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Original Article

Determination of Buccolingual inclination in class 2 division 1 and class 1 malocclusion

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ABSTRACT

Objectives: To determine the buccolingual inclination of maxillary and mandibular posterior teeth between Class II division 1 malocclusion and Class I occlusion.

Materials and Methods: Study consist of 25 subjects with Class I occlusion and 25 subjects with Class II division 1 malocclusion were selected to measure Buccolingual inclination of maxillary and mandibular premolars and first molars were measured with a bevel protractor.

Results: All of the posterior teeth in both groups were lingually tilted. The maxillary premolars and first molars were significantly more lingually tilted (P< .05) in Class II division 1 malocclusion than in Class I occlusion. Mandibular first premolars were significantly less lingually tilted in Class II division 1 malocclusion than in Class I occlusion. No significant difference of Buccolingual inclination was found in mandibular second premolars and first molars between the two groups.

Conclusions: Buccolingual inclination plays an important role in transverse discrepancy of Class II division 1 malocclusion.

Introduction

The maxillary permanent first molar is the largest tooth in the maxillary dentition. Angle referred to this tooth as the "key to occlusion" because he thought that it was by far the most constant in taking its normal position. Clinically, this tooth frequently is mesially rotated; this exacerbates the arch length discrepancy and Class II molar relationships. The Class II malocclusion is a common malocclusion Class II division 1 malocclusion is one of the most common problems in orthodontic clinical practice.[1,2,3]with a prevalence ranging between 5% and 29% [4,5].

Many studies have focused on the sagittal relationship of Class II malocclusion in the past. Currently many studies are been focused on the transverse discrepancy in Class II division 1 malocclusion, and the results have been controversial. According to some Class II malocclusion had a narrower maxillary arch width than Class I or normal occlusion, but the arch is narrow at different posterior teeth positions in these studies[6,7,8]. Whereas few studies have found that there were no

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Fig 1: Bevel protractor for Buccolingual measurement

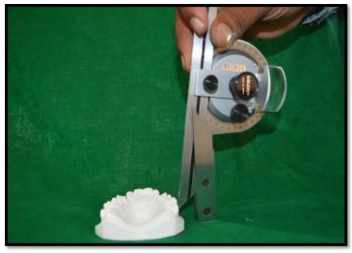

Fig 2: Measurement of Buccolingual inclination

differences in maxillary arch width. The alveolar bone width has also been studied and shows no difference between Class II division I malocclusion and Class I occlusion.[9].Many researches limited their studies with respect to arch width and alveolar width while not giving much importance to buccolingual inclination, one of the important parameter which constitutes Andrews six keys of normal occlusion. Another drawback of these studies[6,7,8,9], they did not include skeletal relationship, as anterioposterior displacement is likely to be compensated with transverse relationship.

Hence, a need for transverse discrepancy with respect to Buccolingual inclination is required with consideration of skeletal and dental parameters. The aim of this research is to study whether there is transverse discrepancy with respect to buccolingual inclination plays a role in Class II division 1 malocclusion.

The null hypothesis is that there is no difference in the buccolingual inclination of posterior teeth between Class I occlusion and Class II division 1 malocclusion.

Material & Methods

The study was carried out in the Department Of Orthodontics and Dentofacial Orthopedics, A.M.E's Dental College and Hospital, Raichur, Karnataka. Study consisted of 50 subjects' dental impression which includes 25 class II malocclusion and 25 class I occlusion.

Materials used:

Patient's Casts

Lateral Cephalogram,

Digital Caliper,

Bevel Protractor

Inclusion criteria

Class II

(1) The mesial cusps of bilateral maxillary first molars were mesial to the centric groove of the corresponding mandibular first molars;

(2) Class II skeletal relationship with ANB angle >5 degree in cephalometric analysis;

(3) patients without orthodontic, prosthodontic, or orthognathic treatment;

(4) no severe crowding- Little's irregularity index of moderate irregularity(5-6mm), crossbite, or scissor bite in the posterior teeth;

(5) fully erupted first premolars, second premolars, and first molars; and

Class I

(1) Bilateral Class I molars and canines in centric occlusion relationship;

(2) Class I skeletal relationship with ANB angle, <5 in cephalometric analysis;

(3) Patients without orthodontic, prosthodontic, or orthognathic treatment;

Table 1: Comparison of the bucco-lingual inclination {Mean (SD)} among both the groups using unpaired t test

{Maxillary right side}

Group	No of samples	1st Premolar Mean (SD)	1st Molar Mean (SD)
Class I	25	10.10 (0.9)	7.90 (0.7)
Class II	25	14 (1.1)	10.30 (1.2)
t value	-	8.510	5.522
P value	-	<0.001**	<0.001**

(p< 0.05 - Significant*, p < 0.001 - Highly significant)**

{Maxillary left side}

Group	No. of samples	1st Premolar Mean (SD)	1st Molar Mean (SD)
Class I	25	10 (0.8)	8.40 (0.8)
Class II	25	13.20 (1.6)	10.10 (0.7)
t value	-	5.580	4.798
P value	-	<0.001**	<0.001**

(p< 0.05 - Significant*, p < 0.001 - Highly significant)**

(4) No severe crowding- Little's irregularity index of moderate irregularity (5-6mm), crossbite, or scissor bite in the posterior teeth region.

(5) Fully erupted first premolars, second premolars, and first molars;

{Mandibular right side}

Group	No of samples	1st Premolar Mean (SD)	1st Molar Mean (SD)
Class I	25	11.10 (0.9)	8.30 (0.8)
Class II	25	12.70 (0.9)	8 (0.8)
t value	-	3.919	0.818
P value	-	<0.001**	0.424

(p< 0.05 - Significant*, p < 0.001 - Highly significant)**

{Mandibular left side}

Group	No of samples	1st Premolar Mean (SD)	1st Molar Mean (SD)
Class I	25	9.30 (1.1)	8.40 (0.8)
Class II	25	10.60 (0.8)	8 (0.8)
t value	-	3.036	1.078
P value	-	0.007*	0.295

(p< 0.05 - Significant*, p < 0.001 - Highly significant)**

EXCLUSION CRITERIA

All conditions other than afore mentioned were excluded.

Methodology:-

Selected cast are duplicated with alginate. A reference plane, 'posterior occlusal plane' (POP) was established as done by Rui Shu et al[10]by placing a flat plane on the most prominent cusps of posterior teeth, similarly one point on another side wall is marked. The bases of the

casts were trimmed to the plane formed by the three points on the lateral wall, which was parallel to the POP. Angle between teeth and the POP is measured which is refered as "buccolingual inclination angle. The facial axis of clinical crown (FACC) and its midpoint, the facial-axis point (FA point) point, are marked on the buccal surface and used to measure the buccolingual inclination. The measuring apparatus for measurement of the buccolingual inclination is a bevel protractor, and the measuring philosophy was similar to the method of Andrews. Casts were put on the flat surface and the measuring limb was adjusted tangential to the FA point along the FACC. The buccolingual inclination between the teeth crown and the POP can be detected on the data panel.

Statistical Analysis

Paired t-test will be applied for testing the difference of the buccolingual inclination between the left and the right side at each tooth category.

Independent t-test will be applied for the comparison of buccolingual inclination between the Class I and Class II division 1 groups. Statistician are used to perform all of the statistical analyses. The statistical analysis was performed using SPSS software.

Results

Buccolingual inclination comparison between the two groups is shown in Table 1. Compared to Class I samples, Class II division 1 malocclusion samples was found to be more lingually tilted with respect to maxillary first molars, first premolars, and second premolars.

It is also noticed that Mandibular first premolars were significantly less lingually tilted in Class II division 1 malocclusion than in the Class I samples. Whereas there was a tendency for mandibular second premolars and first molars of the Class II division 1 group to be less lingually tilted than the Class I group, but the differences showed no statistical significance.

The null hypothesis is rejected as there is a significant difference in buccolingual inclination of posterior teeth between Class I occlusion and Class II division 1 malocclusion.

DISCUSSION

A thorough knowledge of the skeletal and dental components that contribute to a malocclusion is essential as these elements may influence the treatment approach. Andrew and Andrew suggested the use of an anatomic references, such as a parameter with the object of centralizing the roots of teeth in the basal bone, which they denominated via the WALA (Will Andrew & Larry Andrew) Ridge. The WALA ridge is strip of soft tissue immediately above mucogingival junction of the mandible, at the level of the line that passes through the centres of the rotation of the teeth or close to it and is exclusive to the mandible. Therefore the centre line of rotation (hypothetical line that passes through the horizontal centre of rotation of each tooth) would be the line that best conserves the original and ideal form of the dental arch. Thus the ideal form of the maxillary and mandibular dental arches would be dictated by the the form of the basal bone of the mandible. When the form of mandibular dental arch is correct, the wire that unites the bracket slot of "straight wire" bracket should have same shape as that of the WALA ridge. The mandibular alveolar process is selected because its shape would be minimally effected by faciolingual tipping of the teeth, this would happen because of the shape of underlying basal bone. By taking it as a base of study i.e relation between teeth and WALA ridge, standard distances were established between FA points and the WALA ridge which would influence the treatment plan.

Transverse discrepancy in Class II malocclusion has been intensively investigated, and the results are still controversial. Staley et al.[6] and Sayin and Turkkahraman[8] considered that most of the Class II division 1 malocclusion was accompanied by a long and narrower arch form, which is partly caused by a palatal tilt of the posterior teeth.

The term inclination of teeth was first proposed in the six keys by Andrews[11]. Most studies[12,13] focused on the labiolingual inclination of anterior teeth, which seems important to an esthetic profile. In recent years, the buccolingual inclination of posterior teeth has become intriguing to researchers for its important role in smile esthetics and interdigitated occlusion. Lingual tilted posterior teeth would increase the negative corridor and consequently decrease the fullness of a smile. Because buccolingual inclination is another important transverse characteristic of occlusion, it is very important to identify the role of Buccolingual inclination in a transverse discrepancy in Class II division 1 malocclusion.

Most of the prior studies on transverse discrepancy did not consider the skeletal relationship, which might be the cause of transverse discrepancy.[5] ANB angle is a widely accepted diagnosis standard for sagittal jaw discrepancy and was employed in this research to investigate the relationship between transverse discrepancy and sagittal discrepancy. Because we want to measure the Buccolingual inclination of the posterior teeth solely, the occlusal plane, which is decided by both anterior and posterior teeth, is not suitable for this research.

The POP was used as the reference plane mentioned by Jansonet al.[14] This reference plane was more accurate to reflect the aims of this study.

According to our research which is similar to Rui Shu et al[10], the palatal tilt of the maxillary posterior teeth played the most important role in such compensation. The maxillary premolars and molars in a Class II division 1 malocclusion demonstrated significantly, greater lingual tilt than those in Class I occlusion. Differences in mandibular inclination seemed less significant. Mandibular first premolars were less lingually tilted in Class II division 1 malocclusion than in Class I occlusion, but no such significant difference was observed in the mandibular second premolars and first molars. However, all mandibular posterior teeth showed a less lingual tendency, which was in accordance with the compensation hypothesis.

We concluded that the buccolingual inclination played a major role in transverse discrepancy in Class II division 1 malocclusion. Clinicians have attributed several reasons for a transverse discrepancy of Class II division 1 malocclusion which includes nasal obstruction, finger habits, and low tongue position[6]. Maxillary posterior teeth and mandibular posterior teeth have a correct buccal position to create a normal buccal overjet in normal occlusion. Therefore, during eruption the maxillary teeth should be more palatally positioned, and the mandibular teeth would be more buccally positioned to compensate the increased buccal overjet and create an interdigitated occlusion. Compensatory movement of teeth cannot be beyond the alveolar bone, which is not different between Class I and Class II occlusion in both previous studies and in this study. Therefore, the lingual tilt of the maxillary posterior teeth has taken the most important role in this kind of compensation.

Conclusion

- The buccolingual inclination plays a more important role in transverse discrepancy of Class II division 1 malocclusion.
- The maxillary posterior teeth are significantly more lingual tilted significantly in Class II division 1 malocclusion compared with in Class I occlusion.
- The first mandibular premolars are less lingually tilted in Class II division 1 malocclusion than in Class 1 occlusion, whereas there is no difference in buccolingual inclination of mandibular second premolars and first molars between the two groups.

References

1. Ast DB, Carlos JP, Cons NC. The prevalence and characteristics of malocclusion among senior high school students in upstate New York. Am J Orthod. 1965;51:437–445.
2. Willems G, De Bruyne I, Verdonck A, Fieuws S, CarelsC.Prevalence of dentofacial characteristics in a Belgian orthodontic population. Clin Oral Investig. 2001;5:220–226.
3. Lauc T. Orofacial analysis on the Adriatic islands: an epidemiological study of malocclusions on Hvar Island. Eur J Orthod. 2003;25:273–278.
4. Massler M, Frankel JM. Prevalence of malocclusion in children aged 14 to 18 years. American journal of orthodontics. 1951 Oct 1;37(10):751-68.
5. Woodside DG. The present role of the general practitioner in orthodontics. Dental clinics of North America. 1968 Jul:483.
6. 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;88:163–169.
7. Tollaro I, Baccetti T, Franchi L, Tanasescu CD. Role of posterior transverse interarch discrepancy in Class II, division 1 malocclusion during the mixed dentition phase. Am J OrthodDentofacialOrthop. 1996;110:417–422.
8. 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. The Angle Orthodontist. 2004 Jun;74(3):356-60.

9. Frohlich F. A longitudinal study of untreated Class II type malocclusion. Trans EurOrthod Soc. 1961;37:137–139.
10. Shu R, Han X, Wang Y, Xu H, Ai D, Wang L, Wu Y, Bai D. Comparison of arch width, alveolar width and buccolingual inclination of teeth between Class II division 1 malocclusion and Class I occlusion. The Angle orthodontist. 2012 Sep 4;83(2):246-52.
11. Andrews LF. The six elements of orofacial harmony. Andrews J. J OrthodOrofacial Harmony. 2000;1:13–22.
12. Braun S, Hnat WP, Fender DE, Legan HL. The form of the human dental arch. The Angle Orthodontist. 1998 Feb;68(1):29-36.
13. Burris BG, Harris EF. Maxillary arch size and shape in American blacks and whites. The Angle Orthodontist. 2000 Aug;70(4):297-302.
14. Janson G, Bombonatti R, Cruz KS, Hassunuma CY, Del Santo M Jr. Buccolingual inclinations of posterior teeth in subjects with different facial patterns. Am J OrthodDentofacialOrthop. 2004;125:316–322.
15. Tollaro I, Baccetti T, Franchi L, Tanasescu CD. Role of posterior transverse interarch discrepancy in Class II, division 1 malocclusion during the mixed dentition phase. Am J OrthodDentofacialOrthop. 1996;110:417–422.
16. McNamara Jr JA, Baccetti T, Franchi L, Herberger TA. Rapid maxillary expansion followed by fixed appliances: a long-term evaluation of changes in arch dimensions. The Angle orthodontist. 2003 Aug;73(4):344-53.
17. Janson G, Bombonatti R, Cruz KS, Hassunuma CY, Del Santo M. Buccolingual inclinations of posterior teeth in subjects with different facial patterns. American journal of orthodontics and dentofacial orthopedics. 2004 Mar 31;125(3):316-22.
18. Ugolini A, Cerruto C, Di Vece L, Ghislanzoni LH, Sforza C, Doldo T, Silvestrini-Biavati A, Caprioglio A. Dental arch response to Haas-type rapid maxillary expansion anchored to deciduous vs permanent molars: A multicentric randomized controlled trial. The Angle Orthodontist. 2014 Oct 14;85(4):570-6.
19. Moyers RE, Riolo ML, Guire KE, Wainright RL, Bookstein FL. Differential diagnosis of Class II malocclusions: Part 1. Facial types associated with Class II malocclusions. American journal of orthodontics. 1980 Nov 1;78(5):477-94.
20. Mcnamara JR JA. Components of Class II malocclusion in children 8-10 years of age. The Angle orthodontist. 1981 Jul;51(3):177-202.
21. Pancherz H, Zieber K, Hoyer B. Cephalometric characteristics of Class II division 1 and Class II division 2 malocclusions: a comparative study in children. The Angle orthodontist. 1997 Apr;67(2):111-20.
22. Massler M, Frankel JM. Prevalence of malocclusion in children aged 14 to 18 years. American journal of orthodontics. 1951 Oct 1;37(10):751-68.