

Treatment of skeletal class ii malocclusion in a permanent dentition using a two-phase approach – a case report

¹Dr Shruti Choudhary, Senior Lecturer, Department of Orthodontics And Dentofacial Orthopedics, Its Dental College, Hospital And Research, Greater Noida

²Dr Ratendra Singh, Senior Lecturer, Department of Orthodontics And Dentofacial Orthopedics, Kalka Dental College And Hospital, Meerut

Corresponding Author: Dr Shruti Choudhary, Senior Lecturer, Department of Orthodontics And Dentofacial Orthopedics, Its Dental College, Hospital And Research, Greater Noida

Citation of this Article: Dr Shruti Choudhary, Dr Ratendra Singh, “Treatment of skeletal class ii malocclusion in a permanent dentition using a two-phase approach – a case report”, IJDSIR- May - 2021, Vol. – 4, Issue - 3, P. No. 160 – 165.

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Facial aesthetics is one of the main reasons for patients with a Class II Division 1 malocclusion to seek orthodontic treatment. Treatment of Class II malocclusions include various techniques, one of which is a two-phase approach that includes functional jaw orthopaedics followed by fixed mechanotherapy treatment. Aim of this case report was to see the effect of twin block in permanent dentition phase of 14 year old girl. In first phase of the treatment patient was treated by using the functional removable appliance called the Twin Block, for growth modification and correction of retrognathic mandible, overjet and profile. The second phase of the treatment a 0.18 X 0.025 - fixed MBT brackets were placed in the upper and lower arch for the alignment of arches and improved aesthetics and function.

Keywords: Foxed MBT, Prognathic Maxilla, Retrognathic Mandible

Introduction

Class II Division 1 malocclusion, one of the most commonly observed problem in orthodontics. Class II malocclusion present with a wide variety of skeletal and dental configurations. This malocclusion are often complicated due to a skeletal discrepancy involving the prognathic maxilla, retrognathic mandible or combination of both¹. According to McNamara², most prevalent feature of this malocclusion in growing patients is mandibular retrusion. Treatment of skeletal Class II cases depends on growth, age, compliance and the severity of the malocclusion³.

Various treatment options are available for managing Angles Class II division 1 malocclusion, functional appliances are one amongst them. Functional appliances are of both type removable and fixed appliances. Removable appliances can be removed by the patient and

require good compliance, whereas fixed appliances are bonded onto the teeth and do not require patient compliance for placement and removal.

Functional appliances are designed to alter the activity of various muscle groups that influence the position and function of the mandible. By altering the vertical and sagittal position of the mandible, the muscle forces can result in orthodontic and orthopaedic changes in the dentition⁴. In case of mandibular retrognathism, positioning the mandible forward is believed to enhance its growth.

Various functional appliances have been developed over the years mainly to correct Class II malocclusions by altering the soft tissues surrounding the teeth, causing a disruption in the occlusion and creating an inter-maxillary force⁵.

In 1982, Clark described the twin block appliance. In United Kingdom, it was one of the popular functional appliances. Twin Block appliance is composed of acrylic removable plates containing acrylic bite blocks. These bite blocks connect at 70 degrees when the patient closes his/her mouth, while posturing the position of the mandible forward^{6,7}. The dramatic results often seen after wearing functional appliances are due to dentoalveolar movement. Maxillary teeth are tipped distally and mandibular teeth mesially. The appliances tend to restrict maxillary growth while establishing a new occlusal relationship in a patient that is actively growing⁵. Many evidences suggest that it may be considered as one of the most successful appliances for the treatment of skeletal Class II malocclusions. The following case report documented a 12-year-old girl with permanent dentition having overjet of 14 mm and overbite of 9mm treated by growth modification using Twin Block appliance followed by second phase using fixed orthodontic appliances is necessary for treating any remaining discrepancies and to

ensure proper interdigitation of the teeth in their new positions along with the retention appliance. This article discussed that twin block produce similar effect in permanent dentition as in mixed dentition phase with proper case selection and good patient cooperation.

Case Report

A 12-year-old girl came with a chief complaint of forwardly placed upper front teeth she had a history of thumb sucking habit. On extra oral examination the patient had severely convex profile and a posterior facial divergence. She had good facial symmetry and her maxillary midline was coincident with her midsagittal plane. She presented with incompetent lips and a hyperactive mentalis muscle with a lower lip trap, receded chin position with horizontal growth pattern of mandible [Figure 1 a-c]. Intra-oral examination revealed that the patient was in her permanent dentition stage, overjet of 14mm and overbite of 9mm (99%) with Angle Class II molar classification bilaterally. There was mild spacing in maxillary anterior teeth and mild crowding in lower mandibular incisors [Figure 1 d-h].

In pre-treatment radiograph [Figure 2 (a,b)] the CVMI stage of patient indicated that she had considerable amount of growth remaining, growth modification was planned using functional appliance followed by fixed orthodontic appliance for final detailing of occlusion.

Diagnosis

Soft tissue: The patient presented mesocephalic with a severely convex profile, posterior divergence, lower lip wedge and a Class II lip relationship.

Skeletal

Class II skeletal malocclusion [Steiner - ANB (6°) and Beta Angle - 18°] with a retrognathic mandible [SNB (77°) and mandibular plane angle (Go-Gn to SN) (25°)] Horizontal growth pattern.

Dental

Angle Class II Division 1 with maxillary incisors proclined and protrusive and orthopositioned mandibular incisors. An overbite of 9/10 and an Overjet of 14mm due to the proclined maxillary incisors and orthopositioned mandible incisors.

Treatment Objectives

- To achieve normal overjet and overbite
- To achieve skeletal Class I by growth modification with the functional appliance
- To achieve Class I molar relation

Treatment Plan

The Phase I: Orthopedic Stage

The patient had to wear an acrylic twin block full time. The mandibular advancement of 6 mm and the vertical opening between the premolars of 4mm was given to achieve class 1 molar relation. Inclined plane was at 70 degree angulation and extended from mesial of lower first permanent molar to distal of upper first premolar. The phase I orthopedic stage treatment with Twin Block appliance was continued for 12 months which include Active phase of 7 month, support phase of 4 month followed by retention phase with fixed mechanotherapy⁸. The appliance was worn full time for 7 months, followed by the trimming of inter occlusal bite plane to facilitate the eruption of mandibular molars. After 12 month twin block was discontinued and reverse inclined plane was given for a retention phase. The treatment objectives of normal overjet and overbite, and skeletal Class I by growth modification were achieved in stage I orthopaedic stage [Figure 3 (a-f)], [Figure 4 (a-b)].

Second Phase – Fixed appliance treatment

A 0.18 X 0.025 - fixed MBT brackets were placed in the upper arch along with reverse incline plane for retention phase was given for 6 month. The upper arch was leveled

and aligned initially with a 0.014 NiTi archwire and, subsequently, a sequence of both round and rectangular 0.016-in, 0.018-in and 0.020 NiTi wire were followed alternatively till 0.016 x 0.022-in SS archwire. Conventionally the final wire would have been a 0.019 x 0.025 SS, but the decision was made after clinical evaluation of the maxillary anterior teeth that the final archwire of 0.016 x 0.025 SS would be adequate. A further increase in torque would have resulted in an even smaller interincisal angle with the already proclined lower incisors. Clinically, the torque of the maxillary incisors was evaluated and thought to be adequate. No inter-arch Class II elastics were used during the second/fixed orthodontic phase of treatment. The patient had a stable Class I bite from the end of the first phase throughout the rest of the treatment [Figure 5 (a-h)], [Figure 6 (a-b)].

Discussion

Class II malocclusion might have any number of a combination of skeletal and dental component. Hence, identifying and understanding etiology and expression of Class II malocclusion and identifying differential diagnosis helpful for its correction and to select treatment planning whether functional, orthodontic or surgical⁹.

Treatment of Class II Division 1 malocclusions should also be aimed at solving the dentoskeletal disharmony in order to obtain favourable facial aesthetics¹⁰. The use of a two phase treatment approach can best initiated during or slightly after the pubertal growth spurt which can drastically improve both function and aesthetics¹¹.

The first phase requires compliance from the patient and is carried out using a removable functional appliance Twin block for eliminating oral dysfunctions, for mandibular growth by changing the posture in a forward and downward position. The favourable mandibular growth changes occur after mandibular displacement which mainly involve the mandibular condyle. Condyle shows

additional growth in a superoposterior direction, with an increased bone apposition at the posterior aspects of the head of the condyle and ramus¹². The advantages of twin block include simple and aesthetic appliance design, reduced chair side time and comfortable wear of the appliance. The second phase is done using a 0.18 X 0.025 - fixed MBT brackets system along with the Niti round and rectangular wire followed by stainless steel wire.

Here, comparison of pre-treatment and post functional appliance treatment lateral cephalogram showed SNA remained unchanged, and SNB increased by 2°. ANB angle reduced up to 2°. Inclination of maxillary incisors decreased by 3°. The values of selected parameters before and after functional appliance therapy are shown in Table 1.

There still exists a lack of evidence that functional appliances can cause a significant effect on mandibular growth for long term. Despite this lack of evidence, the use of functional appliances has been proven to be very effective for reducing the overjet in growing patients with Class II malocclusions by redirecting the growth of mandibular¹³. Functional appliances require patient compliance and will therefore not be successful in all cases. Patient selection is of utmost importance to ensure successful treatment⁵.

Conclusion

- Effect of twin block depends upon patient's compliance and case selection.
- Use of this appliance during growing phase it produce skeletal effect along with the dentoalveolar effect.
- The two-phase approach will not always be successful and unfortunately its success is not readily predictable.

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Figure 2: Pre-Treatment (a) Lateral Cephalogram (b) Orthopantomogram

Legend Figures



Figure 1: Pre-Treatment intra-oral and extra-oral photographs



Figure 3 (a-f): Extra-oral and Intra-oral photos directly after Twin Block phase.

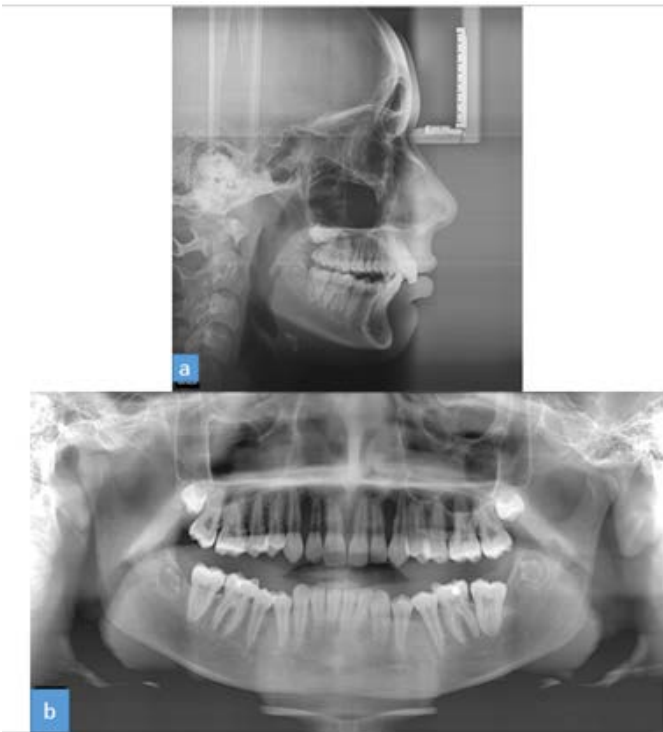


Figure 4: After Twin Block phase (a) Lateral Cephalogram (b) Orthopantomogram.



Figure 5 (a-h): Post-Treatment Extra-oral and Intra-oral photos

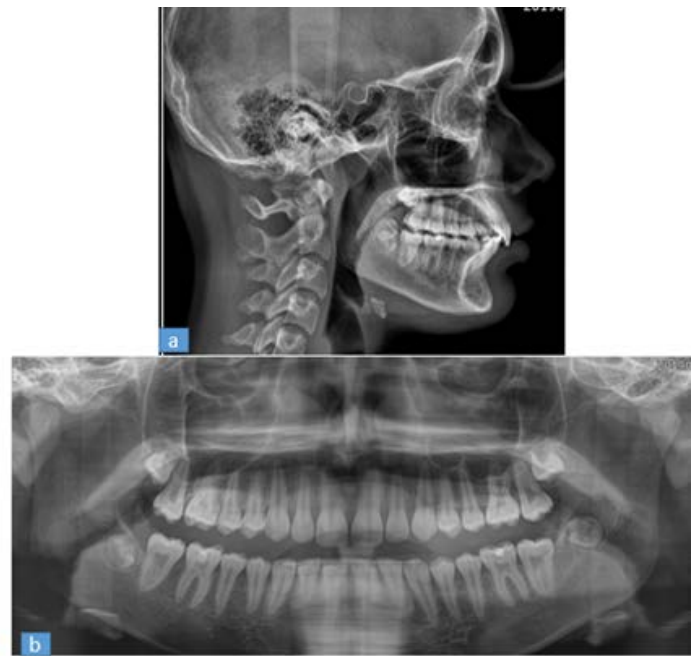


Figure 6: Post Treatment (a) Lateral Cephalogram (b) Orthopantomogram

Variables	Pre-Treatment	Post Functional Appliance
Skeletal Variable		
SNA (°)	83°	83°
SNB (°)	77°	79°
ANB (°)	6°	4°
FMA (°)	22°	24°
Dental Variable		
U1-L1 (°)	119°	126°
U1-SN (°)	115°	112°
U1-NA (mm)	3mm	3mm
U1-NA (°)	30°	27°
L1-NB (mm)	3mm	3mm
L1-NB (°)	24°	24°
IMPA (°)	102°	102°
Soft Tissue Variable		
Nasolabial angle (°)	105°	103°