

## CASE REPORT

# Correction of Class III Malocclusion with Maxillary Deficiency: A Case Report

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## ABSTRACT

**Introduction:** The developing skeletal Class III malocclusion in a child is one of the most difficult malocclusion to treat, causes being maxillary retrognathism, mandibular prognathism or both.

**Case report:** This article presents a case report of a child with skeletal class III malocclusion, with maxillary deficiency, treated using a Face Mask and intraoral expansion appliance incorporating a jack screw.

**Conclusion:** Reverse pull Headgear or Face Mask along with an intraoral expansion appliance has been found effective for maxillary protraction in the early or late mixed dentition period. Face mask therapy has been shown to improve the horizontal maxillo-mandibular relationship.

**Keywords:** Class III malocclusion, Reverse pull headgear

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## INTRODUCTION

The prevalence of class III malocclusion in Indian population is 3.8%.<sup>1</sup> Ellis and McNamara found that 65% to 67% of all Class III malocclusions were characterized by maxillary retrognathism.<sup>2</sup>

Class III skeletal anomaly is one of the most difficult malocclusions to correct in orthodontics. Class III skeletal malocclusion may result from: maxillary retrognathism,

mandibular prognathism, or combined maxillary retrognathism and mandibular prognathism.<sup>3</sup> These may be due to a deviation in the sagittal relationship of the maxilla and the mandible. The suture morphology and physiology of the maxilla's nine articulators aid in bringing about orthopedic changes when heavy forces are employed.<sup>4</sup>

The preferred treatment for children having skeletal Class III malocclusion with retruded maxilla is the anterior movement of the maxilla where bone is added at the posterior sutures.<sup>5</sup> The commonly used appliance is the Petit type of face mask. Petit<sup>6</sup> facial mask consists of a forehead pad and a chin pad that were connected with a heavy steel rod. An intraoral bonded palatal expansion appliance is usually used in combination with a facemask thus resulting in an anterior movement of the maxilla and downward and backward rotation of the mandible.

Some authors suggest that it is effective only during early mixed dentition, under 8 years<sup>7</sup>, a few others are of the view that it is effective in both age groups up to 12 years, and yet another school of thought consider that it is effective in both age groups in spite of being more significant during early mixed dentition. Some others claimed that it protrudes the maxillary bone under 8 years while only pulls the maxillary teeth forward to compensate for skeletal malocclusion in children above 9 years.

The treatment is usually started with palatal expansion followed by maxillary protraction.<sup>8</sup> Early treatment of Class III malocclusion has been advocated to reduce the need of treatment in the permanent dentition, when camouflage orthodontic treatment or surgery become the only options.<sup>9</sup>

## CASE REPORT

A 9 year old male came to the Department of Pediatric and Preventive Dentistry, KMCT Dental College, Calicut, Kerala, India, with the chief complaint of forwardly placed lower jaw.

Extra-oral examination revealed a slight concave facial profile characterized by maxillary retrusion (figure 1).

Intraoral examination revealed multiple decayed teeth, a dental crossbite in both the anterior and left posterior regions, anterior crossbite with a reverse overjet of  $-2.5$  mm (figure 2). There was no relevant medical history or the history of any habits. Family history revealed that his father has a class III profile.

Cephalometric evaluation gave the values for SNA, SNB and ANB as 78, 79 and  $-1$  respectively, suggestive of maxillary deficiency.

Based on the findings, the treatment plan was to complete the mouth preparation, which included oral prophylaxis and restorations, followed by facemask therapy incorporating an expansion appliance.

The main objectives of the treatment were:

- To direct the maxilla in a downward and forward direction
- To obtain class I canine/molar relation
- To obtain ideal overjet and overbite
- To obtain ideal aesthetics

After obtaining the informed consent, treatment was initiated.

### Appliance design

After basic mouth preparation, expansion appliance with posterior bite plate, incorporating a jack screw in the midline and two metal hooks, made of 19 gauge stainless steel wire, at the gingival level of the canine, was delivered. (Figure 3) The appliance was cemented to the posterior teeth with luting glass ionomer cement. The patient was instructed to give a quarter ( $0.25$ mm) turn every 2 days.

The facemask appliance (petit type) was delivered one week after expansion therapy was initiated (Figure 4). Elastics were worn from horizontal bar 2-3 cm in front of the lips to the intraoral attachments located on the expansion appliance, approximately at the gingival level of the canine. Direction of force vector was about  $15^\circ$  to the occlusal plane. A force of approximately 800gm was applied bilaterally by engaging 0.58" elastics. The patient was recalled every 2 weeks for check up.

Oral hygiene instructions were given. Patient was instructed to wear the facemask for 16 hours per day. Oral prophylaxis was done every 2 months by debonding the appliance and fixing it back again.

### Treatment Results

After duration of six months the results showed:

- Forward and downward movement of the maxilla
- Class I canine relationship
- Overjet - 2 mm / Overbite- 1 mm (figure 5)
- Marked improvement in the esthetics.(figure 6)

The maxilla had moved forward, SNA angle had increased from 78 to 80 and ANB from  $-1$  to 4.

### DISCUSSION

Early correction of a developing Class III malocclusion in a child remains a complex challenge. Treatment planning in class III cases is difficult and primarily influenced by the likelihood of future growth, skeletal discrepancy, amount of the reverse overjet, extent of crowding, and degree of existing dento-alveolar compensation.

The interception and treatment of Class III malocclusion should be done at an early age to prevent the progression of an orthodontic problem to a severe dento-facial anomaly, requiring more complex treatment. Some of the other interceptive approaches include fixed appliances,<sup>10</sup> removable appliances, removable functional appliances, chin cup, protraction headgear, and skeletal anchorage systems.<sup>11</sup>

A protraction mask in conjunction with a maxillary



**Figure-1:** Pretreatment extraoral photograph; **Figure-2:** Pretreatment intraoral photograph



**Figure-3:** Intraoral expansion appliance; **Figure-4:** Patient wearing the Petit type face mask



**Figure-5:** Post treatment intraoral photograph; **Figure-6:** Post treatment extraoral photograph

appliance has been used to correct malocclusions associated with maxillary deficiency and/ or mandibular prognathism.<sup>12</sup> The treatment results produced by this appliance are anterior movement of the maxilla and backward rotation of the mandible. Growth at the circummaxillary sutures has the effect of shifting the maxillary complex downward and forward. These evidences suggest that the face mask should be used in subjects with the tendency to horizontal growth.<sup>13</sup>

The changes brought about by a combination of the facemask / expansion therapy in a young child, are an improvement in the dentofacial complex. This also suggests that an early treatment maybe effective.<sup>14</sup>

In this case correction of reverse overjet, canine relation, a marked improvement in aesthetics were achieved.

#### Conclusion

Face mask with expansion appliance can be best utilized for the correction of prognathic children with deficient maxilla during the mixed dentition period. Correction results from a combination of skeletal and dental change with an overall improvement in the dentofacial complex. In properly selected cases, this modality of treatment can be a successful alternative for future expensive and complicated surgical or fixed orthodontic procedures.

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