



Case Report

Esthetic myofunctional intervention for mandibular retrognathia in skeletal Class II: A case report

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Abstract

A 13-year-old male patient presenting with a developing Class II Division 1 malocclusion, characterized by a retrognathic mandible, average growth pattern, convex facial profile, posterior divergence, negative lip step, and a favorable visual treatment objective, was identified to be at cervical vertebral maturation stage 3 (CVMI). The patient was planned for treatment using an esthetic version of the conventional twin block appliance.

Although various myofunctional devices such as Activators, Bionators, and Frankel appliances are available, the twin block—comprising two separate blocks—is often the preferred choice due to its ease of fabrication and simple design when compared with other options.

A significant challenge in treating growing children with skeletal Class II discrepancies is maintaining consistent appliance usage. The modified twin block described in this case replaces traditional wire elements like delta clasps and labial bows with Essix-based thermoformed sheets that provide full tooth coverage. This design is intended to enhance patient comfort and promote longer appliance usage. In summary, with careful case planning and precise implementation, the esthetic twin block can effectively address Class II Division 1 malocclusions in growing patients.

Keywords: Class II malocclusion, Growing patients, Twinblock, Esthetic twinblock

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1. Introduction

A Class II malocclusion may be accompanied by an anteroposterior skeletal discrepancy between the maxilla and mandible, often with mandibular retrusion. Enhancing mandibular growth should be the main objective of treatment, as this is the intent of the numerous myofunctional appliances. Twin blocks are bite-blocks that effectively modify the occlusal inclined plane to induce favorably directed occlusal forces by causing a functional mandibular displacement. In comparison to other functional appliances, occlusal inclined planes give greater freedom of movement in anterior and lateral excursion and cause less interference with normal function. The functional mechanism is very similar to the natural dentition.¹

Patients often report that twin block appliances are the most comfortable among functional devices. Despite being removable, these appliances typically result in quick and noticeable facial improvements, which in turn boosts patient motivation and compliance.^{2,3}

The most favorable period to begin Twin Block Therapy for correcting Class II malocclusion is typically around the peak of pubertal growth. Initiating treatment during this phase offers several key skeletal benefits:

1. Enhanced skeletal involvement in correcting the molar relationship.
2. A notable increase in overall mandibular length and the height of the ramus.
3. Continued posterior growth of the condyles, which facilitates further mandibular development by minimizing anterior condylar displacement and allowing better mandibular remodeling.⁴

Clear aligners have been recognized for their aesthetic appeal and shorter production times. Building on these benefits, the updated version of the appliance—known as the “clear twin block”—retains all the functional strengths of the original twin block while offering several additional improvements. Unlike traditional models, the clear twin block eliminates visible wire

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components from the front of the teeth, enhancing its visual appeal. Comfort and appearance are critical to treatment success, as they directly impact the patient's willingness to wear the appliance consistently. Traditional wire parts, such as delta clasps and labial bow loops, can cause irritation or sores in the soft tissues, discouraging consistent use. The wire-free design of the clear twin block significantly reduces such issues, providing a more comfortable experience, especially for younger patients.⁵

This case report highlights the successful application of the clear twin block approach in managing skeletal Class II malocclusion in a growing patient

2. Case Description

A 13-year-old male patient presented with a skeletal Class II jaw discrepancy, primarily due to a retruded mandible. **(Table 1)** and **(Figure 1)** The patient demonstrated an average growth pattern, an overjet of 10 mm, and an overbite measuring 5 mm. **(Figure 2)** Additional clinical observations included a pronounced mentolabial sulcus, hyperactivity of the mentalis muscle, a lip trap, and signs of potential lip incompetence, alongside a positive visual treatment objective (VTO) as seen in **(Figure 4)**. Cephalometric evaluation

(Table 1) confirmed a diagnosis of Class II Division 1 malocclusion with a skeletal Class II base caused by mandibular underdevelopment, along with a normodivergent growth pattern. Dentoalveolar assessment revealed that the lower incisors were proclined. **(Figure 3)**

Table 1: Pretreatment cephalometric analysis

Parameters	Range	Pre -Tx	Inference
SNA angle	82°	80°	Orthognathic maxilla
SNB angle	80°	74°	Retrognathic mandible
ANB angle	2°	+6°	Skeletal class II malocclusion
Go-Gn to SN	32°	30°	Average growth pattern
FMA	25°	24°	Average growth pattern
Jarabak ratio	62–65%	63%	Average growth pattern
Yen angle	117–123	114°	Skeletal class II malocclusion
W angle	51–56°	45°	Skeletal class II malocclusion
Beta angle	27–35°	16°	Skeletal class II malocclusion
IMPA	90°	93°	Proclined lower incisors



Figure 1: Pretreatment extraoral photographs



Figure 2: Pretreatment intraoral photographs

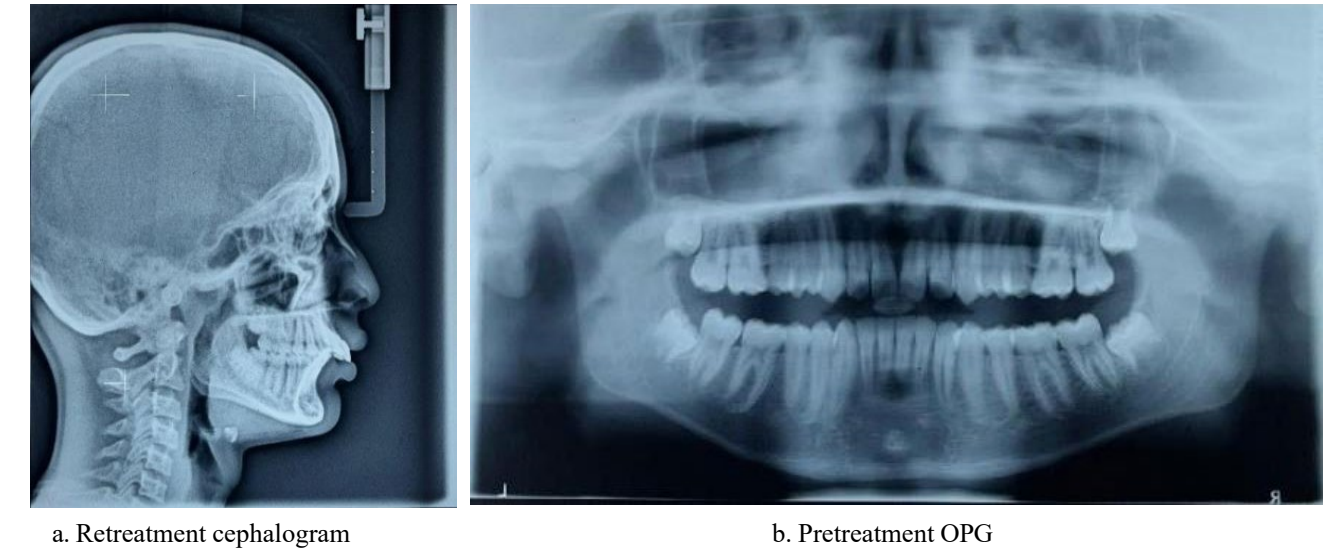


Figure 3: Pretreatment radiographs



Figure 4: Positive visual treatment objective

2.1. Treatment plan

- A two-stage treatment approach was advised, consisting of:
1. The use of a myofunctional appliance to address the skeletal Class II discrepancy.
 2. Follow-up with fixed orthodontic treatment to refine and finalize the occlusal alignment.

2.2. Treatment alternative

Alternative options to the proposed treatment plan included the following:

1. **Camouflage therapy**, which involved extracting teeth 14 and 24.
2. **Orthognathic surgery**, specifically bilateral sagittal split osteotomy (BSSO) with mandibular advancement, to be considered once the patient reaches 18 years of age.

Following a detailed review of the initial diagnostic records, a list of clinical problems was compiled (**Table 2**), and specific treatment goals were formulated (**Table 3**). In line with the two-phase treatment strategy, priority was given

to initiating the first phase. Informed consent was obtained from the patient’s parents after thoroughly discussing the treatment plan and procedure with both the child and the guardians.

Table 2: Problem list

Skeletal problems	Dental problems	Soft tissue problems
Class II discrepancy between the maxilla and mandible	Pronounced overjet (10mm)	Overactive mentalis muscle
Mandibular retrusion	Deep anterior bite	Presence of a lip trap

Table 3: Treatment objectives

Skeletal objectives	Dental objectives	Soft tissue objectives
Achieve Class I skeletal relationship	Reduce excessive overjet (10 mm)	Normalize mentalis muscle activity
Stimulate mandibular growth to address retrusion	Resolve deep bite in the anterior region	Eliminate lip muscle overactivity

2.3. Treatment summary

The following clinical and laboratory steps were carried out for fabricating and delivering the appliance.

2.3.1 Appliance fabrication

Essix sheets were thermoformed and adapted separately to the maxillary and mandibular models. The bite registration, recorded on the working casts, was transferred to an articulator. (**Figure 5**) These thermoformed sheets were then positioned on the upper and lower dental models. Occlusal inclined planes were constructed using clear acrylic material, set at a 70° angle.



Figure 5: Fabrication of esthetic twinblock

2.3.2. Treatment progress

ActivePhase The bite was registered with the mandible positioned forward, and a twin block appliance was custom-fabricated for the patient. **(Figure 6)** The esthetic twin block facilitated mandibular advancement, effectively decreasing the excessive overjet and overbite. Within a few days of appliance placement, a tension zone developed behind the condyles, eventually triggering a pterygoid muscle response observed around three months post-insertion. By the conclusion of the active phase, there was a noticeable enhancement in the facial profile, and both incisor and molar relationships were successfully corrected. **(Figure 7a)**, **(Figure 7b)** However, due to the presence of bite blocks, an open bite was observed in the premolar area after the anterior and posterior corrections were completed.



Figure 6: Intra oral photographs with esthetic twinblock



Figure 7a: Post twin block extraoral photographs



Figure 7b: Post twin block intraoral photographs

2.3.3. Supportive phase

In this stage, the corrected alignment of the anterior and molar teeth was preserved until the buccal segment occlusion was properly established.

2.3.4. Retention phase

To maintain the achieved correction of the skeletal Class II malocclusion, a Hawley's appliance incorporating an anterior inclined plane was used.

2.4. Bonding

Fixed orthodontic appliances were bonded using brackets with a $0.022'' \times 0.028''$ slot as per the MBT prescription. **(Figure 8)**



Figure 8: Bonding with 0.022×0.028 MBT slot

3. Treatment Outcome

Upon completion of the treatment, a stable occlusion was achieved, characterized by bilateral Class I canine relationships and an overjet and overbite of 2mm each. Following mandibular advancement, dental alignment was refined using fixed orthodontic appliances with MBT brackets ($0.022'' \times 0.028''$ slot). **(Figure 9)** Changes in the patient's facial profile after treatment are depicted in **(Figure 10)**. The post-treatment cephalogram is presented in **(Figure 11)**, and corresponding cephalometric values are listed in **(Table 4)**. Superimposition of pre- and post-treatment lateral cephalometric radiographs is shown in **(Figure 12)**.



Figure 9: Post treatment intraoral photographs



Figure 10: Post treatment extraoral photographs



a. Posttreatment cephalogram b. Posttreatment OPG

Figure 11: Post treatment radiographs

Table 4: Post treatment cephalometric analysis

Parameters	Range	Pre -Tx	Inference
SNA angle	82°	80°	Orthognathic maxilla
SNB angle	80°	78°	Average
ANB angle	2°	2°	Skeletal class I malocclusion
Go-Gn to SN	32°	30°	Average growth pattern
FMA	25°	25°	Average growth pattern
Jarabak ratio	62–65%	63%	Average growth pattern
Yen angle	117–123	1180	Skeletal class I malocclusion
W angle	51–56°	510	Skeletal class I malocclusion
Beta angle	27–35°	310	Skeletal class I malocclusion
IMPA	90°	980	Proclined lower incisors

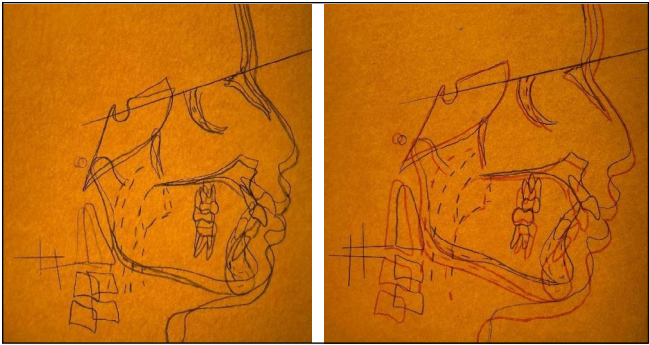


Figure 12: Superimpositions

4. Discussion

Class II Division 1 malocclusion can be addressed using various treatment modalities depending on the patient’s age, growth phase, and level of skeletal development. Among these, functional appliances are commonly employed, especially for managing mandibular retrusion.⁶ According to Baccetti and McNamara, the ideal timing for initiating dentofacial orthopedic therapy lies within CVMI stages 3 and 4.^{4,7}

The twin block appliance, designed by Dr. William Clark, consists of two bite blocks that modify the occlusal inclined plane to generate favorable forces, promoting functional mandibular repositioning. Its main advantages over other appliances include continuous wearability, patient comfort, and ease of use. Following mandibular advancement, an anterior inclined plane is often used to maintain results until the posterior occlusion becomes stable.^{1,8}

Twin blocks can be utilized in both mixed and permanent dentitions and are relatively easy to manage. Compared to appliances like the Frankel, Activator, and Bionator, the twin block uses fewer wire components, making it a preferred option for many clinicians. However, some patients still struggle with compliance due to esthetic concerns.

To improve patient adherence, a less visible, lightweight appliance without wire components is ideal. The “clear twin block” addresses these issues by eliminating labial wires, enhancing aesthetics and comfort—particularly for younger patients. This appliance also reduces chairside adjustment time and simplifies fabrication, as it eliminates the need for wire bending.

One limitation of traditional twin blocks and other functional devices is their inability to control the inclination of lower anterior teeth. In contrast, the clear version offers full crown coverage, which helps manage tooth position while ensuring stable retention. Its design engages more teeth, which enhances retention even in cases of missing or exfoliated teeth.⁹

Studies evaluating the effectiveness of the esthetic twin block (ETB) in correcting Class II malocclusion in growing individuals found significant improvements. Unlike the conventional twin block (CTB), which showed 51% skeletal

and 49% dental effects, ETB produced 81% skeletal and only 19% dental changes. It also demonstrated superior control of lower incisors. Moreover, ETB was rated higher in terms of functionality and appearance, while CTB was associated with greater discomfort and speech issues. As a result, the ETB is recommended over the CTB for mandibular advancement in growing patients with Class II malocclusion.¹⁰

5. Conclusion

Current case report highlights the efficacious management of skeletal class II in a growing adolescent with mandibular retrognathism through esthetic twinblock. This case report concludes elimination of the wire framework helped improve the wear of the appliance by the patient and produced satisfactory results which are stable.

6. Source of Funding

None.

7. Conflict of Interest

Nil

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