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## Case Report

# A case report on growth modification using facemask therapy in management of class III malocclusion in a young patient.

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**ABSTRACT**

**Background:** In a growing patient, orthopaedic treatment of skeletal Class III malocclusion is critical because it can prevent future orthodontic and surgical procedures. Graber's stated that early treatment by growth modification during the eruption of incisors or before the maxillary incisors become locked behind the mandibular counterparts is more advantageous**.**

**Case Description:** This case report describes the treatment of a child aged 10 years with skeletal Class III malocclusion. The treatment plan was carried out with the use of a facemask and the results were highly satisfactory resulting in improved facial esthetics, a skeletal Class I with a Dental Class I molar, and canine relationship, an ideal overjet, and overbite.

**Conclusion:** Thus, growth modification, if done in properly selected cases, alleviates the need for future orthodontic and surgical intervention. The patient is being monitored until the end of growth to ensure the stability of treatment results.

***Key words:*** *Growth modification, orthopedic appliance, facemask therapy, Angle Class III, maxillary deficiency*

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## INTRODUCTION

Class III malocclusion is a form of aesthetic and functional impairment of an individual caused by skeletal or dental discrepancies[1]. Prevalence of Class III is greater in the Asian population compared to Caucasians, ranging between 4% and 13% in Japanese, 7.8–15.2% in Iranians, and between 4% and 14% among Chinese[2,3]. The prevalence of this malocclusion in the Indian population is reported to be about 3.4%[4]. Studies done by Ellis and Mc Namara's found that the most common combination of variables was a retrusive maxilla, protrusive maxillary incisors, retrusive mandibular incisors, protrusive mandible, and a long lower facial height[5]. Since, class III molar relations are the commonest type and it calls for future surgical correction if left untreated. So early intervention by means of growth modification will prevent future need for the treatment. Hence, for orthopaedic growth modification to be considered successful, proper patient selection, a lengthy course of treatment, and long-term follow-up are required. Rapid maxillary expansion (RME) with a facemask to protract the maxilla has evolved over the past two decades into a standard strategy for the early management of cases with maxillary deficiency.[6] This case report presents the use of the above procedure for the successful management of Class III malocclusion with a maxillary deficiency in a 10-year-old patient.

## CASE DESCRIPTION

A 10-year-old girl who was accompanied by her parents came in with a chief complaint of forwardly placed lower jaw (Fig: 1a). There was no significant prenatal, postnatal, or family history. Patient's extraoral examination revealed a concave profile, posterior divergence, a lack of maxillary projection, and a shallow mento labial sulcus (Fig: 1a, b). Her lips were competent, lower lip was ahead of the upper and patient was having an unaesthetic smile. She had an average clinical FMA and an acute nasolabial angle.

**Fig 1** shows Extraoral image of patient
**Fig 1a** - Frontal view **Fig 1b** - Lateral view

On intraoral examination patient was in mixed dentition stage with the reverse overbite of 1mm (Fig: 2c, d), and mild crowding and midline shift was seen in the upper arch towards the left side, proclination of the upper and lower incisor (Fig: 2c,d). The permanent first molars were showing class III relationship on both sides (Fig: 2d, e). Cephalometric analysis (Fig:3) (Table:1) indicated a class III sagittal relationship (ANB= -1mm) with a retrognathic maxilla (SNA= 77˚, N prep to A= -3mm) with orthognathic mandible (SNB= 78˚, Effective mandibular length= 106mm). The patient shows a vertical growing pattern (FMA= 29˚). The upper incisors were moderately proclined (U1-NA = 6 mm and 29°) while the lower incisors showed mild proclination (L1-NB = 5 mm and 33°). Moyer's and Tanaka Johnson's mixed dentition analysis indicated no arch length and tooth size discrepancy. No mandibular deviation on closure or clicking of the TMJ was observed.

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The objectives of the treatment include:

1) To improve the skeletal jaw relationship by increasing the length of the maxilla and protracting the maxilla anteriorly in relation to the cranium
2) To allow adequate space for the eruption of permanent teeth
3) To achieve well-aligned maxillary and mandibular arches with Class I molar and canine relationship
4) To provide an esthetic smile by correcting the vertical discrepancy.


**Fig 2 (a & b)** shows: Intraoral view showing the upper and lower arch

**Fig 2 c** shows-Reverse overbite of 1mm


**Fig 2 d** shows right side class III molar relationship

**Fig 2 e** shows left side Class III molar relationship

**Fig: 3** shows pre op lateral cephalogram radiograph

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**Fig:4** shows RME with Hyrax

**Fig:4a** shows intraoral image showing cemented RME appliance

**TREATMENT DONE**

To correct the anteroposterior discrepancy of the maxilla. It was decided to protract the maxilla with facemask therapy. (Fig:5a, b) And the treatment was started after obtaining the patient consent. Initially, for the first three weeks, an RME appliance (Fig:4a, b) was given as it disrupts the maxillary suture system then followed by facemask therapy which promotes the maxillary protraction.

The RME device, a HYRAX screw (Leone, Italy), was used to begin treatment. It included hooks integrated on the buccal side at the position of the primary canines to engage the elastics for a facemask. (Fig:4a). This appliance was cemented in place in the patient's mouth (Fig 4b). The screw was turned 90 degrees twice a day for the first week, then just once a day for the following two weeks, to activate it. It has been stated that even in patients who do not require any increase in transverse dimension; the appliance should be activated for 8–10 days prior to facemask placement[7]. After the disjunction, the screw was sealed, and PETIT-type face mask therapy was started (Fig:5a, b). The patient was instructed to wear the appliance every day for 14 to 16 hours, excluding when they were in class. As the patient got the vertical growth pattern, by setting the horizontal bar of the facemask 15 to 20 degrees against the upper lip, the pull was only intended to direct the maxilla forward. [8]. Beginning with 230 g of force on each side, it was raised to 300 g on each side during the second week and kept bilaterally. After 4 months, a favourable overjet and Class I molar relation was achieved. (Fig: 6a, b,c). The RME device was then removed, and it was intended to use the FR-III appliance for a year to retain the occlusion.

**Fig 5**: shows: Facemask therapy

**Fig 5a**: shows: Frontal view

**Fig 5b**: shows: Lateral view

**Fig 6a:** After facemask therapy

**Fig 6b:** shows ideal overjet and overbite

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**CLINICAL SIGNIFICANCE: Clinician and patient assessed outcomes**

The facemask and the elastics have very good patient compliance, with that Class I canine and a Class I molar relationship was achieved (Fig: 6c). which was the strength of this case report. And the limitations were as a result of RME excessive tipping of premolar and molar on the left side produced scissor bite which was planned to correct with cross arch elastics (Fig: 6d). An average Sn-Go-Gn angle of 31 degrees was seen in the vertical skeletal measurements, and remained consistent. The patient's face appeared symmetrical with competent lips. The esthetic balance was noticeably better in the lateral view. and the lips were in a normal relationship (Fig: 6f, g). In intraoral radiography, the root parallelism was satisfactory.

**Fig 6c:** showing molar relation class I in relation to right side

**Fig 6d**: shows scissor bite in relation to left side, which was planned to correct with cross arch elastic.

**Fig 6e**: shows post operative lateral cephalogram

**Fig 6f:** shows post op patient profile Frontal view

**Fig 6g:** shows lateral view

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## DISCUSSION

Facemask therapy in a patient with a retrognathic maxilla produces good results by protracting the maxilla in a forward direction and improving the maxilla-mandibular relationship in the sagittal direction. In the present case patient's SNA increased by + 3 degrees, whereas SNB showed no changes, ANB changed to + 2 degrees and FMA showed 27 degrees within the normal range (Table:1, Fig 6e). Dentally, the protractive force led to proclination in the upper incisors. while the lower incisors retroclined as a result of force exerted by the chin cup. In this patient there was proclination of lower incisors 5mm preoperatively which got corrected to 3mm (Table:1, Fig: 6e).

| Parameters | Normal values | Pre treatment | Post treatment |
|---|---|---|---|
| **SNA** | 82˚ | 77˚ | 80˚ |
| **SNB** | 80˚ | 78˚ | 78˚ |
| **ANB** | 2˚ | -1˚ | 1˚ |
| **Mandibular plane** | 14˚ | 61˚ | 28˚ |
| **Occlusal plane** | 32˚ | 55˚ | 31˚ |
| **NA angle** | 22˚ | 29˚ | 33˚ |
| **NA linear** | 4mm | 5mm | 7mm |
| **NB angle** | 25˚ | 33˚ | 24˚ |
| **NB linear** | 4mm | 4mm | 3mm |
| **Interincisal angle** | 130˚ | 118˚ | 132˚ |
| **Facial axis** | 90˚ | 89˚ | 91˚ |
| **Effective maxillary length** | 85mm | 83mm | 85mm |
| **Effective mandibular length** | 106mm | 106mm | 106mm |
| **Lower facial height** | 60mm | 55mm | 58mm |
| **I to pt A** | 4mm | 4mm | 5mm |
| **I to Pog** | 1-3mm | 5mm | 3mm |
| **Nasolabial angle** | 108˚ | 1. 92˚ | 97˚ |

**Table 1:** shows cephalometric analysis pre and post treatment values.

Thus, both the orthopaedic and dental treatments contributed to the favourable overjet that was attained. The treatment was carried out with RME+FM therapy to exhibit greater skeletal effects and lesser dental effects which was observed in the study done by Tortop et al[12] and Vaughn et al[13]. The majority of investigations on the effects of maxillary complex posteroanterior traction in Class III patients have shown improvement in the intermaxillary sagittal skeletal relationship, Pattanaik S, Mishra S[10]. Many unwanted tooth movements such as open bite tendency, mandibular incisor overeruption, and anterior crossbite have been prevented as treatment was initiated at an early stage[11]. And from the patient perspective, she was happy with her facial profile as a result of improved esthetics. The patient is still being monitored throughout adolescence to ensure long-term stability.

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## CONCLUSION

Accurate diagnosis and understanding of the individual growth pattern is crucial in determining the proper timing of Class III treatment. Once a diagnosis is established, early interception of a Class III malocclusion promotes a more favourable environment for normal growth and results in improvement of the facial profile and self-esteem.

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**CONFLICTS OF INTEREST** - There are no conflicts of interest

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