CEPHALOMETRIC CHARACTERISTICS OF CLASS II DIVISION 1 AND CLASS II DIVISION 2 MALOCCLUSION

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ABSTRACT

The purpose of this study was to evaluate the cephalometric skeletal and dental characteristics related with class II division 1 and class II division 2 malocclusions in the sagittal and vertical dimensions. Lateral cephlaograms of 100 patients for both genders were used to determine the characteristics of class II div 1 and class II div 2 malocclusion. The data base was developed in SPSS 11 for windows. In sagittal plane, mandible was more retrognathic in class II / 1 than class II / 2 malocclusion. Vertically, all the measurements were significantly reduced for class II div 2 malocclusion, indicative of a skeletal deep bite. Upper incisors were proclined in class II / 1 and retroclined in class II / 2 patients. Lower incisors were proclined in class II / 1 while normally inclined in patients of class II / 2 malocclusion. Class II / 1 malocclusion is associated with more retrognathic mandible, proclined upper and lower incisors. Class II / 2 malocclusion is associated with a lower anterior facial height and retroclined upper incisors.

Key words: *Class II malocclusion, Class II division 1 malocclusion, Class II division 2 malocclusion*

INTRODUCTION

Numerous parameters concerning skeletal, dental and soft tissues components are evaluated from the cephalometric radiographs for the diagnosis and treatment planning in orthodontics. These are utilized to relate craniofacial landmarks to the profile and occlusion in a meaningful way.[1,2] Among these commonly used are Stieners[3] and McNamara[4].

Class II malocclusion is a common type of malocclusion that may present a variety of skeletal and dental configurations.[5,6] Maxillary protrusion and mandibular retrusion is a frequent dentofacial anomaly in various populations.[7] Skeletal class II patterns arise from not only sagittal, but also from vertical discrepancies.[8] Dental class II malocclusion presents with distal relationship of lower teeth to upper and further has two divisions; Class II division 1, and class II division 2.[9] However the investigations in class II/1 and div 2 malocclusion subjects have not yielded consistent results. Some studies revealed that class II/1 malocclusion is associated with prognathic maxilla and mandible was found out to be retrognathic and in dental parameters, bimaxillary proclination is demonstrated.[10,11,12] Other studies demonstrated that the maxilla was in a normal position while the mandible was retrusive.[13,14] In Class II/2 malocclusion, most of the studies stated a normally positioned maxilla in sagittal plane and retroclined upper incisors.[15,16]

Cephalometric characteristics determined for those of Caucasians might be inadequate for application to different racial or ethnic groups and may exhibit variations. The present study was carried out to determine the Cephalometric characteristics of Class II division 1 and division 2 malocclusion in our region.

METHODOLOGY

The study was carried out on 100 lateral cephalometric radiographs of clinically diagnosed class II patients in the dept of orthodontics, Lahore Medical & Dental College, Lahore. The patients were divided into two groups- Group 1 included 50 class II div1 patients and Group 2 included 50 class II div 2 patients with age

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range 15-19 years. Cephalometric radiographs were traced manually.

Following skeletal parameters were used:

<SNA, SNB, ANB, Facial angle, SN-Md plane, MMA, Y-axis, LAFH/TAFH ratio

Following dental parameters were used:

<UI-SN, IMPA, IIA

STATISTICAL ANALYSIS

The mean and standard deviation for each parameter was calculated using the SPSS Version 11 for Windows. Group 1 and 2 were compared using independent student t-test. Fifty (50) cephalograms were randomly selected and retraced after two weeks of first tracing by the same operator and were compared to the first tracing of the same cephalograms to find out any method error. Paired t-test was applied to determine method error.

RESULTS

There was no statistically significant difference recorded between the first and the second tracings on applying the paired t-test for calculation of the method error.

Sagittal skeletal characteristics

The mean value of <SNA <SNB and <ANB are shown in table 1. The results indicate normal positioned maxilla while mandible was retrognathic for both class II div 1 (81.1°±2.3°) and div 2 (81.5°±2.7°) malocclusions. This means the sample was class II due to mandibular deficiency. No statistical significant difference was noted between the two malocclusions for <SNA, while <SNB indicated a significantly more retrognathic mandible for class II div 1 malocclusion (74.3°±1.9°) than the class II div 2 (76°±2.3°) patients.

Vertical skeletal characteristics

The mean <SN-Md plane (28.1°±1.2°), MMA (19.1°±2.2°) and Y-axis (59.3°±2.1°) were found out to be significantly lesser in class II div 2 sample as compared to class II div 1 patients (32.6.2°±2.3°, 26.2°±1.4°, 62.4°±1.2°). The lower facial height ratio was significantly reduced in the Class II div 2 sample (52.8%±1.4%) as compared to class II div 1 malocclusion (55.3%±1.2%). This indicated more forward rotation and reduced lower anterior facial height in class II div 2 patients.

Dental characteristics

Class II div 1

The mean value of <UI-SN was 118.1°±5.1°, <IMPA 101.9°±10.2° and <IIA was 113.8°±11.3°, thus indicating a bimaxillary proclination.

Class II div 2

The mean value of total sample subjects for <UI-SN was 95.3°±5.3°, <IMPA 95.4°±8.3° and <IIA was 144.31°±2.8°). This shows retroclined upper incisors while lower incisor inclination was within normal range for class II div 2 malocclusion.

TABLE 1: CEPHALOMETRIC CHARACTERISTICS OF CLASS II/1 AND CLASS II/2 MALOCCLUSION (IN DEGREES)

	Parameter	Group 1 Mean Value	Group 2 Mean Value	Difference
1.	<SNA	81.1±2.3	81.5±2.7	0.4
2.	<SNB	74.3±1.9	76±2.3	1.7*
3.	<ANB	6.8±1.2	5.5±1.1	1.3*
4.	Facial Angle	83.4±2.6	86.7±3.4	3.3*
5.	<SN-Md Plane	32.6.2±2.3	28.1±1.2	4.5*
6.	<MMA	26.2±1.4	19.1±2.2	7.1*
7.	<Y-axis	62.4±1.2	59.3±2.1	3.1*
8.	LFH / TAFH (%age)	55.3±1.2	52.8±1.4	2.5*
9.	<UI-SN	118.1±5.1	95.3±5	23.1*
10.	<IMPA	102.9±10.2	94.4±7.5	6.5*
11.	<IIA	113.8±10.3	145±10.4	31.2*

*Significant

DISCUSSION

The current study was carried out on 100 lateral cephlaograms (50 class II div 1 and 50 Class II div 2) to evaluate the skeletal and dental features of Class II div 1 and Class II div 2 malocclusions in sagittal and vertical plane. The mean age of the total sample was 16.3±3.4 years. The study included both male and female patients.

The mean <SNA for both class II div1 (81.1°±2.3°) and div 2 (81.5°±2.7°) sample showed normally positioned maxilla while <SNB (74.3°±1.9°, 76°±2.3°) and <ANB (6.8°±1.2°, 5.5°±1.1°) were quite lesser than the skeletal class I parameters thus indicating a retrognathic mandible in both type of malocclusions. Therefore, the entire sample was class II due to retrognathic mandible. Similar results were found out in a previous study conducted by Rehan Q[9] and Karlsen AT.[17] However, a number of preceding investigations does not agree with current study results and revealed that maxilla is prognathic in class II malocclusions.[11,18,19]

Sagittal skeletal characteristics

The mean of < SNB (74.3°±1.9°) for the Class II div 1 patients was significantly less than Class II div 2 malocclusion (76°±2.3°). This means that class II div 1 malocclusion is associated with more retrognathic mandible than class II div 2. The same was found true in previous studies conducted by Gilmore WA[11], Craig CE[13], Lau JW[20] and Ishii N.[21,22] However, Karlsen AT[17], Pancherz H[18] and Renfroe EW[19] found opposite results in their study and indicated that mandible was more retrognathic in class II div 2 patients.

The mean value of facial angle was significantly higher in class II/2 sample (86.7°±3.4°) than class II/1 (83.4°±2.6°) patients. This showed that chin was more prominent in class II div 2 malocclusion in present study sample. Similar findings were demonstrated by studies conducted by Isik F[10], Pancherz H[18] and Arvystas MG.[23]

Vertical Skeletal characteristics

The mean <SN-Md plane (28.1°±1.2°), MMA (19.1°±2.2°) and Y-axis (59.3°±2.1°) were found out to be significantly lesser in class II div 2 sample as compared to class II div 1 patients (32.6.2°±2.3°, 26.2°±1.4°, 62.4°±1.2°). These indicate a more upward and forward rotation of mandible leading to a skeletal deep bite in Class II div 2 patients in the current study subjects. These results were in agreement to the studies conducted by Henry RG[24], Altemus LA[25] and Hunter WS.[26]

Similarly, the lower facial height ratio was also significantly reduced in the Class II div 2 sample (52.8%±1.4%) as compared to class II div 1 patients (55.3±1.2%). The same was revealed by Renfroe EW[19], Wallis SF[27] and Dibbets JM[28] who established that class II div 2 is commonly associated with a reduced lower facial height in comparison to class div 1 malocclusion.

Dental Parameters

The mean value of <UI-SN for class II div 1 and div 2 were 118.1°±5.1° and 95.3°±5° respectively. This indicated proclined maxillary incisors in class II div1 and retroclined incisors in Class II div 2 malocclusion. These findings are in agreement to Angle's[29] study. Also same results were shown by Emaad et all[12], Lau JW[20] and Ishii N.[21,22]

The lower incisors were found out to be significantly proclined in class II div 1 (102.9°±10.2°) while normally inclined in class II div 2 patients (94.4°±7.5°). The proclined lower incisors indicate dentoalveolar compensations for skeletal class II malocclusion, as is expected. Similar results were derived in a study conducted by Pancherz H[18], Henry RG[24] and Janson T.[27] However, in their study, Emaad et all[12] reported slightly retroclined lower incisors for class II div 2 malocclusion.

The interincisal angle is a reflection of upper and lower incisor inclination. It tends to decrease if either of incisors are proclined and increases in case of retroclined incisors. The mean value of <IIA for class div 1 (113.8°±10.3°) patients was found out to be significantly decreased while significantly increased angle was demonstrated for class II div 2 patients (145°±10.4°). The same was found out to be true in studies conducted by Emaad et all[12], Karlson AT[28], and Rehan Q[30].

CONCLUSION

Class II div 1 malocclusion is associated with more retrognathic mandible, proclined upper and lower incisors.

Class II div 2 malocclusion is usually associated with a lower anterior facial height and retroclined upper incisors.

Although both class II div1 and div 2 malocclusions are class II in relationship, however, they must be considered as a separate component while planning the treatment.

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