CLASS II DIVISION 2 MALOCCLUSION; CEPHALOMETRIC SKELETAL EVALUATION

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ABSTRACT

The purpose of this study was to evaluate the cephalometric skeletal, dental and soft tissue characteristics in class II division 2 malocclusion in the sagittal and vertical dimensions. Lateral cephlaograms of 60 patients for both genders (30 class I and 30 class II/2) were used to determine the characteristics of class II div 2 malocclusion and were compared with control group class I patients. The data base was developed in SPSS 16 for windows. In sagittal plane, mandible was retrognathic in class II/2 malocclusion and demonstrated significantly reduced measurements in vertical plane, indicative of a skeletal deep bite. Upper incisors were significantly retroclined while lower incisors were normally inclined. Both upper and lower lips were protrusive.

Key words: *Cephalometric evaluation, Class II malocclusion, Class II division 2 malocclusion*

INTRODUCTION

Class II malocclusion is a common type of malocclusion that may present a variety of skeletal and dental configurations.[1,2] Maxillary prognathism and mandibular retrognathism is a frequent dentofacial anomaly among various populations.[3] Skeletal class II patterns arise from not only sagittal, but also from vertical discrepancies.[4] Dental class II malocclusion presents with distal relationship of lower teeth to upper and further have two divisions; Class II division 1, and class II division 2. Among these, the Class II/2 malocclusion is rare.[5,6] Numerous studies investigated Class II/2 malocclusion and stated a normally positioned maxilla in sagittal plane and retroclined upper incisors.7-10 However the investigations in class II div 2 malocclusion subjects have not yielded consistent results.[6]

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/2 in our region.

METHODOLOGY

The study was carried out on 60 lateral Cephalometric radiographs of patients in the dept of Orthodontics, University College of Dentistry, The University of Lahore. The patients were divided into two groups-Group 1 (control group) included 30 class I and Group 2 included 30 class II div 2 patients with age range 16-20 years. Cephalometric radiographs were traced manually. Following skeletal parameters were used:

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

Following dental parameters were used:

<UI-SN, IMPA, IIA, <UI-NA, <LI-NB, UI-NA line distance, LI-NB line distance

Soft tissue parameters used in the study were:

Upper lip-E line distance, Lower lip-E line distance in millimeters.

STATISTICAL ANALYSIS

The mean and standard deviation for each parameter was calculated using the SPSS Version 16 for

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TABLE 1: CEPHALOMETRIC CHARACTERISTICS OF CLASS II/2 MALOCCLUSION

S No	Cephalometric parameter	Group 1 Mean Value	Group 2 Mean value
1.	**<SNA**	81.4±30°	81.52±.7°
2.	**<SNB**	78.5±4.3°	76±2.3°
3.	**<ANB**	2.9±3.2°	5.5±1.1° *
4.	**<SN-Pog**	83.1±2.3°	86.7±3. 4°*
5.	**<SN-Md Plane**	34.3±5.1°	28.1±1.2°
6.	**<MMA**	26.1±4.7°	19.1±2.2° *
7.	**<Y-axis**	60.4±3.4°	59.3±2.1°
8.	**LFHT/TAFH (mm)**	57.8±2.3	52.8±1.4*
9.	**<UI-SN**	104.5±3.1°	95.3±5 °*
10.	**<IMPA**	95.6±4.8°	94.4±7.5°
11.	**<IIA**	133.4±6.3°	145±10.4°*
12.	**UI-NA line (mm)**	3.9±2.5	3.1±1.4
13.	**<UI-NA**	23.6±4.3°	14.7±4.3°*
14.	**LI-NB line (mm)**	6.4±3.1	3.2±2.4
15.	**<LI-NB**	25.5.4±3.6°	23.5±6.7°
16.	**UL-E line (mm)**	-3±-1.2	+6.2 ± 3.19
17.	**LL-E Line (mm)**	-1±0.3	+1.9 ± 4.3

* significant p<.05

Windows. Group 1 and 2 were compared using independent student t-test. Thirty (30) 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 documented between the first and the second tracings on applying the paired t-test for calculation of the method error.

Sagittal skeletal characteristics
Class I

Mean Values of <SNA <SNB and <ANB and SN-Pog were found out to be 81.4±3.0, 78.5±4.3 and 2.9±3.2 and 83.1±2.3° respectively.

ClassII/2

The mean value of <SNA and <SNB, as recorded in the table, indicate normal positioned maxilla for both class I and Class II Div 2 malocclusion (81.4±3.0 and 81.5±2.7) while mandible was retrognathic for class II div 2 (76±2.3°) malocclusion. 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 retrognathic mandible for class II div 2 (76°±2.3°) patients. <ANB was found out to be 5.5±1.1° and facial angle was 86.7±3. 4°.

Vertical skeletal characteristics
Class I

The mean values of <SN-Md plane, <MMA, Y-axis and LFHT/TAFHT were 34.3±5.1, 26.1±4.7, 60.4±3.4 and 57.8±2.3 respectively. All the values were within normal ranges.

Class II/2

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 1 patients (34.3±5.1°, 26.1±4.7°, 60.4±1.2°). The lower facial height ratio was significantly reduced in the Class II div 2 sample (52.8%±1.4%) as compared to class1 malocclusion (57.2±1.7%). This indicated more forward rotation and reduced lower anterior facial height in class II div 2 patients, indicative of skeletal deep bite.

Dental characteristics
Class 1

The mean value of <UI-SN was 105.7±4°, <IMPA 95.6±4.8° and <IIA was 133.4±6.3°, thus indicating normal inclined upper and lower incisors. Similarly, <UI-NA , UI-NA line distance and <LI-NB , LI-NB line distance, were also found within normal ranges

Class II/2

The mean value of total sample subjects for <UI-SN was 95.3±5.3°, <IMPA 94.4±7.5° and <IIA was 145±10.4°). This shows retroclined upper incisors while lower incisor inclination was within normal range. The <UI-NA, UI-NA line distance were 14.7±4.3°

and 3.1±1.4 mm, showing severe lingual tipping of upper incisors. The mean value of <LI-NB and LI-NB line distance were found out to be 23.5±6.7 and 3.2±2.4 mm respectively. These values reveal mild lingual tipping of lower incisors, however statistically were insignificant.

Soft Tissue Characteristics
Class I

Upper lip-E line distance was -3±-1.2 mm, Lower lip E line distance was -1±0.3mm

Class II/2

Upper lip-E line distance was +6.2 ± 3.19 mm, where as Lower lip E line distance was +1.9 ± 4.3 mm. All the above values are more than normal, thus exhibiting protectiveness of both upper and lower lips.

DISCUSSION

The current study was carried out on 60 lateral cephlaograms (30 class 1 and 30 Class II div 2) to compare the skeletal and dental features of Class II div 2 malocclusions in sagittal and vertical plane. The mean age of the total sample was 17.2±3.6 years. The study included both male and female patients.

Sagittal skeletal characteristics

The mean <SNA for both class1 (81.4±3.0°) and class II/2 (81.5±2.7°) sample showed normally positioned maxilla. This is in accord with previously published studies, where maxilla was found out to be normally positioned.[7-10]

In contrary, a few investigations does not agree with present study results and indicated prognathic maxilla in class II/2 malocclusions.[11,12]

Means of <SNB (76°±2.3°) and <ANB (5.5°±1.1°) were quite lesser in class II/2 patients thus indicating a retrognathic mandible. Therefore, the entire sample was class II due to retrognathic mandible. Similar findings were narrated in several studies conducted in the past .[5,6,11-15]

The mean value of facial angle was significantly higher in class II/2 sample (86.7°±3.4°) than class 1 (83.1°±2.3°) patients. This showed that chin was more prominent in class II/2 malocclusion in present study sample. The current findings agree with results of previous studies conducted by Pancherz[10], Arvystas[16] and Isik.[17]

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/2 sample as compared to class 1 patients (34.3±5.1°, 26.1±4.7°, 60.4±3.4°). These designate a more upward and forward rotation of mandible contributing to a skeletal deep bite in Class II/2 patients. The same was found out in the studies carried out by Pancherz[10], Rehan[15], Fischer[18], Smeets.[19] Similarly; the lower facial height ratio was also significantly reduced in the Class II/2 sample (52.8%±1.4%) as compared to class1 patients (57.8±2.3%). The same was found out by Naphtali[6], Renfroe[11], Wallis[13], Emad[14], Rehan[15], and Isik[17], who recognized that class II/2 is commonly associated with a reduced lower facial height.

Dental Parameters

The mean value of <UI-SN for class1 and class II/2 were 104.5±3.1° and 95.3°±5° respectively. This indicated retroclined maxillary incisors in Class II/2 malocclusion. These findings were similar to the results of studies presented previously. [1,6,7,8,10,114-17]

The lower incisors were found out to be normally inclined (94.4±7.5). Same was true for numerous preceding studies.[1,6,7,10,11,13,15-17,20] However, in their study, Emaad et all[14] found out slightly retroclined lower incisors for class II/2 malocclusion. The interincisal angle is a reflection of upper and lower incisor inclination and thus increases in case of retroclined incisors. The mean value of <IIA for class II/2 was significantly increased (145°±10.4°). Similar results were indicated in earlier studies[1,6,7,8,10,114-17,20]

Soft Tissue Parameters

Both linear measurements regarding position of upper and lower lips (UL-E line and LL-E line distance) were increased in class II/2 malocclusion (6.2 ± 3.19 and 1.9 ± 4.3 mm) as compared to class I patients, thus showing protrusive upper and lower lips. Similar results were established earlier studies.[1,15,18,20]This might be due to natural compensation due to retroclined upper incisors in attempt to camouflage the profile.

The distinctiveness of Class II/2 malocclusion in comparison with other malocclusions is still controver-

sial and is said to fall between features of class I and class II/1 malocclusion and the same was established by other investigators[6,9,11,15]. This controversy might be the result of the composition of each study group (mean age, age range ethnicity, sample selection criteria, sample size, measuring accuracy[21] etc). A larger sample size and more of Cephalometric measurements should be investigated to clear out the controversies.

CONCLUSION

Class II/2 malocclusion is associated with retrognathic mandible and retroclined upper incisors. The lower anterior facial height is significantly reduced thus indicating upward and forward rotation of mandible resulting in deep bite.

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