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Case Report

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CLASS III CORRECTION IN GROWING PATIENTS USING BI-MAXILLARY PLATE: A CASE REPORT

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1. INTRODUCTION

Dentoskeletal Class III malocclusion is considered one of the most challenging problems encountered in orthodontic practice due to the difficulty in obtaining predictable and stable long-term treatment outcomes. the aetiology of this condition is multifactorial, involving complex interactions between genetic determinants and environmental factors that influence craniofacial development.[1,2,3]

Clinically, Class III malocclusion may present as maxillary deficiency, mandibular prognathism, or a combination of both skeletal discrepancies.[1,22] These skeletal imbalances are frequently accompanied by dentoalveolar compensations that may mask the true underlying skeletal relationship and complicate diagnosis and treatment planning.[22,23,2]

Several therapeutic approaches have been described for the management of Class III malocclusion, ranging from early interceptive treatment during the mixed dentition stage to comprehensive orthodontic treatment in the permanent dentition[4,5,6,7] in severe skeletal discrepancies, treatment may involve adjunctive procedures such as extractions, auxiliary appliances, or orthognathic surgery performed after completion of growth.[7,14]

Early treatment has been widely advocated because of its potential functional and aesthetic benefits, although the predictability of long-term stability remains controversial.[8,9,10,11] Interceptive therapy performed during the active growth phase may help establish a more favourable skeletal relationship between the maxilla and mandible and limit the progression of sagittal discrepancies.[12,13]

In addition to skeletal correction, early treatment may offer important psychosocial benefits, including improvement in facial aesthetics, self-esteem, and social confidence among affected children.[8,11] Furthermore, early management of Class III malocclusion may reduce the complexity and duration of orthodontic treatment required in the permanent dentition.[12,13] Even in cases where complete stability is not achieved, early orthopedic intervention may reduce the severity of the skeletal discrepancy and thereby facilitate less extensive orthognathic surgical procedures at the end of growth.[14–16]

Despite these advantages, strong long-term evidence supporting many early treatment modalities for Class III malocclusion remains limited.[17–21] Growing patients with Class III malocclusion commonly exhibit a combination of skeletal imbalance and dentoalveolar compensation.[22-24]

The main objective of early orthopedic intervention is to modify craniofacial growth by stimulating maxillary advancement, controlling mandibular growth, and establishing appropriate anterior occlusal guidance in order to maintain a more favourable intermaxillary relationship during development.[25–27]

Chin-cup therapy has traditionally been recommended for patients presenting with mandibular prognathism.[28] In contrast, mild skeletal discrepancies or pseudo-Class III malocclusions may be effectively managed using less invasive intraoral appliances.[25] One such approach utilizes Hawley-type bimaxillary plates in combination with Class III elastics, with special emphasis placed on controlling the vertical dimension during treatment.[6,3]

Vertical control is particularly important in hyperdivergent Class III patients because vertical growth patterns significantly influence treatment outcomes and long-term prognosis.[6]

Within this context, the **SEC III protocol incorporating a modified bimaxillary plate together with chin-cup therapy** has been proposed as an interceptive treatment approach. The primary objective of this protocol is to achieve sagittal correction of dentoskeletal Class III malocclusion while preventing clockwise mandibular rotation and minimizing excessive dentoalveolar compensation of the incisors.

2. CASE REPORT

A 12-year-old female pateient presented at the Department of Orthodontics and Dentofacial Orthopedics, citing her primary concern as the protruded lower teeth. Patient's father exhibited similar malocclusion, indicating that there was hereditary factor contributing to the patient's condition Upon clinical examination, the patient had a leptoproscopic facial form, mesocephalic head shape with a concave facial profile, anterior divergence with an vertical growth pattern, obtuse-angled nasolabial angle, straight mentolabial sulcus, and a protruded chin. No gross facial asymmetry was noted (Figure 1). The patient had a tongue-thrusting habit, which was diagnosed by placing a small amount of water in the mouth and parting the lips slightly while swallowing to observe the tongue. The tongue moved forcefully forward when water was swallowed.

The patient exhibited a class III molar and canine relation on both sides. Additionally, the patient had edge to edge bite with erupting lower premoars(Figure 2).

Cephalometric evaluation revealed a class III jaw base with orthognathic maxilla and prognathic mandible, and an vertical growth pattern. Both upper and lower incisors were proclined. On panoramic radiograph, lower premolars are erupting, tooth germs of permanent third molars present(Figure 3).

The patient was diagnosed with Angle's class III malocclusion, on a class III skeletal base, bimaxillary proclination, edge to edge bite with an avertical growth pattern and a tongue-thrusting habit.

2.1 Treatment objectives

- To correct edge to edge bite
- To achieve normal incisor axial inclination
- To achieve Class I molar, canine and incisor relation
- To attain optimal alignment of the upper and lower teeth
- To achieve ideal overjet and overbite

2.2 Treatment plan

The objective is to facilitate the correction of the dentoskeletal Class III malocclusion on the sagittal plane, avoiding the clockwise mandibular rotation and minimising incisor compensation. The two removable modified hawleys appliance with hooks on attached to lower labial bow and delta clasp help to eliminate, or at least control, Class III worsening factors such as the anterior interposition and the lower position of the tongue, and the deflecting contacts. Four hooks, two in the upper and two in the lower arch, are symmetrically located on each side of the appliance, distally to the maxillary last molars and between the mandibular canines and lateral incisors.

2.3 Treatment progress

The patients is asked to apply on these hooks the Class III elastics with a force ranging from 5 to 25 ounces (between 150 and 750 grams) per side . Patients are instructed to wear them for a minimum of 16 hours per day and to change them at least twice a week. These elastics allow a forward movement of the maxilla along with the upper arch, and a posterior movement of the mandible with the lower arch. The side effect is the extrusion of the upper molars with a following clockwise mandibular rotation. To avoid this, the chin cup is applied with the force vector passing through the first upper molars. The chin cup is regulated to develop a force ranging from 16 to 32 ounces (between 500 and 800 grams) per side (Fig. 1), and the patient is required to wear it at least 14 hours per day. However, the magnitude of the force is always related to the individual tolerance. Temporary side effects, such as local alopecia and redness or inflammation of the skin around the chin may be accounted, thus the patient's parents should be aware of these possible side effects. The active phase lasts until a positive overjet (2–3 mm) is reached.

During the waiting period for complete transition, patients are asked to wear the chin cup only at bedtime with the aim of maintaining and stabilising the occlusal sagittal correction achieved during the active phase and, above all, to control the mandibular growth. Thus, the chin cup vector has to pass through the condyle delivering a force ranging from 16 to 32 ounces (between 500 and 800 g) per side.

This protocol allows a sagittal dentoskeletal Class III correction associated with a minimum dentoalveolar compensation and with a good vertical control without clockwise mandibular rotation.

2.4 Treatment results

The intraoral photographs showed satisfactory dental alignment, Class I canine relationships, ideal overjet and overbite, and coincident midlines. The radiographic examination (Figure 8) demonstrated eruption of lower premolars.

Upon comparing the cephalometric values after treatment, the mandibular plane angle increased from 35◦ to 39◦. Similarly, 2◦ clockwise rotation was evident in palatal plane and occlusal plane. Upper and lower incisors proclination decreased, and the interincisal angle increased to 116◦.

The patient expressed satisfaction with her smile and facial appearance. The final photographs exhibit commendable lip competence, correction of the open bite, and enhancement of the facial profile (Figure 6). Tooth intercuspation was adequate. A decreased projection of the lips shown by the Ricketts E-line and an increased nasolabial angle observed after treatment.

Table 1: Pre-treatment and post treatment cephalometric values.

Parameter	Pre treatment	Post treatment
SNA	83	84.2
SNB	85	84
ANB	-2	-0.2
SN to GO-GN	35	39
SN to Occlusal plane	15	19
SN to palatal plane	10	12
Upper incisor NA (angular)	38	44
Upper incisor NA (linear)	10 mm	10.6 mm
Lower Incisor to NB (angular)	27	21
Lower Incisor to NB(Linear)	4 mm	4,5 mm
Interincisal angle	110	116.7
IMPA	89	85.7
Saddle angle	132	130
Articular angle	150	145

3. DISCUSSION

These treatment modalities contributed to the achievement of the intended clinical objectives, namely the correction of the negative overjet and the restoration of normal mandibular function, through a combination of skeletal and dentoalveolar adaptations. Evidence derived from high-level systematic reviews and meta-analyses demonstrates that facemask therapy is effective in the management of Class III malocclusion by stimulating anterior displacement of the maxilla and inducing clockwise rotation of the mandible. These orthopedic effects contribute to improvement in the sagittal maxillomandibular relationship, correction of the anterior crossbite, and an increase in lower anterior facial height.[17,19]

Regarding the use of bimaxillary plates (BMPs), a noteworthy finding was the significant forward movement of the maxilla when compared with baseline measurements. This observation suggests that in growing patients with relatively low sutural resistance, the application of lighter orthopedic forces may be capable of producing skeletal effects in the maxilla comparable to those achieved with heavier orthopedic forces.[29,30]

The sagittal position of the mandible relative to the cranial base remained relatively unchanged compared with the initial records, indicating a possible short-term restraining effect on forward mandibular displacement. The establishment of a positive overjet together with the restoration of appropriate anterior guidance may have contributed to this observation,[31] Moreover, it has been proposed that light Class III orthopedic forces may stimulate adaptive remodeling of the glenoid fossa, with bone apposition occurring at the posterior wall, thereby limiting anterior displacement of the mandible.[32,33]

From a dentoalveolar standpoint, the treatment resulted in a significant buccal inclination of the maxillary incisors accompanied by lingual inclination of the mandibular incisors. However, the magnitude of dentoalveolar compensation was considerably greater in the BMP group. This difference may be attributed to the design characteristics of the appliances used. The horseshoe appliance functions as a splint-type appliance that completely covers the maxillary and mandibular dentition, including the occlusal surfaces. In contrast, the BMP appliance leaves both the occlusal and vestibular surfaces of the teeth uncovered, and its retention is mainly provided by clasps connected to the acrylic resin, which may permit greater dentoalveolar movement during treatment.

Figure 1: Pre-treatment extra-oral photographs.

Figure 2: Pre-treatment intro-oral photographs.

Figure 3: Pre-treatment radiographs.

Figure 4: Bimaxillary plate with class III elastics.

Figure 7: Post-treatment extra-oral photographs.

Figure 7: Post-treatment intro-oral photographs.

Figure 8: Post-treatment radiographs.

4. CONCLUSION

The bimaxillary appliance has demonstrated excellent treatment outcomes, successfully achieving the intended goals. BMPs may represent the best choice for those subjects affected by mild form of class III malocclusion, considering the patients' discomfort and treatment acceptance with FMs.

5. Declaration of Patient Consent

The author confirms that all necessary patient consent forms have been obtained. The patient has provided consent for the use of their images and clinical information in the journal. It has been made clear to the patient that their name and initials will not be published, and every effort will be made to maintain their anonymity.

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