of right and left maxillary permanent canines.

[1] **Correspondence:** Dr Ch Rehan Qamar, Associate Professor, University College of Dentistry, The University of Lahore, 1Km Raiwind Road, Lahore. Email: rehanqamar@live.com

[2,3] Demonstrators (Dept of Orthodontics)

2 Maxillary Interpremolar width (UP-P): Distance between buccal cusp tips of right and left maxillary permanent first premolars.

3 Maxillary Intermolar width (UM-M): Distance between the mesiobuccal cusp tips of right and left maxillary permanent first molars.

Mandibular cast

1 Mandibular Intercanine width (LC-C): Distance between the cusp tips of right and left mandibular permanent canines.

2 Mandibular Interpremolar width (LP-P): Distance between buccal cusp tips of right and left mandibular permanent first premolars.

3 Mandibular Intermolar width (LM-M): Distance between the mesiobuccal cusp tips of right and left mandibular permanent first molars.

STATISTICAL ANALYSIS

The mean and standard deviation for each parameter was calculated using the SPSS Version 16 for Windows. Class 1 and Class II/1 measurements were compared using independent t-test. 50 casts were randomly selected and remeasured after one week of first measurement and was compared to find out any method error by applying paired t-test.

RESULTS

There was no statistically significant difference documented between the first and the second measurements.

TABLE 1: COMPARISON OF DENTAL ARCH WIDTHS

Parameter	Class I (n=50) Mean Value (mm)	Class II/1 (n=50) Mean Value (mm)
UC-C	34.2 ± 1.3	34.1 ± 2.1
UP-P	40.3 ±1.9	39.9 ± 2
UM-M	52.3 ± 1.8	50.1 ± 2.4*
LC-C	26.3 ± 2	28.3 ± 2.3*
LP-P	33.9 ± 1.3	34.3 ± 2.5
LM-M	44.1 ± 2.3	44.5 ± 2.5

* Significant value ($p < .05$)

No significant difference was found for the mean values of maxillary Intercanine width in class I (34.2 ± 1.3) and ClassII/1 (34.1 ± 2.1) patients, while the mandibular Intercanine width was significantly larger in class II/1 (26.3 ± 2) than Class I subjects (28.3 ± 2).

The mean value of Maxillary and mandibular Interpremolar widths was found out to be 40.3 ±1.9 and 33.9 ± 1.3 for Class I whereas in class II/1 subjects it was 39.9 ± 2.1 and 34.3 ± 2.5 respectively, thus indicating no significant difference between both the groups.

The maxillary Intermolar width mean value for class I subjects (52.3 ± 1.8) was found out to be significantly larger as compared to class II/1 (50.1 ± 2.4). However, no statistically significant difference was demonstrated between the mandibular Intermolar width in class I and class II/1 groups (44.1 ± 2.3 and 44.5 ± 2.5) respectively.

DISCUSSION

The current study was carried out to compare the dental arch widths in normal Class I occlusion with Class II/1 malocclusion patients. The mean age of the study sample was 18.54±2.3 years. The literature reveals that most common causes of narrow maxillary arches for class II/1 mouth breathing, digit sucking habits, tongue thrusting.[14,15]

The results of current study indicated no significant difference between the upper Intercanine dental arch widths among the two groups. However, the lower Intercanine width was significantly larger in class II/1 malocclusion as compared to class I occlusion. These results were similar to Sayin[7] and Tancun Usyal[8] study whereas was in contrary to study carried out by Staley et al[15] who stated that maxillary Intercanine width was narrower in class II/1 than class I. No difference was found out in their study regarding lower Intercanine width between the tow groups. Bishara[17] however found no significant difference in Intercanine widths between class I and class 11/1 malocclusion group.

The present study revealed no statically significant difference in Interpremolar width of both class I and Class II/1 group in both the arches. This was similar to the results obtained in previous studies.[7,8,16-19]

The current study revealed that maxillary Intermolar width was significantly larger in class 1 occlusion as compared to class II/1 malocclusion. This

was in agreement to previous studies conducted by Sayin[7], Staley[16], Tallaro[18] and Buschang.[19] The results of investigations carried out by Tancan[8] were contrary to our study, where upper and lower Intermolar width was greater in class II/1. Another study conducted by Frohlich[20] found no difference in Intermolar widths between class I and class II/1 malocclusion groups.

CONCLUSION

1 Lower Intercanine width is significantly larger in class II/1.

2 Maxillary Intermolar width is significantly narrower in class II/1 as compared to class I normal occlusion patients. Therefore, maxillary transverse discrepancy suggests itself due to maxillary posterior teeth rather than the lower posterior teeth.

REFERENCES

1 Rehan Q, Naseer Ch. Cephalometric characteristics of class II malocclusion: Gender Dimorphism. Pak Oral Dental J 2007;27:73-78.

2 Abida A, Amjad N, Hameedullah J. Prevalence of class II malocclusions in Pakistani sample. Pak Oral Dental J 2010; 3:96-100.

3 Firdos T. Investigation of class II malocclusion-A study conducted at Khyber College of Dentistry, Peshawar-Pakistan. Pak Oral Dental J 2000;20:158-64.

4 Emmad A, Al-Khateeb A, Susan N, Al-Khateeb. Antero posterior and Vertical Components of Class II division 1 and division 2 Malocclusion. Angle Orthod 2009;79:859-66.

5 Rehan Q, Nadia R, Sadia L. Cephalometric characteristics of class II division 1 and Class II division 2 malocclusion. Pak Oral Dental J 2010;30:138-41.

6 John Y, Ling K, Wong R. Dental Arch Widths of Southern Chinese. Angle Orthod 2009;79:54-63.

7 Sayin MO, Turkkahraman H. Comparison of Dental Arch and Alveolar Widths of Patients with Class II, Division 1 Malocclusion and Subjects with Class I Ideal Occlusion. Angle Orthod 2004;74:356-60.

8 Tancan U, Serdar U, Badel M, Zafer S. Dental and Alveolar Arch Widths in Normal Occlusion and Class III Malocclusion. Angle Orthod 2005;75:941-47.

9 Baccetti, Franchi TL, McNamara Jr JA, Tollaro I. Early dentofacial features of Class II malocclusion: a longitudinal study from the deciduous through the mixed dentition. Am J Orthod Dentofacial Orthop 1997;11:502–9.

10 Lux CJ, Conradt C, Burden D, Komposch G. Dental arch widths and mandibular-maxillary base widths in Class II malocclusions between early mixed and permanent dentitions. Angle Orthod 2003;73:674–85.

11 Baccetti, Franchi TL, McNamara Jr JA, Tollaro I. Early dentofacial features of Class II malocclusion: a longitudinal study from the deciduous through the mixed dentition. Am J Orthod Dentofacial Orthop 1997;11:502–9.

12 McNamara Jr. J. A. Early intervention in the transverse dimension: is it worth the effort? Am J Orthod Dentofacial Orthop 2002;121:572–4.

13 Bishara SE, Jakobsen JR, Treder J, Nowak A. Arch width changes from 6 weeks to 45 years of age. Am J Orthod Dentofacial Orthop 1997;111:401–9.

14 Enlow DH, Hans G. Essentials of Facial Growth. Philadelphia, Pa: WB Saunders; 1996:1–280.

15 Laine T, Hausen H. Space anomalies, missing permanent teeth and orthodontic treatment. Angle Orthod 1985;55: 242–50.

16 Staley RN, Stuntz WR, Peterson LC. A comparison of arch widths in adults with normal occlusion and adults with Class II division 1 malocclusion. Am J Orthod 1985;88: 163-69.

17 Bishara SE, Bayati P, Jakobsen JR. Longitudinal comparisons of dental arch changes in normal and untreated Class II, division 1 subjects and their clinical implications. Am J Orthod Dentofacial Orthop 1996;110:483–89.

18 Tollaro I, Baccetti T, Franchi L, Tanesescu CD. Role of posterior transverse interarch discrepancy in Class II, division 1 malocclusion during the mixed dentition phase. Am J Orthod Dentofacial Orthop 1996;110:417–22.

19 Buschang PH, Stroud J, Alexander RG. Differences in dental arch morphology among adult females with untreated Class I and Class II malocclusion. Eur J Orthod 1994;16: 47–52.

20 Fröhlich FJ. A longitudinal study of untreated Class II type malocclusion. Trans Eur Orthod Soc 1961;37:137–59.