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Early Orthodontic Intervention Using Twin Block Appliance Combined with Lip Bumper for Jaw Alignment and Dental Development

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Abstract: ***Class II malocclusion associated with mandibular retrusion and hyperactive perioral musculature can adversely affect facial esthetics, oral function, and occlusal development in growing patients. Early orthopaedic correction during active growth offers the opportunity to modify skeletal relationships and achieve stable functional outcomes. This case report describes the management of a 9-year-old boy presenting with increased overjet, incompetent lips, vertical growth pattern, and hypermentalis activity. Treatment involved construction of a Twin Block with a lip bumper to relieve lower lip pressure and enhance neuromuscular balance. Progressive wear resulted in overjet reduction, improvement in lip competence, soft-tissue relaxation in the chin region, and establishment of a Class I occlusion.***

Keywords: twin block, lip bumper class ii malocclusion, functional appliance

1. Introduction

Functional appliances are orthodontic devices that utilize forces generated by the orofacial musculature to bring about desirable dental and skeletal changes. These appliances are designed to posture the mandible in a forward position and have demonstrated effectiveness in improving skeletal relationships, enhancing quality of life, and positively influencing respiratory parameters when used during periods of active growth.

Class II malocclusion is among the most commonly encountered skeletal discrepancies in growing patients and is more frequently associated with mandibular retrusion rather than maxillary prognathism. Early orthopaedic intervention during the growth phase is aimed at correcting the underlying skeletal imbalance, improving facial esthetics, and minimizing the severity of malocclusion in later stages of development. In this context, functional appliances play a pivotal role by harnessing residual growth potential to encourage mandibular advancement and facilitate neuromuscular adaptation.

The Twin Block appliance, introduced by Clark, is one of the most widely accepted removable functional appliances for the management of Class II malocclusion. It consists of separate maxillary and mandibular acrylic plates incorporating occlusal bite blocks that guide the mandible into a forward position in a comfortable and efficient manner. Unlike monoblock appliances, the Twin Block design permits greater freedom of mandibular movement, which contributes to improved patient comfort, compliance, and functional wear.

Mandibular advancement achieved with the Twin Block appliance induces favorable skeletal, dental, and soft tissue changes, including increased mandibular length, reduction in overjet, and enhancement of facial profile. Its adaptability, ease of adjustment, and compatibility with subsequent fixed appliance therapy make it particularly suitable for use during the mixed and early permanent dentition stages. Therefore, the Twin Block appliance continues to be regarded as a cornerstone modality in growth modification therapy for the correction of Class II malocclusion.

2. Case Description

A 9-year-old boy reported to the Department of Pedodontics and Preventive Dentistry with the chief complaint of forwardly placed upper front teeth. Extraoral examination revealed incompetent lips with pronounced hyperactivity of the mentalis muscle, a vertical growth pattern and with deep mentolabial sulcus. Intraor al examination showed proclined maxillary incisors, an increased overjet of 10 mm, and an overbite of 2 mm. The molar relationship was consistent with a Class II malocclusion. Additionally, root stumps were present with respect to teeth 65 and 75. Considering the patient's age, growth status, and skeletal discrepancy, functional orthopaedic intervention was planned. Bite registration was recorded at 6 mm advancement, and treatment plan was initiated using a Twin Block appliance combined with a lip bumper to correct the Class II relationship and reduce the excessive overjet while addressing the perioral muscular imbalance.

Preoperative Pictures

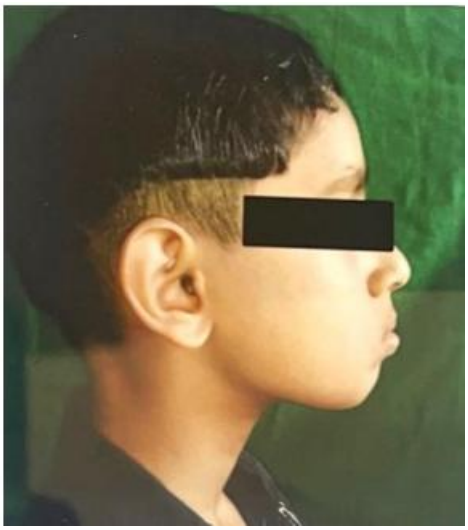

Pretreatment Cephalometric Analysis

Parameters	Range	Pre-Tx	Inference
SNA angle	82°	82°	Protruded maxilla
SNB angle	80°	75°	Retruded mandible
ANB angle	2°	7°	Skeletal class II
Go-Gn to SN	32°	39°	Vertical growth
I to N-A(mm)	4mm	12mm	Protruded maxillary incisors
To N-A(angle)	22°	42°	Proclined maxillary incisors
I to N-B(mm)	4mm	8mm	Protruded mandibular incisors
I to N-B(angle)	25°	37°	Proclined mandibular incisors
I to I(angle)	131°	116°	Class II
Occl. To S-N (angle)	14°	18°	Vertical growth

Treatment Objectives

1) Correction of skeletal class II maxillomandibular relationship.
2) Correction of retrognathic mandible by mandibular advancement.
3) Correction of increased overjet (10 mm)
4) Correction of hyperactive mentalis muscle.

PREOPERATIVE VTO


Treatment Summary

A comprehensive treatment plan was formulated, which included myofunctional appliance therapy to correct the skeletal Class II malocclusion. Extractions were performed in relation to teeth 65 and 75 to assist in achieving appropriate dental alignment. Glass ionomer cement restorations were completed on teeth 83 and 64, and pulp therapy was provided for tooth 53. A twin-block functional appliance incorporating a lip bumper was then delivered to facilitate correction of the Class II skeletal discrepancy and to reduce hyperactivity of the mentalis musculature.

A construction bite was recorded with the mandible advanced by 6 mm in the sagittal plane and the vertical dimension increased by 4 mm, ensuring that the combined displacement remained within the acceptable clinical limit for mandibular repositioning. Care was taken when trimming the upper bite plates. Some acrylic was removed from the occlusal inclined plane in the upper arch to make space for the eruption of teeth **25** and **35**. The appliance was then given to the patient to wear during both the day and night.

Problems & Correction Using Twin Block with Lip Bumper

Clinical Problem	Associated Issues	Correction with Twin Block	Role of Lip Bumper
Mandibular retrusion (Skeletal Class II)	Convex profile, increased overjet, compromised facial esthetics	Mandibular advancement through forward posturing	Eliminates perioral muscular pressure.
Increased overjet	Risk of trauma to maxillary incisors, speech difficulty	Encourages mandibular growth remodeling	Reduces lip pressure on incisors
Incompetent lips	Mouth breathing, dryness, poor oral seal	Improves mandibular projection improving lip contact	Retrains lower lip musculature
Deep mentolabial fold	Facial strain, esthetic concern	Forward mandibular positioning relaxes chin region	Decreases lower lip tension
Vertical growth tendency	Increased lower facial height	Controls mandibular rotation during advancement	Prevents incisor flaring
Abnormal perioral muscle activity	Oral habit persistence & relapse risk	Improves neuromuscular balance	Acts as myofunctional training aid
Reduced masticatory efficiency	Poor occlusal function	Establishes Class I occlusion	Supports arch coordination

3. Treatment Progress

Clinical Timeline

- Initiation (0-6 months): Bite registration at 6 mm advancement; full-time wear initiated post-extractions/restorations, with early overjet reduction and arch expansion.
- Mid-phase (6-12 months): Mandibular repositioning progressed, mentalis hyperactivity decreased, and profile softened as lower lip adapted.
- Completion (12-18 months): Achieved Class I occlusion, overjet correction, and stable lip posture; appliances removed for potential fixed phase

The Twin Block featured separate acrylic blocks guiding forward posture, trimmed to allow eruption of teeth 25 and 35, worn full-time for compliance. The lip bumper, attached to lower molar bands, relieved lip/cheek pressure, expanded the mandibular arch by 2-4 mm, distalized molars, and reduced mentalis strain, resolving initial puckering within 1-2 weeks. Combined therapy prevented Class II relapse, improved soft tissue balance.

Post Operative Pictures

4. Discussion

A lip bumper eases pressure from lips and cheeks, letting the tongue gently push the lower arch wider (by 2-4 mm), tip molars back, and create space for new teeth- great for children 8-12 in mixed dentition with crowding, excess overjet, or lip-sucking habits. It pushes the lower lip forward, cutting strain on the chin muscles (which causes initial puckering that fades in 1-2 weeks as teeth straighten). Use a swallow test- sip water and watch for lip puckering or chin dimpling- to spot related tongue thrust issues. Paired with a twin block (which advances the jaw via bite blocks to cut overjet by 4-6 mm and boost growth), it relaxes lip muscles, widens the arch, and supports better bite stability without pulling teeth.

5. Conclusion

Twin Block combined with a lip bumper effectively corrects Class II malocclusion by promoting mandibular advancement and enhancing lip posture. This combination stimulates skeletal growth, reduces overjet and overbite, and improves facial esthetics through dentoalveolar changes like lower incisor proclination and maxillary molar distalization.

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