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A BETTER FACE WITH A SINGLE PHASE

Dentistry

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ABSTRACT

Class II malocclusion with mandibular deficiency is a common skeletal problem in Orthodontics. Of the various functional appliances, Twin Block appliance is preferred by many clinicians due to the ease of use by the patient and ease of management of the appliance and is very effective in a growing patient. This case report illustrates a 11-year-old boy who underwent one-phase treatment with headgear-twin block appliance followed by comprehensive fixed orthodontic treatment for a period of 18 months to improve the patient's dental, skeletal and soft tissue profile.

KEYWORDS

Angle's Class II malocclusion, One-phase treatment, Twin-block appliance, headgear, mandibular deficiency

INTRODUCTION

Class II malocclusions may reflect maxilla–mandible skeletal disharmony with underdevelopment of mandibular growth and/or maxillary excess, leading to a convex soft tissue profile. Ideally, treatment of Class II malocclusion should focus first on improving the skeletal discrepancy using functional appliances while the individual is still growing.1

Functional appliances can bring about skeletal and dental corrections in Class II patients with retruded mandible by utilizing force from the surrounding musculature.[2] In 1988, Clark[3] described the twin block appliance and is now popularly used in growing patients with retruded mandible. The amount of mandibular advancement in twin block construction varies from patient to patient. In case of limited overjet, bite can be registered by placing incisors in an edge-to-edge relation while in patients with larger overjet, a step-wise advancement is done by advancing the mandible gradually.[4]

The following case report illustrates one-phase treatment using a headgear twin-block appliance for skeletal correction of a Class II division 1 malocclusion in a 11-year-old male patient followed by comprehensive fixed orthodontic treatment.

CASE REPORT

Figure 1: Pre-treatment Extraoral And Intraoral Photographs And Radiographs

A 11-year-old boy reported to the department with the chief complaint of forwardly placed upper front teeth and increased visibility of upper front teeth. Extra oral examination revealed that the patient had an apparently symmetrical face with a convex profile, incompetent lips, deep mento-labial sulcus and with posterior divergence (Figure 1). Patient also presented an increased incisal display at rest and on smiling. Intraoral features showed an end-on molar relation on both sides with Class II incisor relationship. The overjet was about 8 mm, and overbite of 6mm with lower midline shifted to right by 2mm and upper midline corresponding with the facial midline (Figure 1). Orthopantomogram of the patient revealed a permanent dentition stage with 3rd molar buds seen in all the quadrants (Figure 1).

Cephalometric analysis (Figure 1) confirmed the case as Class II division 1 malocclusion on a skeletal Class II base with prognathic maxilla, mandibular deficiency with ANB- 7° and Wits analysis- 6mm. Skeletal parameters revealed a protrusive maxilla and retruded mandible in relation to cranium, normodivergent growth pattern with increased saddle angle and decreased gonial angle. Dento-alveolar findings showed proclined and protruded maxillary anteriors and normally positioned mandibular incisors with an incisor visibility of 8mm at rest. The pre-treatment Cephalogram (Figure 1) indicated that he was at the peak of his pubertal growth spurt (CVMI-3) with a considerable amount of growth remaining. The patient also had a positive visual treatment objective (VTO) (Figure 2) which also favoured the use of mandibular advancement using the twin block appliance.

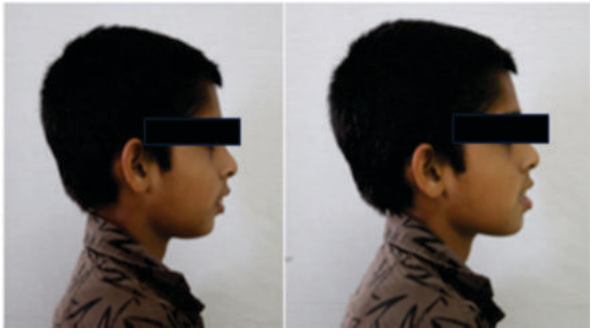

Figure 2: Positive Visual Treatment Objective

Diagnostic Summary

A 11-year-old boy was diagnosed as Angle's Class II division 1 malocclusion on a Class II skeletal base with prognathic maxilla, retrognathic mandible and normal growth pattern. Other associated problems include proclined upper incisors with overjet of 8mm and overbite of 6mm with lower midline shifted to right by 2mm.. Soft tissue parameters revealed convex profile, acute nasolabial angle and incompetent lips.

Treatment Objectives

a. Interception of Class II skeletal malocclusion.
b. Reduction of profile convexity and achieving optimum soft tissue balance.
c. Achievement of normal overjet and overbite.
d. To achieve Class I incisor relationship.
e. To achieve Class I molar and canine relationship bilaterally.
f. Long term retention.

Treatment Plan

As the patient had skeletal and dental Class II relationship in growing phase (CVMI stage -3), growth modification was planned using functional and orthopaedic appliance followed by comprehensive fixed orthodontic treatment for the final detailing of occlusion.

Treatment Progress

Bite registration was done with mandibular advancement of 6mm sagittally and 4mm vertically. As patient also presented with a maxillary excess, headgear was also incorporated along with twin block. The twin block appliance was delivered to the patient and he was instructed full-time wear of the twin block and head gear for 14 hours a day. Headgear force of 400 g per side was maintained.

After the twin-block treatment, the second stage of the treatment began. For closure of the midline diastema, settling in the premolar region and final detailing of occlusion, fixed orthodontic treatment was started without giving an upper anterior inclined bite plane appliance. Pre-adjusted edgewise appliance 0.022" slot MBT prescription (Ormco Mini 2000 brackets, Glendora, CA) was bonded on the maxillary and mandibular teeth and a 0.016" NiTi was placed. After the initial alignment was complete, the arch wires were sequentially changed to 0.017" ×0.025" and 0.019"×0.025" Nickel Titanium wires on the maxillary and mandibular teeth. After aligning and levelling, both arches were coordinated on 0.019 × 0.025" stainless steel arch wires and the midline diastema was closed. The appliance was debonded after 9 months, and the patient was given Hawley's retainer for upper and lower arches.

Skeletal correction of the prognathic maxilla and retrognathic mandible was achieved with a drastic improvement in the profile; an increase in the lower anterior facial height was seen cephalometrically in both the post-functional and post-treatment lateral cephalograms (Table 1). There was also good improvement in the macro and micro smile characteristics of the patient. An ideal overjet and overbite were established with a Class I incisal, canine and molar relationship with good buccal intercuspation (Figure 3). The upper and lower dental midlines coordinated with each other and the facial midline. Evaluation of post-treatment panoramic radiograph showed acceptable root parallelism along with normal alveolar bone levels.

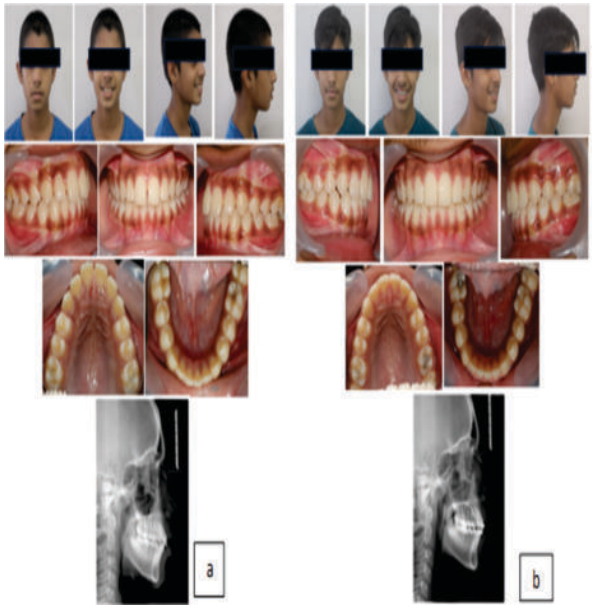

Figure 3: (a) Post-functional Extraoral And Intraoral Photographs And Lateral Cephalogram. (b) Post-treatment Extraoral And Intraoral Photographs And Radiographs.

Table 1: Comparison Between Pre-treatment, Post-functional, And Post-treatment Cephalometric Values

Variable	Pre-treatment values	Post-functional values	Post-treatment values
SKELETAL PARAMETERS			
SNA	86°	84°	84°
SNB	78°	81°	81°
ANB	7°	3°	3°
Wits appraisal	6mm	4mm	2mm
SN-GO GN	33°	26°	27°
FMA	35°	22°	21°
DENTAL PARAMETERS			
Upper incisor to NA (mm)	7 mm	5 mm	3 mm
Lower incisor to NB (mm)	6 mm	5 mm	4 mm
Upper incisor to SN plane (°)	110°	113°	112°
Upper incisor to maxillary plane (°)	65°	65°	65°
Lower incisor to mandibular plane (°)	100°	98°	96°
ANALYSIS OF FACIAL SKELETON			
Saddle angle (°)	117°	117°	117°
Articular angle (°)	140°	141°	141°
Gonial angle (°)	138°	129°	129°
Sum of angles (°)	395°	387°	387°
Y-axis (°)	51°	58°	58°

DISCUSSION

Class II malocclusion maybe due to maxillary excess, mandibular deficiency or a combination of both. Hence, identifying and understanding the etiology and expression of Class II malocclusion is helpful for proper treatment planning, whether growth modification, camouflage or surgical correction.[5]. The basic goal of functional appliance therapy is to stimulate greater growth at the condylar cartilage to promote lengthening of the mandible. [6] The patient can wear the appliance full time with little discomfort. It is suitable for mixed dentition as well as deciduous dentition.[7] Several studies have documented the effectiveness of the twin block appliance alone or in combination with a headgear to produce significant skeletal as well as dentoalveolar changes to correct Class II malocclusion.[8,9,10]

Successful treatment of Class II division 1 cases can prevent (1) possible trauma to maxillary incisors, (2) temporomandibular joint dysfunction, and (3) poor psychosocial adaptation.[11] The underlying skeletal discrepancy of some severe cases can be camouflaged by orthodontic treatment in conjunction with extractions.[12]

This patient showed a skeletal Class II malocclusion with ANB of 6°, vertically maxillary excess and increased incisor visibility. With proper and regular wear of headgear twin block appliance for 11 months, ANB angle reduced to 3° and SNB increased from 78° to 81°. The mandible was advanced by 6 mm. Skeletal Class I relation was achieved, facial convexity was reduced, lip competence was achieved, and the midlines were coinciding. Although dental corrections obtained with the appliance were minimal, the reduction in incisor visibility and the interlabial gap supported an overall improvement in smile and facial aesthetics. The most significant component in the success of utilizing a functional appliance is the patient's compliance, and this patient was very motivated and had exceptional compliance.

CONCLUSION

Functional appliance therapy is an effective way of treating skeletal Class II malocclusion due to mandibular retrusion with growth modification, however its effect depends upon patient compliance and case selection. Out of all the functional appliances, twin block by far is one of the most popular and versatile functional appliances used and its use during growing phase with good patient cooperation can produce more of skeletal effects along with some dental effects. Given the severity of the situation at the outset, the anticipated outcome was achieved. It was possible to attain harmonious skeletal, dental and soft-tissue equilibrium.

Declaration Of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his consent for his images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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