

TREATMENT OF SKELETAL CLASS II MALOCCLUSION WITH TWIN BLOCK APPLIANCE FOLLOWED BY FIXED ORTHODONTIC THERAPY SUPPORTED BY TEMPORARY ANCHORAGE DEVICE : A CASE REPORT

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ABSTRACT

Functional Appliance, both fixed and removable, are used to Promote mandibular development by forward repositioning the mandible in developing Class II malocclusions. It alters the neuromuscular environment and promotes favourable growth of the mandible by condylar adaptation. This is a case report of a successful treatment of growing patient with class II div I malocclusion with Twinblock appliance and fixed orthodontic treatment. Twin-block appliances were used in phase I therapy to move the retrognathic mandible forward. A fixed appliance was used in phase II therapy to achieve arch coordination, correct minor displacement, and finalize occlusion. Post treatment Skeletal Class I relation was attained. Incisors' inclination was improved, and ideal overjet and overbite with bilateral class I molar relationship was achieved. As the mandible advanced, lip competency, facial convexity, and mentolabial sulcus improved.

KEY WORDS

Class II DIV1 malocclusion, Mandibular retrognathia, Twin block appliances, Growing patient, TAD supported Anterior intrusion.

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INTRODUCTION

Class II malocclusion is one of the most common orthodontic conditions, affecting one-third of patients undergoing orthodontic treatment.¹

There is a wide range of skeletal and dental configurations associated with class II malocclusion. While it has been determined that mandibular retrognathism and maxillary protrusion may both be contributing factors. According to McNamara, the most consistent diagnostic finding in skeletal Class II malocclusions is mandibular retrognathism.²

Orthodontists can now modify the occlusal relationships commonly observed in Class II malocclusions using a variety of treatment techniques. These therapies consist of various extraction techniques, functional jaw orthopedic appliances, extraoral traction appliances, and arch expansion appliances.

As discussed earlier, mandibular skeletal retrusion is the most consistent finding in Class II malocclusion. It may be necessary to use a functional jaw orthopedic (FJO) appliance if the patient's overall craniofacial configuration includes this issue.²

The term Functional Appliance refers to a variety of removable appliances designed to change the arrangement of various muscle groups that influence the function and position of the mandible.³

Forces are transmitted to the dentition and the basal bone. Typically, these Mandibular position changes produce muscular force sagittally and vertically, resulting in orthodontic or orthopedic changes

In growing individuals with Class II malocclusions due to mandibular retrusion, removable and fixed functional appliances are used to encourage mandibular development by forward repositioning the mandible.

In 1982, Clark described the twin block appliance. According to numerous studies, it is one of the most effective appliances for the treatment of skeletal Class II malocclusions.

Twin Block appliances are simple bite blocks

that are designed for full-time wear. They achieve rapid functional correction of malocclusion by the transmission of favourable occlusal forces to occlusal inclined planes that cover the posterior teeth. The forces of occlusion are used as the functional mechanism to correct the malocclusion. The appliance is made up of maxillary and mandibular acrylic plates with bite blocks that interlock at a 70° angle when closed, propping the mandible forward⁽⁴⁻⁷⁾. The fact that it comes in two parts rather than one is said to improve patient compliance and reduce speech disturbance.

This case study shows how two phases therapy were used to treat a patient with Class II Division I malocclusion. The first phase of treatment was completed with a twin block appliance, and the second phase was completed with a fixed appliance therapy.

CASE REPORT

A 13-year-old male patient came to Department of Orthodontics and Dentofacial Orthopedics, Dr. R. Ahmed Dental College & Hospital complain of forwardly placed upper front teeth. No relevant medical history was reported.

Extraoral examination [Figure 1] revealed a mesocephalic head shape, mesoprosopic face type, retrognathic mandible, convex profile, and deep mentolabial sulcus. No abnormality was detected in the temporomandibular joint. Intraoral examination revealed a Class II molar relationship, deep and complete overbite, 12 mm of overjet, spacing in upper anterior region. Upperright and left lateral incisors were peg shaped with reduced mesial-distal dimension. Cephalometric values show a case of skeletal class II jaw base with ANB angle of 7° and



Fig -1



Fig -2

wits appraisal of +5mm. An SNB angle of 72° indicated that the mandible was retrognathic. The skeletal growth pattern was average as evidenced by the SN-MP angle of 30°. Maxillary incisors were proclined with U1-NA-7 mm/32° and mandibular incisors were upright over the basal bone with L1-NB-4mm/24°. Cervical vertebrae indicated acceleration period of growth. (fig 2).

DIAGNOSIS

A 12 year old male growing patient in CVMI stage 3 with Angle's class II div 1 malocclusion on class II skeletal bases with average growth pattern tendency with proclined upper anteriors with spacing in the upper anterior arch. Protrusive upper lip and lower lip trap with retrusive chin. There was complete deep bite and overjet of 12 mm with increased interlabial gap and convex profile.

TREATMENT OBJECTIVES

The objectives of Phase I therapy were to advance the retrognathic mandible to correct skeletal Class II relation and to reduce convexity of the face.

The objectives of Phase II therapy were to Space consolidation in upper arch, correct the inclination and align the proclined upper and lower anteriors in the basal bone, correct the discrepancy caused by the peg lateral and to improve the smile aesthetics and overall appearance.

TREATMENT PLAN

The main criteria in determining treatment plan were the skeletal Class II relation with retrognathic mandible and overjet. Two-phase therapy was planned. Phase I therapy was planned with twin-block appliance to advance the retrognathic mandible to correct skeletal Class II relation.

Phase II therapy was planned with fixed appliance for arch coordination to correct minor displacement and to detailing the occlusion.

TREATMENT PROGRESS

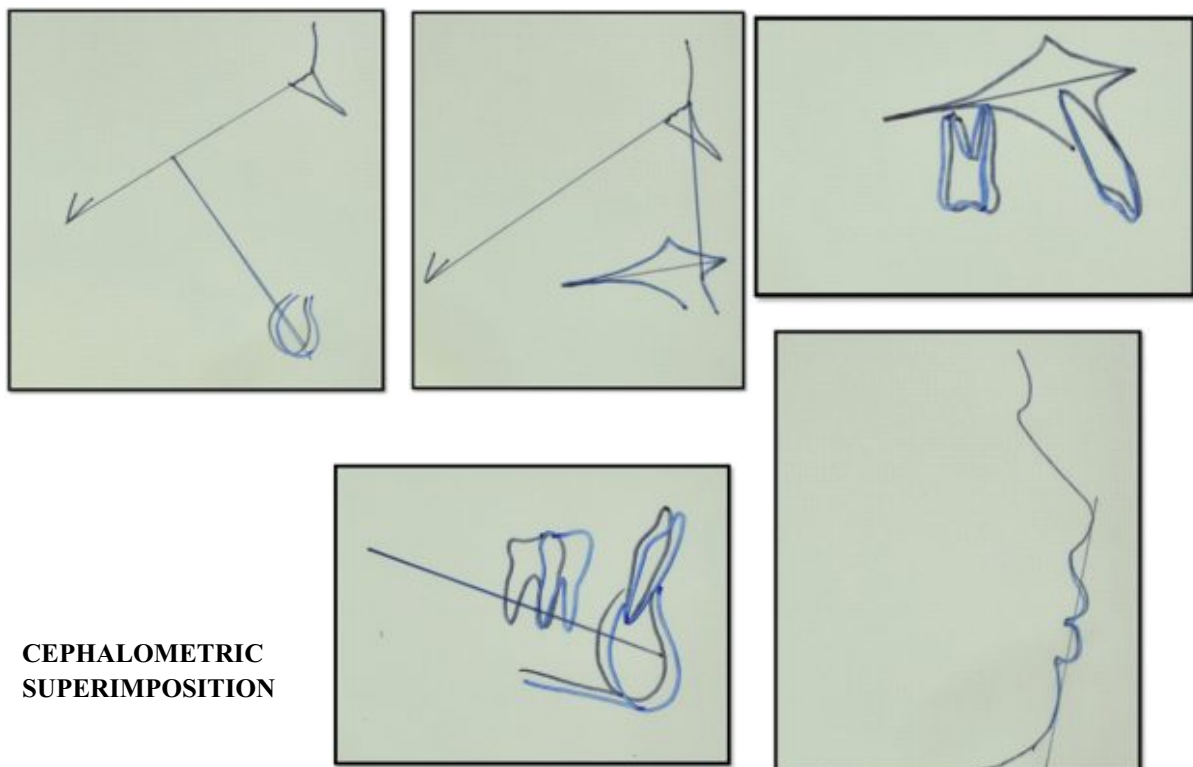
Phase I: Growth modification therapy

Phase I treatment involved the use of twin-block appliance to advance mandible, to reduce overjet, and to achieve Class I skeletal relationship. A labial bow was used for anterior retention of the appliance. A midline screw was also included. The jack screw was activated at a rate of 0.5 mm/week for 8 weeks to achieve a maxillary expansion of 4 mm. Use of twin-block appliance was discontinued after 8 months of treatment

Phase II: Fixed appliance

MBT 022 slot preadjusted edgewise brackets using continuous arch mechanics was used.

Alignment and leveling was accomplished with the following sequence of archwires: (a) 0.016"



CEPHALOMETRIC SUPERIMPOSITION

nickel-titanium archwires (b) 0.018" stainless steel archwires, and (c) 0.017×0.025 stainless steel arch wire. After aligning and leveling, both arches were coordinated on 0.019×0.025" stainless steel archwires. Placement of mini-implant was done in the inter radicular space between the maxillary lateral incisor and canine (Fig. 6) on right and left side. TAD supported anterior intrusion was done to open the bite. (Fig 6)

Case was debonded, Modified Hawleys retainer with anterior inclined plane were given. The active treatment ended in 26 months. The patient is being recalled for every 6 months for follow-up

TREATMENT RESULT

The most impressive aspect of the patient's treatment was the improvement in his facial esthetics. With twinblock therapy, the mandible advanced 3 mm, converting the skeletal Class II relationship to the skeletal Class I relationship. His lip competency and facial convexity were both enhanced. A bilateral Class I molar relationship was established. Post treatment, intraoral photographs and lateral cephalogram showed that the maxillary and mandibular incisors were inclined appropriately. The panoramic radiograph showed adequate root parallelism in both the upper and lower arches.

DISCUSSION

The primary goal of functional appliance therapy is to induce supplementary lengthening of the mandible by stimulating increased growth at the condylar cartilage. A pubertal peak in mandibular growth has previously been described in classical cephalometric studies.⁸⁻¹³ Petrovic et al. revealed that the therapeutic effectiveness of various functional appliances is most favorable when these appliances are used during the pubertal growth spurt.¹²⁻¹³ There were several reasons for starting treatment early. First, McNamara et al. demonstrated that the earlier treatment begins, the more skeletal correction is achieved. Second, the nature of the twin block appliance design makes it more appropriate for treatment when solid deciduous molars are available for clasping. Third, younger patients adapt more easily to wearing removable appliances and are less likely to have speech difficulties than their adolescent counterparts. In this case, a comparison of the lateral cephalograms obtained before and after treatment showed that SNA remained same but SNB increased by 2°. The ANB angle was decreased by up to 2°. The length of the mandible was enhanced by 3 mm. The below mentioned Table shows the values of chosen parameters before and after functional as well as fixed appliance therapy.



Twin block



POST PHASE I

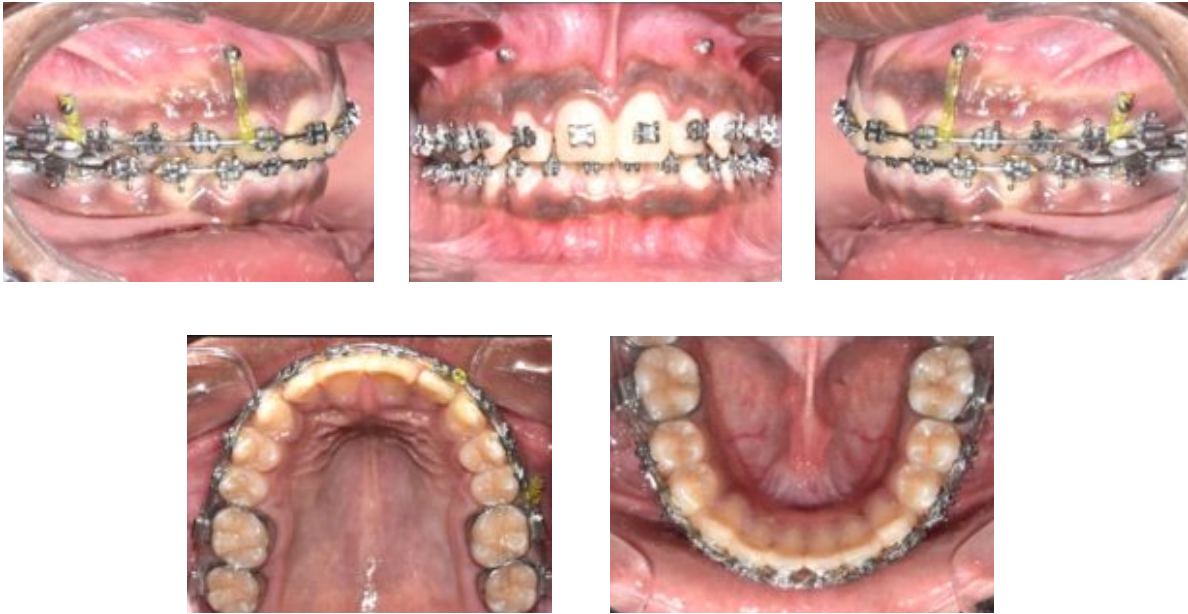


FIG 6



POST TREATMENT

Parameter	Pre treatment	Mid Treatment	Present Treatment
SNA	79 ⁰	79 ⁰	79 ⁰
SNB	72 ⁰	74 ⁰	74 ⁰
AB Plane to NPog	-9 ⁰	-2 ⁰	-5 ⁰
ANB	7 ⁰	5 ⁰	5 ⁰
Wit's Appraisal	+5mm	+1.5mm	+2mm
Pog -Na perp	-7mm	-5mm	-5mm
Na perp to point A	+1mm	+0.5mm	0.5mm

Growth Pattern	Pre treatment	Mid treatment	Present treatment
Y (growth) axis	58 ⁰	60 ⁰	61 ⁰
F M A	23 ⁰	25 ⁰	25 ⁰
MPA (Steiner's)	30 ⁰	31 ⁰	31 ⁰
MPA (Down's)	23 ⁰	24 ⁰	23 ⁰
L A F H	62mm	63mm	63mm
JARABAK's ratio	64%	63.86%	65.4%

Parameter	Mean	Pre treatment
Upper CI to A-Pog	+5 to -1 mm (2.7 mm)	+13mm
Inter incisal angle	130 ⁰ -150 ⁰ (134 ⁰)	117 ⁰
Upper CI to NA (linear)	04mm	7mm
Upper CI to NA (angular)	22 ⁰	32 ⁰
Upper incisor Protrusion	4-6 mm	7mm
Upper CI to SN	102 ⁰	110 ⁰

	Pre treatment	Mid Treatment	Present Treatment
Lower CI to NB (linear)	4mm	+6mm	+6mm
Lower CI to NB (angular)	24 ⁰	28 ⁰	30 ⁰
IMPA (Tweed)	95 ⁰	100 ⁰	101 ⁰



SN (Linear)	62 m m	62 m m
SNA	79 ⁰	79 ⁰
SNB	72 ⁰	74 ⁰
S-Ar	28 m m	29 m m
Saddle angle	136 ⁰	136 ⁰
Articular angle	127 ⁰	124 ⁰
Gonial angle	123 ⁰	124.5 ⁰
Maxillary Base	43 m m	43 m m
Mandibular Base	65 m m	67 m m
Ascending Ramus	47 m m	50 m m
Upper incisor-N:Pog	14 m m	12 m m
Lower incisor-N:Pog	4 m m	6 m m
N-Me	102 m m	103 m m
S-Go	65 m m	70 m m

Functional Analysis

CONCLUSION

This case report illustrates two -phase therapy of a skeletal class II case. Growth modulation was achieved with twin-block appliance in phase I and occlusion was finalized with fixed appliance in phase II. The mandible was advanced by 3 mm by Twin-block appliance therapy results in both skeletal and dento alveolar adaptations. Skeletal Class I relation was achieved, facial convexity decreased, and competency of lips achieved. The patient presented a positive smile arc with a pleasing smile at the end of the treatment.

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