CONCORDANCE BETWEEN TWO VARIOUS ANTEROPOSTERIOR CEPHALOMETRIC MEASUREMENTS

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ABSTRACT

Cephalometric analysis is important as diagnostic tool in orthodontic treatment planning. On the basis of these analyses we can determine dental and skeletal relationship for the patient. For this purpose numerous parameters have been proposed, such as ANB angle, Wits appraisal.

The aim of this study was to determine the degree of concordance of assessment sagittal skeletal relationship, based on ANB angle and Wits appraisal.

Material and Methods: The study was conducted on 425 lateral cephalometric radiographs of patients from the archives of the Department of Orthodontics of the Faculty of Dentistry in Sarajevo.

Results: Of the total of 425 respondents 142 had I class according to the ANB angle and 71 to Wits appraisal; 146 had class II according to ANB angle and 168 to Wits appraisal. Of the total of 425 respondents 137 had class III according to ANB angle and 186 to Wits appraisal.

Conclusion: These parameters, ANB angle and Wits appraisal should not be used alone, but only the combination of these two parameters will provide more reliable assessment of sagittal skeletal relationships.

Key words: Cephalometrics, Orthodontics, Wits appraisal, Stainer.

Introduction

Cephalometric analysis is important as diagnostic tool in orthodontic treatment planning. Based on these analyses we can determine dental and skeletal relationship for the patient.

Cephalograms can be used to assess dentofacial proportions and to clarify the anatomical basis of malocclusion. [1]

Objectives of cephalometric analysis are to assess relationship of functional components of the face (skull and base of the skull, skeletal maxilla, skeletal mandible, maxillary dentition and alveolar process and mandibular dentition and alveolar process) in all reference planes.

Stainer analysis is one of the most commonly used cephalometric analysis. The base line is the nasion-sella. The analysis can be divided into skeletal and dentoalveolar segment. [2]

SNA angle determines the anteroposterior position of the point A to the cranial base and the location of the upper jaw to cranial base. [3]

SNB angle determines the anteroposterior position of the mandible the point B to the cranial base.

ANB determines skeletal sagittal relationship between the upper and lower jaw.

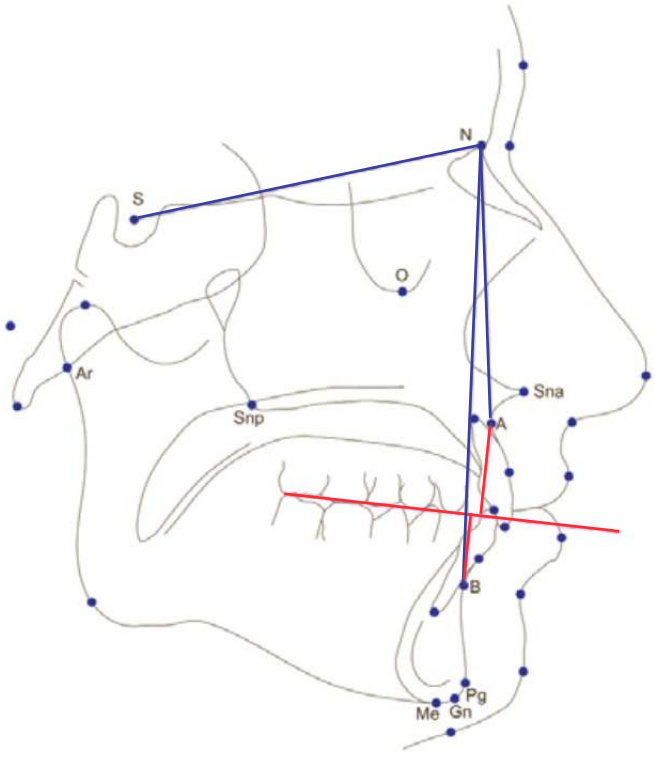

Figure 1.
Drawing of analysis Steiner (blue line) and Wits (red line) 8

A. Jacobson in 1975 and 1976 proposed a new diagnostic procedure called "Wits Appraisal" (Wits assessment). [4, 5] Wits appraisal is a linear assessment of the sagittal relationship, constructed by dropping perpendiculars from point A and point B on occlusal plane, and the distance between the resulting points representing Wits appraisal.

The aim of the research was to determine the degree of concordance of estimated skeletal relationship based on ANB angle and Wits appraisal.

Material and Methods

The sample consisted of 425 lateral cephalometric radiographs of patients from the archives of the Department of Orthodontics of the Faculty of Dentistry with clinics in Sarajevo who have previously signed a consent for using their images for research purposes.

Recordings are made in standardized terms of camera KODAK 8000C Digital Panoramic and Cephalometric System.

For this study we used lateral cephalogram of healthy children and technically good quality.

We excluded subjects with systemic diseases, physical and mental retardation, developmental abnormalities of the teeth and also lateral cephalogram that did not meet the technical quality.

For analysis and drawing we used Corel DRAW X6 as follow:

Stainer analysis:

The point S is position in the center of the bone crypt sella turcica.

Then we marked point at the intersection of N nazofrontal and internasally suture in mediosagital level.

We marked the point A in mediosagital level at the point where the lower edge of spine nazalis anterior passes into the front wall of the maxillary alveolar process.

Then we marked point B being located in the deepest part of the alveolar process of the lower jaw between points of infradental and pogonion in mediosagital level.

ANB is calculated as the difference between angle SNA and SNB angle.

Based on the obtained values of ANB angle respondents were divided into three categories:

1) subjects in class I skeletal (2°- 4°)
2) subjects in class II skeletal (> 4°)
3) subjects in class III skeletal (< 2°)

Wits appraisal

We marked the point A in mediosagital level at the point where the lower edge of spina nazalis anterior passes into the front wall of the maxillary alveolar process.

The, we the marked point B is located in the deepest part of the alveolar process of the lower jaw between points of infradental and pogonion in mediosagitalnoj level.

We draw the occlusal plane of contact between the most distal teeth to half switching incisors. Then, we draw a line from point A to occlusal plane to be per-pendicular to the occlusal plane. We draw a line from point B to the occlusal plane to be perpendicular to the occlusal plane.

We measured the distance between the projection of point A on the occlusal plane (AO) and projections of point B on the occlusal plane (BO).

Based on the obtained values of the distance AO-BO, the patients were classified into three categories:

1st participants in the class I skeletal (-1mm male, 0 mm female)

2nd respondents in class II skeletal (> -1mm male, > 0 mm female)

3rd respondents in class III skeletal (< -1mm male, < 0 mm female)

Results

Class	Frequency	Percent (%)
I	142	33,4
II	146	34,4
III	137	32,2
Total	425	100,0

Table 1. The proportions of subjects to different classes based on ANB angle

Of the total of 425 respondents 142 had I class according to the ANB angle, 146 had class II according to ANB angle and 137 had class III according to ANB angle.

Class	Frequency	Percent (%)
I	71	16,7
II	168	39,5
III	186	43,8
Total	425	100,0

Table 2. The proportions of subjects to different classes based on WITS appraisal

Of the total of 425 respondents 71 had I class according to Wits appraisal, 168 had class II according to Wits appraisal and 186 had class III according to Wits appraisal.

	ANB I	ANB II	ANB III	TOTAL	(%)
WITS I	58	11	2	71	81,69
WITS II	47	115	6	168	68,45
WITS III	37	20	128	186	69,35
TOTAL	142	146	137	425	
(%)	40,85	78,77	94,16		

Table 3. Concordance of estimated skeletal relationship based on ANB angle and Wits appraisal

Of the 71 respondents who had I class according to Wits appraisal 58 of them had I class according to the ANB angle, that is 81, 69%.

Of the 168 respondents who had II class according to Wits appraisal 115 of them had II class according to the ANB angle that is 68, 45%.

Of the 186 respondents who had III class according to Wits appraisal 129 of them had III class according to the ANB angle that is 69, 35%.

Discussion

Determination of intermaxillary relations plays an important role, not only because of participation in the diagnosis, but also to determine the goal of the

treatment, especially in terms of achieving such values of ANB angle, which would be acceptable both in terms of the stability of the results of treatment, and the aspect of facial esthetics of the case. [6,7]

ANB determines skeletal sagittal relationship between the upper and lower jaw. This angle is referred to as positive when the point A is in front of the NB line. Amounts to 0 when the lines NA and NB match, the angle is negative when the point A is behind NB lines. The distal skeletal jaw relationship indicates the class II and class III, mesial. The average value of the angle of the Steiner analysis is 2 ° (± 2 °). [3]

One of the shortcomings of this analysis is that if nasion point is misinterpreted all other parameters are not liable. In other to overcome this, it was found that perhaps ANB should not be interpreted directly, but this angle should be considered as depending on the position of nasion, the length of the front part of the skull base, the size of the SNA angle from the vertical position of nasion to points A and B, and the face rotation type. [3]

Due to the limitations of ANB angle in assessment of sagittal intermaxillary relationship, A. Jacobson (1975) proposed a new diagnostic procedure called "Wits Appraisal" (Wits assessment). [4, 5] Wits appraisal provides reliable indication of anteroposterior skeletal disharmony of the jaws. Measurements based on cranial base do not necessarily provide a reliable expression of the anteroposterior jaw relationships in dentofacial complex. [9]

Therefore, the aim of this research was to determine the degree of concordance of estimated skeletal relationship based on ANB angle and Wits appraisal. The results showed that there is different concordance among three skeletal class, estimated with ANB angle and Wits appraisal (**Table 3**.). Similar studies conducted by Wellens H. (2009.) and Shrikant S. (2011.), where they found a different association between mentioned parameters for assessment of sagital skeletal relationship. [10, 11] Assessment of the sagital skeletal relationship based on these two parameters do not match in all cases raising the question which of these two parameters is correct?

Even though these parameters have been in used as cephalometric parameters, they have their own drawbacks, and orthodontist should be cautions when applying these parameters.

Conclusion

Therefore we can conclude that ANB angle and Wits appraisal should not be used alone, but only the combination of these two parameters will provide more reliable assessment of sagital skeletal relationships.

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