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Modified Fixed Twin Block Appliance in Growth Modification of Class II Malocclusion- Case Report.

[1]Dr. Sharon K Sabu, Department of Orthodontics and Dentofacial Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.

[2]Dr. Gyan Prakash Singh, Professor, Department of Orthodontics and Dentofacial Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.

[3]Dr. G K Singh, Professor, Department of Orthodontics and Dentofacial Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.

Corresponding Author: Dr. Sharon K Sabu, Department of Orthodontics and Dentofacial Orthopaedics, King George's Medical University, Lucknow, Uttar Pradesh 226003, India.

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Abstract

The two-phase therapy of growth modification with functional appliance and subsequent fixed orthodontic treatment is an accepted procedure with certain advan tages like-better esthetics, ability to modify growth, fewer extractions, reduction in duration and reduction in trauma to flared incisors. Twin block appliance designed by Clark has been widely accepted. It brings about correction of sagittal discrepancy by skeletal changes and dentoalveolar compensation. As with any removable appliance compliance was a major concern in patients at the peak of or close to the end of pubertal growth spurt. Fixed twin block was designed to overcome these limitations. The main objective of this innovation is to introduce a modification in twin block appliance in skeletal class II growing patients without much pro clination of lower incisors. This modification was proved to be successful in treating skeletal class II growing patients as a method to achieve mandibular advancement with minimal to no effect on lower incisor proclination. This method can be used in in class II growing patients during phase I therapy.

Keywords: Class II, Myofunctional appliance, twin block, lower incisor proclination, mandibular advan cement

Introduction

Class II division I is the most common malocclusion and found to be associated with skeletal discrepancies like short mandible, maxillary prognathism or combination of both. Treatment involves growth modification in growing children and camouflage or ortho gnathic

surgery in adults, depending on the severity of discrepancy.

Sagittal correction in growing children requires functional appliance therapy to stimulate the mandibular growth by forward positioning of mandible. Whether removable or fixed, functional appliance efficacy has always been controversial and many studies in the literature report dentoalveolar effect as the main outcome. Twin block is the most commonly used functional appliance for correction of skeletal class II malocclusion [1]. Besides the common desired effects of functional appliance therapy like mandibular growth enhancement, maxillary growth restriction and retro clination of maxillary incisors, there is also unwanted proclination of lower incisors. Proclination of lower incisors not only hinders the retraction of upper incisors but also makes the mandibular advancement difficult and also make treatment results unstable [2]. Some studies concluded that in most of the cases treated with functional appliances, lower incisor proclination was the major contributor in overjet reduction, therefore the use of functional appliance should be limited to the patients with retro lined or normally inclined lower incisors [2]

The fixed twin block is chosen to eliminate patient compliance and to ensure fulltime wear of the appliance. The main objective of this innovation is to introduce a modification in fixed Twin block appliance to achieve mandibular advancement, overjet reduction in class II growing patients without much proclination of lower incisors.

Appliance Design

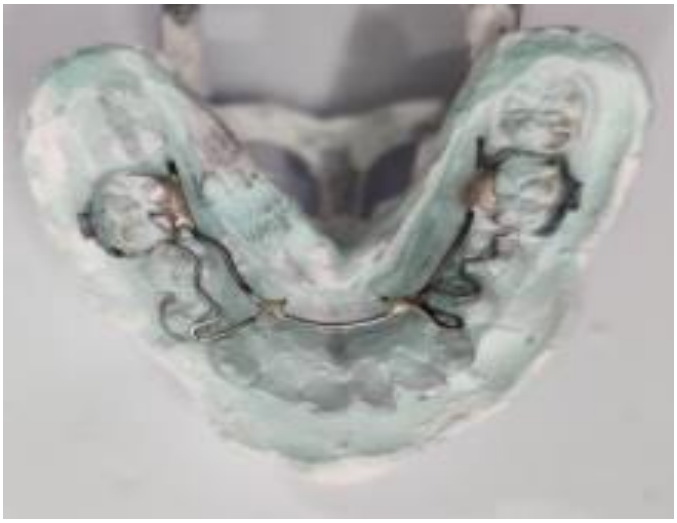
The present modification of the standard twin block comprises maxillary and mandibular components.

Maxillary components consist of 21 guage SS wire soldered to molar band, whereas mandibular components include right and left molar bands with SS wire soldered to lingual arch (Figure1a).

Armamentarium for modified fixed Twin block appliance

- Molar bands for maxillary and mandibular first molars
- 19 G Stainless steel (SS) wire
- Soldering kit

The patient is diagnosed and planned to be treated with functional appliance, molar bands are selected for maxillary and mandibular molars. Lower jaw impression is made with molar bands in position. Lingual arch is made with 1 mm SS wire is soldered to the lingual side of mandibular bands and without any contact with lower incisors. Additionally adapt 21guage stainless steel wire in a zigzag configuration to the occlusal surface of each molar, and solder the ends of the wire to the band on the lingual side. Press clear acrylic into the wire mesh until it contacts the entire occlusal surface of the model tooth and completely surrounds all of the zigzag wire surfaces. Once the acrylic block has been built up to the required height, it is fully cured, then the appliance is ready to be cemented (Figure 1a&b).



A

B

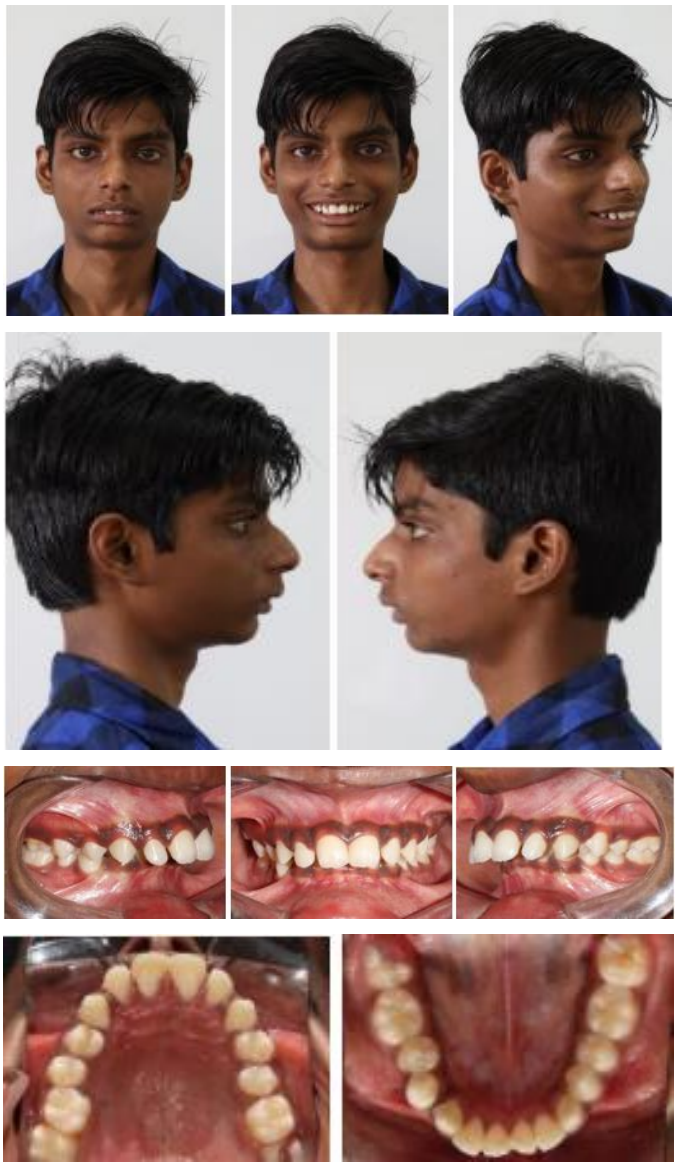
Figure 1: A, B.

A

B

Figure 2: A, B

Case report : A 14-year-old male patient reported to the Department of Orthodontics and Dentofacial Orthopedics with a chief complaint of forwardly placed upper front teeth. On extraoral examination, the patient had a convex profile, incompetent lips, retrognathic chin, and deep mentolabial sulcus. Intraoral examination revealed Angle's class II division 1 malocclusion with an overjet of 14 mm and spacing in the upper arch [Figure 2]. The patient showed positive visual treatment objective (VTO). The cephalometric analysis [Table I] revealed a skeletal Class II pattern (ANB = 9°) with retrognathic mandible (SNB = 77°), reduced mandibular length (Co-Gn = 90 mm), proclined maxillary anteriors (Upper 1 to NA = 28°), and incisor mandibular plane angle (IMPA) of 107°. The patient had horizontal growth pattern (FMA =18°) and was in cervical vertebral maturation index (CVMI) transition stage.



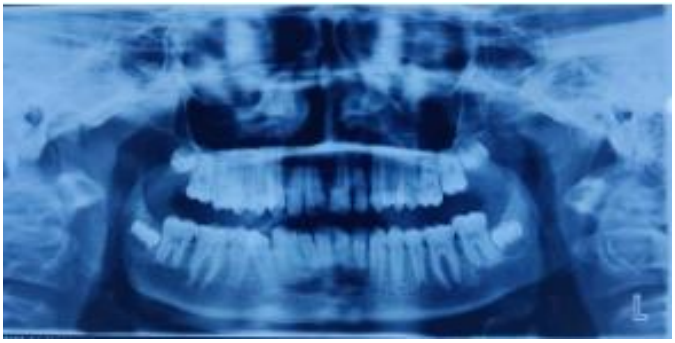


Figure 2: Pre-treatment photographs and Radiographs.

Figure 3: Intra oral picture of modified functional appliance in place.

Treatment objectives

1. To achieve class I molar and canine relation
2. Improvement of patient's soft tissue profile.
3. To correct skeletal class II discrepancy with two phase therapy
4. To prevent flaring of lower incisors
5. Consolidation of spaces in upper arch

Treatment plan and progress

The pre-treatment overjet was 14 mm, which entailed a stepwise advancement with an initial bite registration taken at 6 mm sagittal advancement and 4 mm vertical opening. The modified twin block was fabricated and inserted (Figure 3) with relevant instructions for appliance wear. The patient was recalled after 3 days and no discomfort was reported with the appliance. The patient was advised to maintain proper oral hygiene. The pterygoid response was achieved in 6 weeks.

Result

The class I molar and canine relationship was achieved successfully in 8 months with improvement in the profile of the patient [Figure 4]. Post phase 1 therapy revealed a reduction in the ANB angle by 3° with an increase in mandibular length by 4 mm (Co-Gn = 94 mm) [Table I]. It was found that there was almost no change in the position of lower incisors (IMPA = 107°) [Table I]. The occlusion was not settled for which fixed orthodontic therapy (Phase 2) was planned.

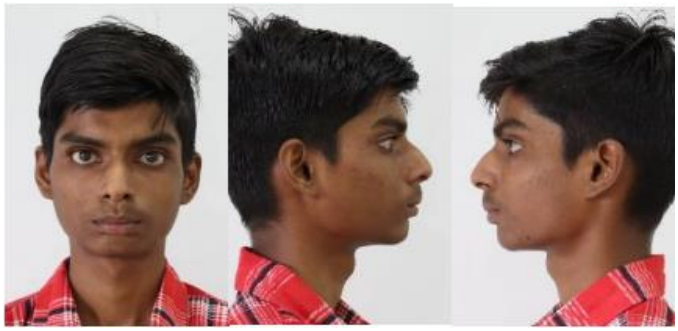


Fig 4: Photographs and lateral cephalogram after completion of phase.

Table 1: Pre and Post treatment cephalometric analysis.

Cephalometric values	PRE	POST FUNCTIONAL
SNA(Degree)	86	86
SNB(Degree)	77	80
ANB(Degree)	9	6
WITS	7	5
IMPA(Degree)	107	107
FMA	18	19
Maxillary base (Co-pt A)	81	81
Mandibular base	90	94

Clark's Twin Block is a functional appliance that alters the occlusal inclination plane in a way that causes favourably directed occlusal force by moving the mandible [3,4]. The patient experiences less discomfort and can wear the appliance full time and also allows masticatory function. Many studies have documented that twin block appliance produce significant skeletal as well as dentoalveolar changes which together causes correction of Class II malocclusion [5,6]. Besides skeletal base changes, influence on overjet, palatal tipping of maxillary, and labial tipping of mandibular incisors are also observed.

The lower incisor proclination limits the forward displacement of mandible, thereby reducing the envelope of skeletal correction [7]. Therefore, a technique that control the position of lower incisors was required to maximise the range of orthopaedic correction in twin-block treatment.

Though there were clinically effective changes with Clark's twin block, patient's compliance still remained a significant issue. As a result, when compliance is an essential consideration for any growth modification therapy, the fixed form of the twin block design was successfully employed to treat Class II malocclusion in patients who reported for treatment at the peak of or close to the end of the pubertal growth spurt.

We devised a method to control lower incisor position by avoiding any contact so there's minimal force on teeth to procline them. In the present case, we achieved class I

canine and molar relationships at the end of phase 1 treatment. However, this should be followed by fixed orthodontic mechanotherapy to achieve final settling of the occlusion.

Conclusion

The use of the modified fixed twin-block appliance therapy can provide maximum control over the position of lower incisors and continuous orthopaedic forces, thereby expanding the envelope for ortho paedic cor rection in class II myofunctional therapy. This should be followed by fixed orthodontic treatment for proper finishing and settling of occlusion. This type of appliance is extremely helpful and recommended in cases of significantly proclined lower incisors where the greatest amount of orthopaedic treatment is desired.

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