

Management of Class II Division 1 Malocclusion in a Growing Patient Using Twin Block Appliance: A Case Report

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Abstract: *Twin block therapy is highly effective in patients with remaining growth potential. However, its successful use is confounded by many patients related factors such as age, gender, compliance of the patient and other miscellaneous criteria's. If treated within time, growth modification and orthopedics can harness suitable forces to cause skeletal correction of the malocclusion. The appliance is highly successful in a patient with retruded mandible and presenting with a positive visual treatment objective. This paper discusses a case of 10-year-old female patient with characteristic twin block appliance indication in which successful skeletal modification was achieved.*

Keywords: Class 2 malocclusion, Twin block, Myofunctional therapy, Growing patient, Mandibular retrognathism

1. Introduction

“Catch them young and watch them grow”. The age specific, pediatric dental practice enables the practitioner to predict and intercept a developing malocclusion and guide it towards normal occlusion that is stable, functional and esthetically pleasing. Pediatric dentistry adapts treatment approaches to harness the natural growth phases of children's developing jaws and teeth. These modifications are crucial for early prevention, correction, and minimizing future complex dental issues. Enhancing looks and confidence of an adolescent. A malocclusion is an occlusion that deviates from the normal occlusion in one or more of the following ways: the relationship between the maxillary and mandibular arches is aberrant in one or more of the planes, or the location, number, form, or developmental position of the teeth is abnormal.¹ The development of malocclusion can be caused by various etiological factors such as genetics, environmental factors, or a combination of both, as well as several local variables like poor or destructive oral habits.²

According to the report, 12.5% is the overall prevalence of malocclusion. A severe malocclusion that required treatment would be ideal and recommended was recorded in 3.1%.³ Malocclusion can be categorized in several ways in the sagittal plane based on the relation of maxilla to mandible. Class I is when both maxilla and mandible are orthognathic. Class II when Maxilla is prognathic, mandible is retrognathic or a combination of both. Class III is when the maxilla is retrognathic and mandible is prognathic or a combination of both.

Globally, the average prevalence of skeletal class II malocclusion is about 19.56%, with notable variation.⁴ Among individuals with skeletal class II malocclusion, a retrognathic mandible with an orthognathic (normally positioned) maxilla is the most prevalent pattern. Approximately 68% of skeletal class II malocclusion cases are due to a retrusive (retrognathic) mandible with a normal (orthognathic) maxilla.⁵ When intervened at active pubertal

growth phase, skeletal class II malocclusion with retognathic mandible can be corrected using myofunctional appliance.

Using natural forces, a functional device delivers them in a specified direction to the alveolar bone and teeth. Several intraoral appliances, known as "myofunctional appliances," rely on the orofacial musculature's intrinsic forces to function. These appliances have been used in orthodontics for a long time and often. They are typically passive and detachable. Instead of using active forces, they either transmit, eliminate, or direct the orofacial musculature's inherent forces to repair the dentofacial structures' abnormal growth and function. They are primarily considered for modifying development in Class II division 1 and skeletal Class III disorders.⁶ Many functional and orthopedic appliances are available for repairing Class II skeletal and occlusal disharmonies, including Herbst appliances, Bionator 1-3, and fixed FR-2 of Fränkel.⁷ One aspect common to these appliances is that they are single unit appliances and hinder functions of speech and mastication.

One of them was created by William J. Clark in Fife, Scotland, and has amassed a great deal of fame over the previous 10 years. Due to its efficiency and, most crucially, patients' compliance, the twin block myofunctional appliance is frequently utilized in orthodontics. The ideal appliance for treating Class II malocclusions has acrylic mandibular and maxillary plates with bite blocks that move the mandible forward when the mouth is closed. To promote higher growth at the condylar cartilage, the primary objective of mandibular extension is implemented.⁸ The main objective for seeking orthodontic intervention in cases of Class II malocclusions is often related to esthetic improvements. Nevertheless, in situations where the malocclusion has a skeletal basis, the available treatment choices may be influenced by the age of the patient.⁹

The following case is of a 10-year-old female patient with Class II division 1 malocclusion, and its correction with the

help of a twin block myofunctional appliance followed by fixed orthodontic treatment.

2. Case Presentation

A 10-year-old female patient reported to the department with the complaint of forwardly placed upper front teeth since 2 years. The parent reported seeking treatment from a private clinic and discontinuing it after not seeing results and not being comfortable with the appliance. No H/o parents, sibling or anyone else in the family having a similar condition. No relevant medical history, drug allergy, habit history. On extraoral examination, no gross asymmetry is seen, has a mesocephalic head, euryprosopic facial form, convex facial profile, posterior divergence, everted lips with lip trap, deep mentolabial sulcus, short lower third of face seen. (Figure1a&b). Visual treatment objective (VTO) was positive.



Figure 1 (a)

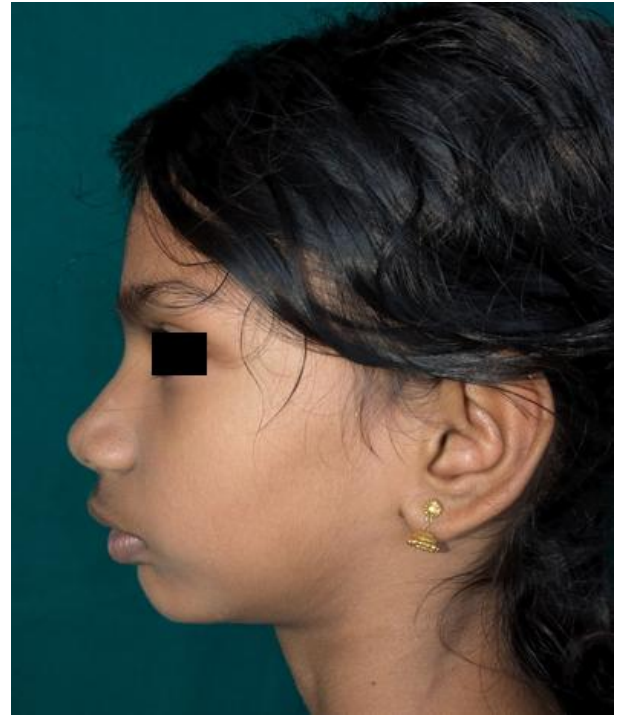


Figure 1 (b)



Figure 2 (a)



Figure 2 (b)



Figure 2 (c)



Figure 2 (d)



Figure 2 (f)



Figure 2 (e)

Molar relationship was end on both the sides. It showed a class II molar and canine relation, increased overjet, overbite, the deep Spee curve, and minor crowding in the upper and lower anterior on intraoral examination (Figures 2a-f).

The cephalometric analysis showed orthognathic maxilla, retrognathic mandible, horizontal growth pattern and reduced height of lower third of face (Table 1). The patient was diagnosed with class 2 molar relationship superimposed on a class 2 skeletal base with increased overjet and overbite.

The treatment objective was to attain a Class I canine and molar relation with functional occlusion to achieve a straight profile and have a normal overjet and overbite. Correct scissors bite irt 14-44 and 24-34.

The aim also included maintaining the axial inclination of the lateral incisor to increase stability, starting with the appliance for attaining normal overjet and overbite. The appliance used for mandibular advancement was the Clark's twin block. Ideally, a 6:4 ratio is followed for the fabrication of a twin block appliance in which 6 mm is sagittal advancement and 4 mm is vertical opening. The appliance is designed to create changes in the bite in both the sagittal and vertical

dimensions, featuring a 7 mm sagittal advancement and a 5 mm vertical opening.

Table 1

MEASUREMENT	OBSERVED VALUE	MEAN VALUE	INFERENCE
SNA	90	82	Prognathic maxilla
SNB	76	80	Retrognathic mandible
ANB	14	2	Class 2 skeletal base
Mandibular plane angle	28	32	Horizontal growth pattern
Occlusal plane angle	20	14	
I to A mm	8	4	Proclined upper incisors
I to A angle	35	22	Proclined upper incisors
I to B mm	4	4	Orthoclinal lower incisors
I to B angle	24	25	Orthoclinal lower incisors
Inter incisal angle	115	131	Class 2 incisor relationship
N $\perp$ to point A	5	0 $\pm$ 2	Prognathic maxilla
N $\perp$ to pogonion	-6	0 TO -4	Retrognathic mandible
Facial axis angle	-7	0	Anticlockwise rotation of mandible
Mandibular plane angle	30	26 $\pm$ 4	
Effective maxillary length	90	85 $\pm$ 2.3	Excess maxilla
Effective mandibular length	101	106.1 $\pm$ 3.4	Deficient mandible
Maxillomandibular differential	11	21.1 $\pm$ 2.7	
Lower anterior face height	50	60 $\pm$ 2.9	Reduced lower facial height
Incisor to Point A	8	4mm	Proclined upper Incisors
I to APO line distance	1	1-2mm	Orthoclinal lower incisors
Nasolabial angle	85	90-110	Pragnathic maxilla



Figure 3 (a)

**Figure 3 (b)**

Myofunctional therapy resulted in achieving a Class I molar and canine relationship, overjet of 2mm, overbite of 3mm (Figure 6a-f).

**Figure 3 (c)****Figure 3 (d)****Figure 3 (e)****Figure 3 (f)**

Extraoral photographs of the patient after the use of myofunctional therapy with improvement in profile and facial proportions are shown in (Figure 4a&b).

**Figure 4 (a)****Figure 4 (b)**

Since minor tooth movements and finishing are not possible with the help of a functional appliance, the case was referred for fixed mechanotherapy and the lower and upper arches were bonded using 0.022" slot MBT brackets.

3. Discussion

Based on the patient's age, growth, and skeletal maturity, there are several ways to treat Class II division 1 malocclusion. The most common treatment approach is functional appliance therapy.¹¹ Dr. William Clark developed the twin block, a two-piece device designed to correct the mandible's occlusion relation. The primary advantage of the twin block appliance over other functional appliances is that it can be worn 24 hours a day, and the masticatory force assists in repositioning the mandible forward. After the mandibular advancement is complete, an anterior inclined plane is placed for retention, and it is retained until the posterior occlusion stabilizes. Twin block functional appliances offer several well-known benefits, are well received by the patients, and can be used in both permanent and mixed dentition. They are also easy to maintain. However, two potential drawbacks of the twin block appliance are the advancement of a posterior open bite and the proclination of the mandibular incisors. In this case, the patient's excellent compliance was crucial to achieving therapeutic goals, and the patient's confidence has grown due to the functional appliance's ability to reduce overjet and the decreased risk of trauma to the upper incisors¹².

In 1973, Harvold described histological changes related to this type of treatment¹⁴, while in 1980, McNamara reported immediate changes in neuromuscular proprioceptive response¹⁵. Modification of the appliance design without arch expansion was used since the patient had scissors bite and expansion was not necessary. Delta clasps were replaced with adams clasp for additional retention. Additionally, acrylic was added to the upper labial bow of the twin block to enhance retention, and the appliance also includes a ball clasp for retention on the lower arch. If lateral arch development is necessary, expansion screws can be placed in either the upper or lower arch. The twin block appliance, commonly used in orthodontics to correct Class II malocclusions, comes in various modifications and adaptations to provide specific patient needs and treatment objectives.

4. Conclusions

The twin block is a full-time wear appliance that corrects the maxillomandibular relationship by promoting functional repositioning of the mandible. It modifies the occlusal inclined plane and guides the mandible forward into the correct occlusion. The upper and lower bite blocks interlock at a 70° angle. Twin block functional appliances primarily have dentoalveolar effects with minor skeletal components. They benefit from the functional forces acting on the dentition, which simplifies the subsequent stage of fixed appliance orthodontics. In the discussed case, an 11-year-old patient was treated with a twin block appliance before the fixed appliance orthodontic phase. This case study illustrates the influence of the appliance's design.

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