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Research Article

PATHOGNOMANIC CRANIO-FACIAL CHARACTERISTICS OF SHORT FACE PATTERN IN CLASS II DIV 2 MALOCCLUSION- A RETROSPECTIVE STUDY

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ABSTRACT

Background: Class II Div 2 malocclusion is discussed as having short face patterns with occlusal and dental features which includes deep overbite, minimal overjet, tendency toward vertical displacement of maxillary incisors, lingual flexion of mandibular incisors, increased curve of spee, no exposure of the anterior maxillary teeth at rest and limited tooth exposure on smiling. The main aim of the study was to assess the severity of short face pattern in untreated class II Div 2 malocclusion.

Materials&Method: A total of twenty pre-treatment records such as study models, photographs and lateral cephalograms of patients with class II Div 2 malocclusion with age ranging from 10-15 years were obtained from the Dept. of Pedodontics & Preventive Dentistry, Government Dental College and Hospital, Hyderabad and were analysed for the dental & skeletal characteristics of class II Div 2 malocclusion.

Results: In all the cases deep overbite is common with the incisal edges of the lower incisors contacting the soft tissues of palate is seen in few cases and in few cases the mandibular labial gingival tissues are also traumatized by the lingually inclined maxillary incisors. In cephalometric analysis, all the subjects were having smaller mandibular plane angle, smaller gonial angles & more retroclined maxillary incisors.

Conclusion: Angles class II Div 2 malocclusion has a marked horizontal growth pattern with decreased lower facial thirds leading to short face pattern, which will limit the socialization of the individual and the deep bite which is most common in all class II Div 2 cases. If untreated will lead to severe attrition of lower incisors & recurrent lacerations of the palatal tissues.

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INTRODUCTION

Edward H Angle (1899)¹ classified malocclusion in the sagittal plane based on the mesio-distal relationship into Class I, Class II & Class III. Angles Class II is characterized by a Class II molar relationship where the distobuccal cusp of the upper first permanent molar occludes in the buccal groove of the lower first permanent molar. The disto-occlusion i.e; Class II is categorized into Division 1 and Division 2 based on spatial orientation of anterior teeth. Class II Div 1 is characterized by proclined upper incisors with a resultant increase in overjet. Class II division 2 malocclusion is characterized by retroclined upper central incisors, deep bite molars & canines in disto-occlusion.

The prevalence of Class II div 2 malocclusion was 3.15% and white individuals had the highest prevalence.² The dento-skeletal disharmonies in Class II div 2 result in short lower third of the face. This short face pattern presents vertical deficiency of the lower third of the face and compressive lip sealing but swallow with the mouth closed with no tongue interposition, resulting in intra and perioral functions which potentially predispose these individuals to normality.³ Dental & occlusal features include deep overbite, a tendency toward vertical displacement of the maxillary incisors, lingual flexion

of the mandibular incisors, increased curve of spee, incisor crowding, no exposure of the anterior maxillary teeth at rest and limited tooth exposure on smiling. Short face may be due to combination of etiological factors such as variability in growth intensity, mandibular soft tissue, muscle function and dentoalveolar component.⁴ Class II div 2 malocclusions pose a challenge for the early diagnosis and treatment plan as the facial features may hinder the developing abnormality in the initial stages. This study was undertaken to assess the cranio-facial parameters in Class II div 2 malocclusion & to identify the pathognomonic characteristics ensuring short face pattern at an early stage.

MATERIALS AND METHOD

This retrospective study was done by using study models & lateral cephalograms of untreated Class II div 2 malocclusion subjects from the Pedodontic department of Govt. Dental College & Hospital, Hyderabad. To be included in the study, the subjects had to have (1) Class II div 2 malocclusion based on Angles classification (Fig. 1- Fig. 3). (2) Cephalograms of sufficient quality for landmark identification. (3) No prior orthodontic treatment & (4) No major craniofacial anomalies. The untreated study sample consisted of 20 subjects within the age range of 10-15yrs and they were compared with an equal

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number of subjects with Angles Class I control sample. The cephalograms were traced and measurements were chosen to characterize developmental changes in both the sagittal & vertical planes of space (1) Angular measurements: SNA, SNB, ANB (Fig.4). Mandibular plane angle (S-N/ Go-Gn), gonial angle (Fig.5). interincisal angle (UI/LI), Upper incisal to NA angle (UI/NA), Lower incisal to NA angle (LI/NB angle). (2) Proportions: Lower facial height (LFH). (3) Linear measurements: UI-NA, LI-NA (Fig.6).

Statistical analysis

The data obtained was subjected to statistical evaluation using SPSS– Version-20 where independent ‘t’ test was performed.

RESULTS

In this study, the mean value of skeletal parameters SNA, SNB & ANB in study group were 80.01, 77.05 & 7.20 respectively (Table-1) where as in control group they were 82.6, 81.1 and 3.05 respectively (Table-2) with a significance level of $p < 0.0001$. The MPA in study group was 22.9 ± 3.15 where as in control group it is 24.8 ± 3.01 which is also significant of $p < 0.05$ (Table-3). Coming to dental parameters, mean value of UI-NA, UI-NA linear & INA were 19.72, 0.8 & 150.7 respectively (Table-1) where as in control group they were 23.4, 4.3 & 127 respectively (Table-2) with $p < 0.001$ (Table-3). LFH was 69.3 ± 5.7 in study group when compared to control group (59 ± 3.3) which is also significant at $p < 0.001$.

DISCUSSION

Facial growth patterns are the progeny etiological factor betrayed malocclusions. Short face pattern, though does not attract much attention in the early stages, worsens with aging.⁵ Class II div 2 cases show short face pattern which is determined by facial and skeletal changes including vertical deficiency of lower third of the face and compressive lip sealing. Early detection of children with short face pattern aids in development of suitable treatment programs at an earlier stage. Hence identifying specific criteria to diagnose or quantify the clinical condition is very important to prevent untoward sequelae. The deep incisal overbite in class II div 2 patients may become worse as the upper incisors erupt and become more and more under the influence of the lower lip, and at the same time, mandible rotates upwards and forwards. The lower dento-alveolus may be held back on the underlying bone as a result of the deep overbite in such a forward rotating pattern. In this study, cephalogram tracing was done by the principal investigator and checked for accuracy by other investigator. In case of disagreements, retracing of anatomic structures was done. Among the skeletal parameters, SNA (80.150 ± 2.4), SNB (77.050 ± 3.7) were significantly low with p value 0.001 and ANB angle (7.02 ± 1.5) was significantly high with $p < 0.001$, indicating forward placement of maxilla compared to mandible. Similar results were found in a study done by Barbosa *et al* (2017).¹ MPA was significantly low in study group than control group ($P < 0.05$) indicating horizontal growth pattern which was comparable to the results of Bastos *et al* (2017)⁵ and Dodda *et al* (2015).⁶ Upward and forward direction of mandible results in decrease in gonial angle. According to Rubika *et al*,⁷ the gonial angle in average growth pattern is 127.03° and in horizontal growth pattern is 122.43° . In this study, Gonial angle was 115° which was significantly low with $P < 0.0001$ indicating closed Gonial angle, reduced molar heights resulting in excessive curve of spee and short face pattern. Similar results

were found in study conducted by Rubika *et al* (2015).⁷ Among the dental parameters the UI-NA angle (19.725 ± 5.3) and UI-NA linear (0.825 ± 2.9) were significantly low indicating retroclined upper incisors in most of the Class II div 2 patients. Inter-incisal angle (150.70 ± 10.6) was significantly high with $p < 0.001$ indicating that deep-bite is common in most of the Class II div 2 patients. Lower anterior facial height (69.75 ± 5.6) was significantly less with $P < 0.0001$ in Class II Div 2 malocclusion due to vertical growth of condyle resulting in forward & upward mandibular rotation. Similar results were reported by Dodda *et al* (2015)⁶ and Maurya *et al* (2014).⁴ In Class II Div 2 malocclusion, forward & upward mandibular rotation results in a closed Gonial angle (115.00 ± 8.1) when compared to children with normal occlusion (128 ± 5.3).⁹⁻¹² The anti-clockwise rotation of class II Div 2 malocclusion may be because of incisor support.¹²⁻¹⁵

CONCLUSION

Within the limits of this study, the results are suggesting that the identification of Angle's class II div 2 subjects at an early age is based on morphological factors, facial features as well as dento-skeletal characteristics. Angle's class II div 2 malocclusion, if untreated, will lead to severe attrition of lower incisors & lingual side of upper incisors. The reduced lower facial height leads to short face pattern which will worsen with age & limit the socialization of the individuals affecting the quality of life.

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