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Sagittal pattern and severity of skeletal discrepancy in Class II Div 1 malocclusion

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Abstract

Introduction: Class II Div 1 discrepancy forms a major chunk of malocclusions, especially in countries like Pakistan. It is imperative to understand the underlying skeletal pattern of Class II Div 1 malocclusions and severity of its discrepancy in selecting the right treatment modality. Hence the aim of this study was to find out the underlying pattern of sagittal discrepancy in Class II Div 1 malocclusions and to know about its severity.

Material and Methods: The study was conducted on 103 patients, with convex profiles as judged by orthodontists in consensus. Lateral cephalogram was taken for each patient and traced for SNA and SNB. ANB angles were analyzed to determine the severity.

Results: 52.4% of class II Div 1 patients exhibited short mandible as the primary area to be addressed. Another 21.3 % of the patients showed short maxilla but mandible was further short again needing mandibular treatment only. 19.4% of the class II Div 1 patients however showed prognathic maxilla. Majority of the class II Div 1 patients had either mild (ANB>4<7°) or moderate skeletal discrepancy (ANB≥7<9°).

Conclusions: It is thus concluded that the sagittal pattern and severity of Class II Division1 malocclusion is empirical to understand for formulating a desirable treatment plan.

Keywords: Class II malocclusion, convex profile, ANB angle

Introduction

Class II Div 1 discrepancy forms a major chunk of malocclusions especially in countries like Pakistan.[1] It is thus important to understand the underlying sagittal skeletal pattern in Class II cases as this will help in proper planning of such orthodontic cases. Various cephalometric variables such as ANB angle,[2-4] Wits Appraisal,[5,6] Beta angle,[7] AF-BF and AFB angle,[8] App-Bpp distance,[9] McNamara Analysis[10] and Zone Index[11] have been used to assess the sagittal pattern of the patient. ANB angle introduced by Steiner in his popular Steiner's cephalometric analysis[2-4] in-spite of its limitations[12-15] is still being widely used to assess the sagittal skeletal discrepancy. ANB angle is measured by subtracting the SNB angle from the SNA angle. Normal value is 0-4° with the mean value of 2°.[2] Normal values represent skeletal class I. Value less than 0° represents skeletal class III, while value more than 4° represents skeletal class II.

ANB angle 4-7° is considered as representing mild skeletal class II, ANB 7-9° is considered as representing moderate skeletal class II while ANB >9° represents severe skeletal discrepancy. Knowing about the severity of discrepancy in skeletal class II cases is thus empirical in orthodontic diagnosis and treatment planning as treatment can vary from growth modification to camouflage in young patients and from camouflage to orthognathic surgery in adult patients depending upon the severity of sagittal discrepncy.[16,17]

Though ANB angle assesses the nature and severity of sagittal discrepancy, it is the SNA

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angle which helps in identifying maxillary skeletal dysplasia. Normal value of SNA angle is 80-84°. A value greater than 84° indicates prognathic maxilla. SNB angle helps in identifying mandibular skeletal dysplasia and the normal value for SNB angle is 78-82°. A value lesser than 78° suggests mandibular retrognathia.[2-4] These variables help in identifying the underlying skeletal dysplasia in class II malocclusions. Skeletal class II can be due to prognathic maxilla, short mandible or a composite problem. Various types of severity have different treatment options depending upon age. Skeletal class II patients with prognathic maxilla may require headgear therapy in their growing ages. Mild to moderate dysplasia can be camouflaged with distalization or extraction therapy in adults. Severe cases require absolute anchorage with extractions or orthognathic surgery as possible treatment strategies. In composite skeletal class II cases, Stockli-Teuscher appliance is one of the treatment options in growing ages, camouflage treatment in mild to moderate discrepancy cases while in severe cases orthognathic surgery is the best possible treatment modality.[18-22]

Aim of this study was, thus to identify the underlying skeletal dysplasia associated with Class II Div 1 cases and know about the severity of skeletal dysplasia with the purpose that this will ultimately help in managing the orthodontic cases more effectively and efficiently.

Material and Methods

103 patients, above 10 years of age who reported to Orthodontic Department, (University College of Dentistry, The University of Lahore) with retrognathic profiles were selected. Written Informed consent was taken from each patient regarding his / her inclusion in the study. Those who accepted were examined intra-orally. On clinical examination, patient having bilateral Class II molar relationship and over-jet > 3 mm were selected for the study. Lateral cephalogram was then taken for each patient in natural head position and traced for Wits value (which was used to assess the sagittal skeletal dysplasia) and SN-MP angle (which was used to assess vertical pattern of the patient) which might have an impact on ANB angle. Finally patients having Wits value > 0 mm and SN-MP angle > 32$\pm$4° were included in the study. The study was thus conducted on 103 subjects (63 females, 40 males) who followed the selection criteria. Study was conducted over a period of six months and the sample was collected using the non-probability convenience sampling technique.

Lateral cephalogram tracing was drawn to assess maxillary and mandibular dysplasia in sagittal plane. SNA and SNB angles were traced respectively (Figure 4). To assess severity of skeletal class II malocclusion, ANB angle were analyzed to categorize mild, moderate and severe forms (Figure 1).

SPSS 17.0 was used for statistical evaluation. Descriptive statistics including mean, standard deviation and minimum & maximum values were calculated for each subject for SNA, SNB and ANB angles to assess sagittal pattern and severity of sagittal discrepancy (Table I).

Results

In this study, 103 patients (63 females & 40 males) with retrognathic profiles had a mean age of 12.21$\pm$2.83. Descriptive statistics for each variable used in the study were calculated (Table I). On the basis of ANB angle determined cephalometrically, patients were classified as mild, moderate and severe skeletal class II. Descriptive statistics for each variety were then calculated (Table II and Figure 2). Underlying sagittal pattern (prognathic maxilla, short mandible and composite) for Class II Div 1 patients was assessed (Table III and Figure 3).

Table I: Descriptive statistics of variables used

n=103	Minimum	Maximum	Mean	SD
SNA	73.00	90.00	82.1748	3.5242
SNB	66.00	84.00	75.1262	3.7974
ANB	4.50	15.00	7.0583	1.7197

Table II: Severity of sagittal discrepancy in Class II Div 1

	n	Minimum	Maximum	Mean	SD
Mild skeletal class II (ANB>4<7°)					
SNA	43	75.00	90.00	81.8953	3.8615
SNB	43	69.00	84.00	76.3488	3.9014
ANB	43	4.50	6.50	5.5465	.5324
Moderate skeletal class II (ANB>7<9°)					
SNA	43	73.00	89.00	82.0349	3.3672
SNB	43	66.00	82.00	74.6047	3.3816
ANB	43	7.00	8.50	7.4535	.5211
Severe skeletal class II (ANB>9°)					
SNA	17	80.00	90.00	83.2353	2.9692
SNB	17	66.00	81.00	73.3529	3.7239
ANB	17	9.00	15.00	9.8824	1.5363

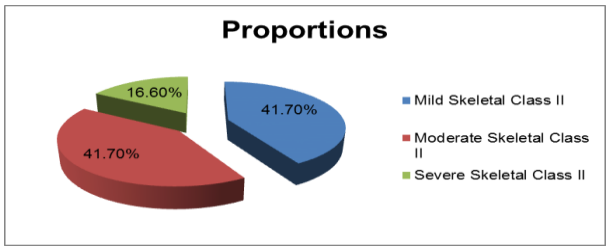

Figure 1: Comparative view of mild, moderate and severe skeletal class II

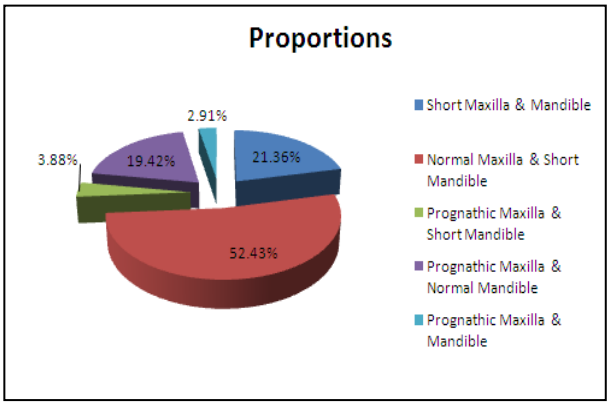

Figure 2: Comparative view of pattern of sagittal discrepancy in Class II Div 1 malocclusion

Table III: Pattern of sagittal discrepancy in Class II Div 1

	n / %	Minimum	Maximum	Mean	SD
Skeletal Class II (Short maxilla & still shorter mandible)					
SNA	22 / 21.3 %	73.00	79.00	77.3182	1.5625
SNB	22 / 21.3 %	66.00	74.00	70.9545	2.0349
ANB	22 / 21.3 %	5.00	8.50	6.3182	.9825
Skeletal Class II (Normal maxilla & short mandible)					
SNA	54 / 52.4%	80.00	84.00	81.9722	1.4871
SNB	54 / 52.4%	66.00	79.00	74.5833	2.5099
ANB	54 / 52.4%	4.50	15.00	7.4259	1.9605
Composite skeletal class II					
SNA	4 / 3.8%	85.00	87.00	85.7500	.9574
SNB	4 / 3.8%	76.00	77.00	76.7500	.5000
ANB	4 / 3.8%	8.00	10.00	9.0000	.8165
Skeletal Class II (Prognathic maxilla & normal mandible)					
SNA	20 / 19.4%	85.00	90.00	86.3250	1.3981
SNB	20 / 19.4%	78.00	82.00	79.6250	1.3066
ANB	20 / 19.4%	5.00	9.00	6.7000	1.3018
Skeletal Class II (Prognathic maxilla & large mandible but still class II)					
SNA	3 / 2.9 %	88.00	90.00	89.0000	1.0000
SNB	3 / 2.9 %	83.00	84.00	83.3333	.5774
ANB	3 / 2.9 %	5.00	6.00	5.6667	.5774

Discussion

Skeletal Class II Div 1 malocclusion represents the most common skeletal discrepancy which orthodontists see in daily practice in Pakistan. The understanding of the morphology is a key element in planning dentofacial orthopedic treatment for this type of malocclusion. Sidlauskas and Svalkauskiene in their study found that Class II Div 1 malocclusion exhibits retrognathic mandible (60%), maxillary prognathism (55.8%) and reduced vertical skeletal jaw relationship as primary features.[23] The optimal correction of the antero-posterior and vertical dental and skeletal discrepancies could be designed on the basis of individual diagnosis for every class II Div 1 patient.[24]

Figure 3(a): Skeletal Class II Short Mandible

Figure 3(b): Skeletal Class II Prognathic Maxilla

Figure 3(c): Skeletal Class II Composite

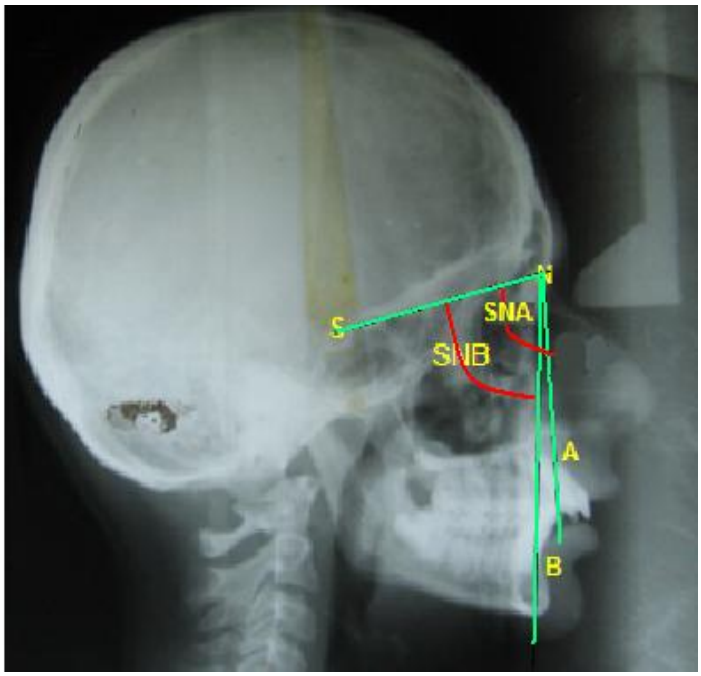

Figure 4: Lateral Cephalograph showing Bony Landmarks and angles used in this study: S (Sella), N (Nasion), Point A (Deepest point on anterior maxilla), Point B (Deepest Point on anterior mandible), <SNA (Maxillary Prominence), <SNB (Mandibular Prominence),ANB=(SNA-SNB)

Lawrence in a study found that retrusive maxilla, protrusive maxillary incisors, protrusive mandibular incisors, a retrusive mandible and a long lower facial height are the most prevalent features of skeletal class II.[25] Asad and Hamid in a study on Pakistani sample of class II patients reported that 62 % had short mandible, 35% exhibited prognathic maxilla while 3% showed composite skeletal class II problem.[1] In present study 52.43% of skeletal class II Div 1 patients exhibited short mandible as the primary area to be addressed. Another 21.36 % of the patients showed short maxilla but mandible was further short again needing mandibular treatment only. 19.42% of the class II Div 1 patients however showed prognathic maxilla. On the other hand Lau in his cephalometric study on Chinese patients found that compared with Caucasians, Chinese with Class II Division 1 malocclusion have more prognathic maxilla, less retrusive mandible, flatter chin, steeper mandibular plane angle and more proclined maxillary incisors.[26] Rosenblum in his study also concluded that only 27.0% of the sample had mandibular retrusion while 56.3% of the sample had maxillary protrusion.[27]

In this study it was attempted to find the severity of sagittal discrepancy based on ANB angle. 41.70% Class II Div 1 cases exhibited mild skeletal class II, 41.70% exhibited moderate skeletal class II and 16.60% exhibited severe skeletal class II.

Conclusions

It was thus concluded that for proper treatment planning it is empirical to understand the skeletal sagittal pattern and severity of discrepancy in skeletal class II Div 1 malocclusions.

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