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## **FUNCTIONAL AND FIXED ORTHODONTIC MECHANOTHERAPY FOR SKELETAL CLASS II MALOCCLUSION: A CASE REPORT**

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### **ABSTRACT:**

The twin-block appliance introduced by Clark in the year 1977 and is commonly used functional appliance to treat skeletal Class II malocclusion in growing patients. During the active phase, it guides molar eruption, and helps in reduction of posterior open bite by eruption of buccal teeth into occlusion. After which, an anterior inclined bite plane is used to maintain occlusion. The use of these appliances is greatly dependent on the patient's compliance and simplifies the fixed appliance phase. This is a case report of growing skeletal Class II patient who was successfully treated by twin block appliance. After which, fixed orthodontic treatment was done to correct dental irregularities and desired results achieved. Keywords: Mechanotherapy, Skeletal, Malocclusion



### **INTRODUCTION:**

A patient with Class II malocclusion presents with numerous skeletal and dental variations. The commonest among skeletal variations is mandibular retrusion. Numerous treatment possibilities are available for treating Class II malocclusion. Among the various treatment possibilities, functional appliances can be used in skeletal mandibular retrusion cases.<sup>[1-3]</sup> Functional appliances are used to correct the aberrant muscle functions which are responsible for the abnormal growth and development of the underlying hard tissues. Functional appliances redirect the neuromuscular activity of the oral cavity to normal limits thereby correct the skeletal malocclusion. In case of mandibular retrognathism, positioning the mandible forward enhances its growth.<sup>[4]</sup> Dr. Clark originally developed Twin Block appliance.

It is a commonly used functional appliance for the skeletal correction of Class II malocclusion with retrognathic mandible.<sup>[5]</sup> Its acceptance over other functional appliances is due to high patient compliance and ability to yield swift treatment changes.<sup>[6]</sup> The twin block appliance has an upper and lower acrylic plates with clasps on upper and lower premolars and molars to retain the plate and bite blocks that interlock at an angle (70degree) on closure, as a result the mandible is postured forward.<sup>[7,8]</sup> The following case report documents a 13-year-old female with 11 mm overjet treated by growth modification using Twin Block appliance and post functional correction fixed orthodontic treatment was done to correct dental irregularities.

### CASE REPORT:

A 13 year old female reported to the Department of Orthodontics and Dentofacial Orthopedics, Mahatma Gandhi Dental College and Hospital, complaining of forwardly placed upper front teeth and irregularly placed lower front teeth. The patient was in the early permanent dentition. On extra oral examination the patient had a convex

facial profile, posterior facial divergence, acute nasiolabial angle, deep mentolabial sulcus, receded chin position with horizontal growth pattern of mandible (Figure-1 a-c). Intra-orally, patient presented with a Class II Division 1 malocclusion. She had an overjet of 11 mm and overbite of 5 mm (Figure-2 a-c).



Fig-1:Pre-treatment (a-c) Extra Oral Photographs



Fig-2:Pre-treatment (a-c) Intraoral Photographs

Teeth present

17 16 15 14 13 12 11 21 22 23 24 25 26 27

47 46 45 44 43 42 41 31 32 33 34 35 36 37

**Diagnosis:** Angle's Class II division 1 malocclusion on class II skeletal bases with retrognathic mandible, horizontal growth pattern, proclined upper and crowded lower anteriors, skeletal deep bite with increased overjet and overbite and highly placed canine i.r.t. 23.

**Treatment Objectives:**

- To obtain good facial balance.
- To achieve Class I skeletal pattern by growth modification with the functional appliance.
- To achieve a normal inclination of upper & lower anteriors.
- To achieve class I molar, incisor and canine relationship.
- To correct deep bite.
- To correct crowding and rotations in lower anteriors.
- To correct curve of spee

**Treatment Plan**

*The Phase I: Orthopedic Stage*

The patient had to wear an acrylic twin block full time. But due to poor compliance of patient temporary fixation of twin block was done for a period of 14 days. Skeletal correction was achieved in 2 steps as

overjet was more than 10 mm. Initially mandibular advancement of 6 mm, vertical opening between the premolars of 4mm and incisal opening of 2mm was given. Inclined plane was at 70 degree angulation and extended from mesial of lower first permanent molar to distal of upper first premolar [Figure 3]. In second step of mandibular advancement an edge to edge incisor relation was achieved. The phase I orthopedic stage treatment with Twin Block appliance was continued for 12 months. The appliance was worn full time for 6 months, followed by the trimming of inter occlusal bite blocks to facilitate the eruption of mandibular molars.

The twin block appliance was worn for 12 months and was discontinued. The treatment objectives for orthopaedic stage were obtained.

**The Phase II Retention Stage**

To maintain skeletal correction and to facilitate eruption of mandibular molars anterior inclined bite plane was given for period of 3 months. Along with retention phase, T Loop was given to correct highly placed 23 (Figure-4).



Fig-3: Twin Block Appliance in Mouth



Fig-4: Anterior Inclined Bite Plane Appliance

#### Treatment Assessment

All the treatment objectives pertaining to skeletal correction were achieved by the end of 15 months. The overjet and overbite reduced from 11mm to 1mm. The Class II malocclusion was changed to Class I relation (Figure-5 a-c and Figure-6 a-c). The lateral cephalometric superimposition comparison was done between pre and post treatment. (Figure-7 a, Table-1).



Fig-5: (a-c) Mid-treatment Extra-oral Photographs



Fig-6: (a-c) Mid-treatment Intra-oral Photographs

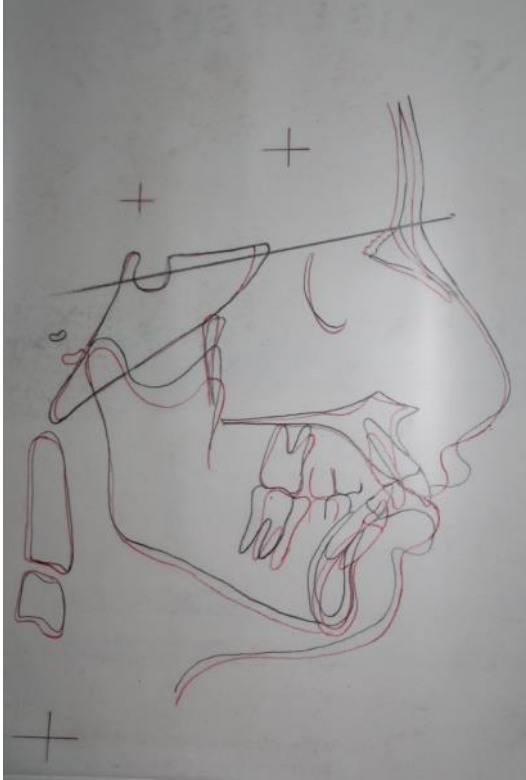


Fig-7: Cephalometric superimposition at sella-nasion registered at S

Table-1: Comparison of pre- treatment and post-treatment parameters

Parameter (degree)	Pre-treatment	Mid-treatment	Post-treatment
SNA	81°	81°	81°
SNB	75°	76°	77°
ANB	6°	5°	4°
Facial angle	81°	79°	82°
Interincisal angle	101°	112°	129°



Fig-8: Fixed orthodontic treatment with MBT .022" appliance



Fig-9: (a-c) Post-Treatment Extra-Oral Photographs



Fig-10: (a-c) Post Treatment Intra-oral Photographs

After orthopaedic stage, fixed orthodontic treatment with MBT .022" appliance was carried out for a period of 15 months to correct dental problems. To correct dental problems extraction of 14, 24, 34 and 44 was done. After alignment and leveling, individual canine retraction was done in upper arch and en-masse retraction was carried out in lower arch to achieve desired results (Figure-8 a-c). Post treatment extra oral and intra oral photographs shows desired results. (Figure-9 a-c, 10 a-c).

#### DISCUSSION:

Ideal time to start functional treatment of Class II malocclusion is during or slightly after the pubertal growth spurt. Corresponding to the occlusal development, treatment should be started

at late mixed or early permanent dentition stage.<sup>(7)</sup> The patient in this case, was in early permanent dentition and, thus, was at an ideal age to start with the treatment.<sup>[9, 10].</sup>

The treatment objectives set for this case, were achieved due to the good compliance by the patient. The patient's chief complaint was forwardly placed upper front teeth. In this patient, overjet was reduced due to favourable growth of mandible with the forward movement of lower incisors as well as due to retroclination of the upper incisors by twin block. Thus by reducing the overjet, the patient's confidence enhanced and also the risk of sustaining trauma to the upper incisor was reduced. The positive result at

the end of treatment is due to the skeletal and dento-alveolar changes produced by the appliance. Due to increased mandibular growth the patient experienced an increase in the SNB angle with two degrees, from 75 degrees to 77 degrees.

Twin-block for Class II correction is constructed from bite registration. The bite is registered with the mandible in a forward and downward posture. The rationale behind this procedure is that favorable mandibular growth occurs after mandible is displaced in forward and downward position. The changes mainly occur at the mandibular condyle, which responds by growth in a posterior-superior direction, with an increased bone deposition at the posterior aspects of the head of the condyle and ramus.<sup>[11]</sup> The advantages of twin block are simple design, comfortable to wear, aesthetic and efficient. It is a lesser amount of obstruction on speech and other oral functions compared to one piece functional appliance.

Major favourable effects achieved by twin block therapy after the pubertal growth spurt compared to earlier phases are

- Greater skeletal impact in correction of the molar relation.
- Larger growth increments in total mandibular length and in ramus height.
- Increased posterior direction of condylar growth, a biological mechanism which leads to supplementary mandibular lengthening and reduced amount of

forward condylar displacement in favour of effective mandibular growth and reshaping.<sup>[8]</sup>

## CONCLUSION:

Twin Block appliance can be an appliance of choice, for correction of Class II malocclusion in growing individuals, as it brings about major changes by skeletal effect on the mandible. Along with the skeletal changes, it also induces dentoalveolar changes by altering dental inclination. They simplify fixed appliance treatment by achieving Class I molar relationship and esthetic facial profile. Although, case selection and favorable growth period are key elements that determine the success of functional appliance therapy.

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