ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 6, Issue – 1, February - 2023, Page No. : 262 - 265

The beta angle - reliability in comparison with ANB and witt's

[1]Dr. Sakshi Babra, PG Student, Department of Orthodontics and Dentofacial Orthopaedics, Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh

[2]Dr.Rahul Paul, HOD, Department of Orthodontics and Dentofacial Orthopaedics, Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh

[3]Dr.Deepti Yadav, Professor, Department of Orthodontics and Dentofacial Orthopaedics, Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh

[4]Dr. Ish Kumar, Associate Professor, Department of Orthodontics and Dentofacial Orthopaedics, Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh

Corresponding Author: Dr. Sakshi Babra, PG Student, Department of Orthodontics and Dentofacial Orthopaedics, Inderprastha Dental College & Hospital, Ghaziabad, Uttar Pradesh

Citation of this Article: Dr. Sakshi Babra, Dr. Rahul Paul, Dr. Deepti Yadav, Dr. Ish Kumar, "The beta angle - reliability in comparison with ANB and witt's", IJDSIR- February - 2023, Volume – 6, Issue - 1, P. No. 262 – 265.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Objectives: The purpose of the study is the assessment of sagittal skeletal relationship using beta angle by comparing it with ANB angle and Wit's appraisal

Materials and methods: 30 patients with pre-treatment records were taken from the Department of Orthodontics & Dentofacial Orthopaedics, Inder prastha Dental College & Hospital, Sahibabad, Ghaziabad, India. The Lateral cephalogram were obtained by the machine Kodak 8000C (Digital panaromic and cephalo metric system) with exposure time 13 seconds, at 71 KV(p) and 10 mA was considered for the study. Beta angle, ANB and wits appraisal were measured for all the patients and assessed for its reliability.

Results and conclusion: Previously established measure ments for assessing the sagittal jaw relationship can often be inaccurate. A new angle, the Beta angle, was developed as a diag nostic aid to evaluate the sagittal jaw relationship more consistently. Subjects with a Beta angle between 27° and 35° have a Class I skeletal pattern; a Beta angle less than 27° indicates a Class II skeletal pattern, and a Beta angle greater than 34° indicates a Class III skeletal pattern. There is no statistically significant difference between mean Beta angle values of males and females

Introduction

In orthodontics diagnosis and treatment planning, great importance has been attached to evaluating the sagittal apical base relationship. The anteroposterior apical base relationship was first evaluated cephalo metric ally in 1948 by Downs[1] by measuring the angle formed by AB and N-Pog. The relative protrusion and retrusion of the mandible were denoted by positive and negative signs. "ANB angle" and "Wit's appraisal" have been the most popular and currently used cephalometric diagnostic methods to assess sagittal jaw relationship.

Incorporation of both angular and linear measurements in various cephalometric analyses helps the clinician in

diagnoses of anteroposterior (AP) discrepancies and establish the most appro priate treatment planning. The ANB angle is very popular and useful, it has been demonstrated in the literature that there is often a difference between the interpretation of this angle and the actual discrepancy between the apical bases. Several authors have shown that the position of nasion is not fixed during growth, and any displace Ment of nasion will directly affect the ANB angle. Furthermore, rotation of the jaws by either growth or orthodontic treatment can also change the ANB reading[2].

A second widely used measure Ment, is the Wits appraisal, which was introduced by Jacobson to over come problems related to the ANB angle. However, the Wits appraisal relates points A and B to the functional occlusal plane; this generates major problems. Method for recording wits appraisal is by drawing perpendiculars from points A and B on the maxilla and the mandible, respectively to the occlusal plane.

The occlusal plane is defined as the line drawn through the overlap of the mesiobuccal cusps of the first molars and the buccal cusps of the first premolars. First, accurate identification of the occlusal plane is not always easy or accurately reproducible, especially in mixed dentition patients or patients with open bite, severe cant of the occlusal plane, multiple impactions, missing teeth, skeletal asymmetries, or steep curve of Spee. Second, any change in the angulation of the functional occlusal plane, caused by either normal development of the dentition or orthodontic intervention, can profoundly influence the Wits appraisal. Therefore, consecutive comparisons of the Wits appraisal throughout orthodontic treatment might be of limited value because they reflect changes in the occlusal plane instead of pure AP changes of the jaws[3-6].

A measurement independent of cranial reference planes or dental occlusion would be a desirable adjunct in determining the apical base relationship pre-treatment and posttreatment sagittal relationships of the jaws. Such a measurement was recently developed and named the Beta angle. This angle does not depend on any cranial landmarks or dental occlusion and would be especially valuable whenever previously established cephalometric measure ments, such as the ANB angle and the Wits appraisal, cannot be accurately used because of their dependence on varying factors. It is hypothesized that the Beta angle would remain relatively stable even when the jaws are rotated downward and backward[7]. This study was aimed at assessment of sagittal skeletal relationship using beta angle by comparing it with ANB angle and Wit's appraisal.

Materials and methods

In this study, 30 patients were taken as samples based on departmental pre-treatment records from the Department of Ortho dontics & Dentofacial Ortho paedics, Inder prastha Dental College & Hospital, Sahibabad, Ghaziabad, India. The Lateral cephalograms of the patients were obtained by the machine Kodak 8000C (Digital panaromic and cephalo metric system) with exposure time 13 seconds, at 71 KV(p) and 10 mA was considered for the study.

Inclusion criteria

- Age range was between 15 and 25 years
- No previous history of trauma
- No previous history of orthodontic treatment or orthognathic surgery.

Exclusion criteria

- Previous history of trauma.
- Any previous history of orthodontic treatment or orthognathic surgery.
- Missing teeth with the exception of 3rd molar.
- Congenital defects present.

Methodology

A sample of 30 patients were taken based on their pre-treatment records , from the Department of Orthodontics & Dentofacial Orthopaedics, Inder prastha Dental College & Hospital, Sahibabad, Ghaziabad, India for this study , after the selection of the radiograph according to the above mentioned standardization ,the x-rays will be retraced, to locate the ANB and the Wits appraisal by the investigator separately, for the recording of the measure ments and the mean values of these measurements will be evaluated.

To construct beta angle, wits appraisal, the ANB angle we need to mark these points:

- A point (subspinale)—the deepest midline points on the premaxillae between the ANS and prosthion (described by Downs)
- B point (supramentale)—the most posterior point in the concavity between infradentale and pogonion (described by Downs)

The Center of the condyle, found by tracing the head of the condyle and approximating its Center (C).

Patient measurements were taken from the tracings and then, further they were divided into 3 groups on the basis of the criteria mentioned below.

Group 1 (class I)

1. Angle ANB of 1-3°
2. Wits appraisal of 0 to −3 mm
3. Angle's Class I molar relationship
4. Orthognathic, Class I profile.

Group 2 (class ii)

1. Angle ANB was above 4°
2. Wits appraisal greater than 0 mm
3. Molar relationship was Angle's Class II
4. Retrognathic, Class II profile.

Group 3 (class iii)

1. Angle ANB was lesser than 1°
2. Wits reading equal to or lesser than −4 mm
3. Molar relationship Angle's Class III
4. Prognathic, Class III profile

Three skeletal landmarks-point A, point B and apparent axis of the condyle-point C were measured. Angle formed between A-B line and point A per pendicular to C-B line (Condy lion-B point) is the Beta angleThen the Beta angle was evaluated for each patient in all 3 groups by the investigator separately. The average of Beta angle was taken and on the basis of above-mentioned groups, patient's measurements were checked for the reliability in assessing the sagittal discrepancy.

Statistical analysis

Data collected by the investigators were first entered to Excel (Microsoft, Redmond, Wash). All data were visually screened for any missing data or outliers and for validity of distribution assumptions. Data were then summarized by finding means and standard deviations. level of significance was set at $P < 0.05$. Pearson correlation is denoted as r – value is measured of r range between-1 and +1.

Results

The mean value for Beta angle in the Class I skeletal pattern group was 33.4 with a standard deviation of 6.66, The mean value for Beta angle in the Class II skeletal pattern group was 30.30, with a standard deviation of 5.18. The mean value for Beta angle in the Class III skeletal pattern group was 40.50, with a standard deviation of 3.50. Beta angle is shown in table 1. Significant ($P < 0.05$) is observed in table 2 which depicts that the Beta angle is more significant for Class III and class II patients with that of ANB angle. As, ANB is showing more relevance with beta angle (table 1).

Discussion

An accurate AP measurement of jaw relationships is critically important in orthodontic treatment planning. In Cephalometrics, both angular and linear variables have been proposed to analyze sagittal jaw relationship and jaw position. Angular measurements can be erroneous as a result of changes in facial height jaw inclination, and total jaw prognathism; linear variables can be affected by the inclination of the reference line. The most popular parameter for assessing the sagittal jaw relationship remains the ANB angle, but it is affected by various factors and can often be misleading. When using the ANB angle, all those factors should be considered; this makes the interpretation of this angle much more complex than previously thought.

A popular alternative, the Wits appraisal, does not depend on cranial landmarks or rotation of the jaws but still has the problem of correctly identifying the functional occlusal plane, which can sometimes be impossible. Furthermore, changes of the Wits measurement throughout orthodontic treatment might also reflect changes in the functional occlusal plane, rather than pure sagittal changes of the relationship of the jaws.

To overcome these problems, a new measurement was developed. This measurement, the Beta angle, does not depend on cranial landmarks or the functional occlusal plane. It uses 3 points located on the jaws— point A, point B, and the apparent axis of the condyle (point C)—so changes in this

angle reflect only changes within the jaws. In contrast to the ANB angle, the configuration of the Beta angle gives it the advantage to remain relatively stable even when the jaws are rotated, when B point is rotated backward and downward, then the C-B line is also rotated in the same direction, carrying the per pendicular from point A with it. Because the A-B line is also rotating in the same direction, the Beta angle remains relatively stable. Therefore, the Beta angle can assess the sagittal jaw relationship in skeletal patterns when clockwise or counter clock wise rotation of the jaws would tend to camouflage it.

Another advantage of the Beta angle is that it can be used in consecutive comparisons throughout ortho dontic treatment because it reflects true changes of the sagittal relationship of the jaws, which might be due to growth or orthodontic or orthognathic intervention.

Conclusion

1. Previously established measurements for assessing the sagittal jaw relationship can often be inaccurate.

2. A new angle, the Beta angle, was developed as a diagnostic aid to evaluate the sagittal jaw relationship more consistently.

3.Subjects with a Beta angle between 27° and 35° have a Class I skeletal pattern; a Beta angle less than 27° indicates a Class II skeletal pattern, and a Beta angle greater than 34° indicates a Class III skeletal pattern.

4. There is no statistically significant difference between mean Beta angle values of males and females.

References

1. Downs WB. Variations in facial relationships; their significance in treatment and prognosis. Am J Orthod 1948; 34:812-40.

2. Freeman RS. Adjusting A-N-B angles to reflect the effect of maxillary position. Angle Orthod 1981; 51:162-711

3. Wylie WL. The assessment of anteroposterior dys plasia. Angle Orthod 1947; 17:97-109.

4. Downs WB. Variations in facial relationships; their significance in treatment and prognosis. Am J Orthod 1948; 34:812-40.

5. Steiner CC. Cephalometrics for you and me. A m J Orthod 1953; 39:729-55.

6. Jacobson A. The “Wits” appraisal of jaw disharmony. Am J Orthod. 1975; 67:125-38.

7. Sundareswaran S, Kumar V. Reliability of Beta angle in assessing true Antero posterior apical base discrepancy in different growth patterns. Journal of natural science, biology, and medicine. 2015 Jan; 6 (1): 125.

8. Baik CY, Ververidou M. A new approach of asses singsagiĴ al discrepancies: The Beta angle. Am J Orthod Dento facial Orthop2004; 126:100-5.