

# Early Orthopaedic Intervention with Skeletal Class III Malocclusion Using Reverse Twin Block and Chin Cup: A Case Report

Savitha Sathyaprasad<sup>1</sup>, Amitha L.<sup>2</sup>

<sup>1</sup>MDS, PhD Faimer, Head of the Department, Department of Pediatric and Preventive Dentistry, KVG Dental College and Hospital, Sullia, Karnataka, India

<sup>2</sup>Post Graduate Student, Department of Pediatric and Preventive Dentistry, KVG Dental College and hospital, Sullia, Karnataka, India

**Abstract:** *This case report describes the early orthopaedic treatment of a 9-year-old male patient with skeletal Class III malocclusion due to mandibular prognathism. Treatment consisted of a reverse twin block appliance combined with chin cup therapy. After 3 months of active treatment, significant skeletal and dental improvements were achieved, including positive overjet and overbite, edge-to-edge molar occlusion, and a more harmonious facial profile. This case highlights the effectiveness of early intervention in modifying skeletal growth and minimising the need for future surgical treatment.*

**Keywords:** Class III malocclusion, Reverse twin block, Chin cup

## 1. Introduction

Class III malocclusion in growing individuals poses a significant diagnostic and therapeutic challenge due to its complex aetiology, which may involve skeletal, dental, and functional components. If left untreated, it can lead to facial disharmony, compromised function, and psychosocial concerns. Early orthopaedic intervention during active growth phases can redirect unfavourable skeletal patterns and reduce the need for future surgical correction.

The combined use of reverse twin block and chin cup appliances offers a synergistic approach for modifying maxillofacial growth. While the reverse twin block encourages maxillary advancement and alters mandibular posture, the chin cup applies downward and backwards pressure to control mandibular prognathism. Interceptive

An 9-year-old boy presented to the department of pediatric and preventive dentistry with the chief complaint of irregularly placed teeth and forwardly placed mandible and unsatisfactory aesthetic concerns. (Fig1a) The family history was not suggestive of any genetic predisposition. The medical and dental history was non-contributory.

Orthodontic Treatment is a form of early orthodontic care aimed at correcting developing dental and skeletal problems in children, usually between the ages of 6 and 10, before all permanent teeth have erupted. It's considered Phase I of a two-phase orthodontic treatment. The effectiveness of such interceptive therapy is highly dependent on precise timing, which can be accurately determined using cervical vertebrae maturation (CVM) as a skeletal maturity indicator.

This case report presents the interceptive treatment of a developing skeletal Class III malocclusion in a growing patient, using a combination of reverse twin block and chin cup appliances and underscores the importance of growth assessment in planning early orthopaedic intervention to achieve optimal functional and esthetic outcomes.

## 2. Case Presentation

A concave profile was noticed with an appearance of maxillary growth restriction on extraoral examination (Fig1 a)

Intraoral examination revealed a mixed dentition stage with class 3 malocclusion in relation to the left side and class 1 malocclusion on the right side. (Fig 1 b)



(a)



(b)

**Figure 1(a & b):** (a) Pre-treatment extraoral and (b) intraoral photographs showing class III malocclusion with developing cross bite

### Treatment objectives and plan

The treatment objectives were to

- 1) Correct the skeletal class III relationship and improve the ANB angle ;
- 2) Establish normal overjet and overbite and functional occlusion;

- 3) Improve facial appearance and profile by increasing the vertical dimension of the occlusion; (IV)improve facial appearance and profile

To accomplish these objectives a two phase treatment plan involving reverse twin block accompanied by chin cup was planned (Fig 2).





**Figure 2:** Figure showing appliance delivery

### Treatment progress

Phase I of treatment commenced with the placement of a modified fixed reverse twin block (RTB) appliance in conjunction with a chin cup (Fig. 2). The appliance was designed to correct the skeletal Class III malocclusion by

promoting forward growth of the maxilla and applying downward and backward force to the mandible. The patient was instructed to wear the chin cup for 12–14 hours daily to reinforce orthopaedic correction.

### 3. Results

After 3 months of active treatment (Fig 3), significant improvements were observed. The overjet improved from -2 mm (reverse overjet) to +2 mm, establishing a normal incisal relationship. Bilateral edge-to-edge molar relationships (fig 4) were achieved, contributing to functional occlusal harmony. Cephalometric analysis revealed an improvement in the ANB angle from a negative value to  $+1^\circ$ , indicating

favourable skeletal changes and improved maxillo-mandibular relationship.

Cephalometric superimposition demonstrated forward displacement of the maxilla along with controlled, moderated growth of the mandible. These skeletal modifications contributed to a more balanced facial profile, which showed notable aesthetic enhancement post-treatment.



**Figure 3:** Figure showing extra oral and intra oral pictures after 3 months follow- up

### 4. Discussion

Class III malocclusion is typically characterised by a mesial relationship of the mandible to the maxilla, resulting from maxillary retrusion, mandibular prognathism, or a combination of both. Early orthopaedic intervention during the active growth period is critical in guiding skeletal

development and potentially preventing the need for surgical correction in adulthood <sup>1</sup>.

In the present case, the patient demonstrated a skeletal Class III malocclusion predominantly due to mandibular protrusion, confirmed through cephalometric evaluation. Given the patient's growth potential, a two-phase treatment plan was initiated, beginning with a reverse twin block (RTB)



appliance combined with a chin cup. This functional orthopaedic approach aimed to encourage forward growth of the maxilla while simultaneously restraining excessive mandibular advancement <sup>2</sup>.

The reverse twin block is designed to correct skeletal discrepancies by advancing the maxilla and repositioning the mandible posteriorly. It is most effective when employed during the early mixed dentition stage, as skeletal changes can be more easily achieved during this period of active craniofacial growth <sup>3</sup>. In this case, the RTB successfully corrected the anterior crossbite and improved both overjet and overbite, with cephalometric superimpositions showing forward movement of Point A and an increase in the ANB angle. These outcomes are consistent with previously reported benefits of early functional appliance therapy in mild to moderate Class III cases <sup>4</sup>.

The chin cup, used concurrently with the RTB, provided additional control over mandibular growth. Although its long-term skeletal effects remain a subject of debate, short-term studies have shown that chin cup therapy can produce favourable dentoalveolar and skeletal changes by altering the direction of mandibular growth and reducing anterior chin prominence <sup>5</sup>. In this case, it contributed to the redirection of mandibular growth vertically, thereby assisting in profile improvement.

**Post-treatment cephalometric analysis** revealed several positive outcomes:

- Increased ANB angle, indicating skeletal improvement
- Forward displacement of the maxilla
- Retroclination of the lower incisors contributing to overjet correction
- Enhanced facial convexity and improved vertical proportions

These findings support the effectiveness of combining the RTB with chin cup therapy in managing developing Class III malocclusions, particularly in compliant patients during their growth phase

## 5. Conclusion

This case highlights the importance of early diagnosis and intervention in managing skeletal Class III malocclusion treatment with a reverse twin block and chin cup produced significant improvements in dental and skeletal relationships, enhancing both function and facial esthetics. Growth modification strategies such as these can be highly effective when implemented during the developmental stages, reducing the need for future complex treatment. Interceptive orthopaedic treatment remains a valuable approach in managing young Class III patients with skeletal discrepancies.

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