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## Case Report

# Time matters! A simple early approach to avoid complex massive surgery – A case report

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## ABSTRACT

Skeletal Class III malocclusion has always been in discussion for its complex nature, which can be caused by Deficient maxilla and/ or Procumbent of mandibular basal bone or combination of both. With regard to the ideal timing of the treatment, research has shown that early intervention may be most successful as it utilises the growth status of the patient and if avoided necessitates additional surgical procedures at later period. As surgery is only performed later on, obtaining treatment early, helps to prevent the patient's social life from being negatively impacted by the facial disfigurement. This case study details the management of a 16-year-old girl who had maxillary retrusion and mesio-occlusion. Treatment was with pre-adjusted edgewise mechanics with slow maxillary expansion with a Ni-Ti expander and protraction facemask.

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## 1. Introduction

An individual may experience both functional and aesthetic impairment from class III malocclusion,<sup>1</sup> that can be brought on by skeletal or dental anomalies. There has been significant variation in the occurrence of mesio-occlusion among the various ethnic groups, with Asian descent accounting for a higher proportion of cases.<sup>1</sup> Prevalence rate estimated to be 3.4% among Indians.<sup>2</sup> According to Ellis and McNamara a retrusive maxilla, proclined upper incisors, retroclined lower incisors, a protruding lower jaw and increase in dimension of lower 3<sup>rd</sup> of face were the most common findings associated with an adult Class III malocclusion.<sup>1</sup> Furthermore, 60% of Class III malocclusions<sup>1,3</sup> are typically caused by maxillary deficiency. In a growing patient, orthopaedic treatment of skeletal mesio-occlusion is essential because it can avoid

additional surgical procedures. Furthermore, if treatment is received early rather than later, it helps to mitigate the negative effects the patient's facial disfigurement would have on their social life.<sup>4</sup>

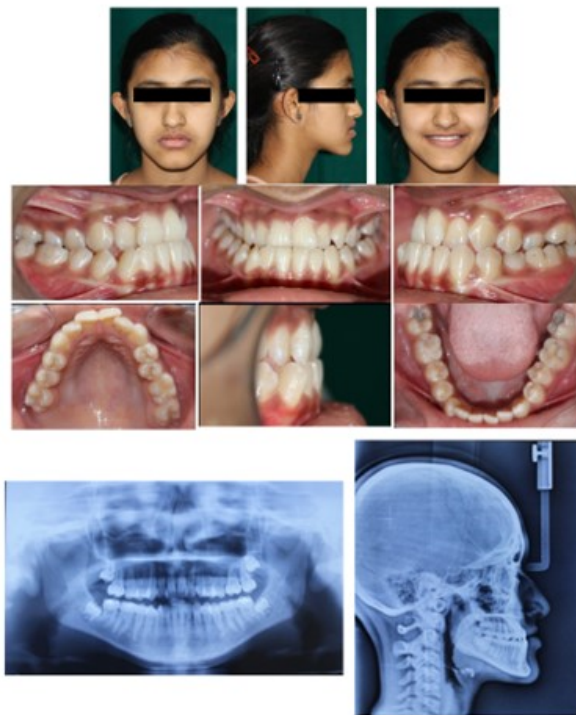
Facemask in conjunction with rapid maxillary expansion(RME) has been in use since past 20 years to protract the maxilla in growing patients with maxillary Deficiency.<sup>1,5</sup> However, major disadvantage associated with RME is pain and discomfort when the mid-palatal suture is opened. Conversely, slow maxillary expansion lessens patient discomfort and permits greater physiological adaptation of the mid palatal suture. Thus, the mid-palatal suture can be subjected to gentle, continuous pressure using a Ni-Ti expander, a tandem loop temperature-activated palatal expander.<sup>6,7</sup> And concerning the ideal time to treat a developing class III malocclusion, based on research findings, facemask therapy is a feasible option for older children, even though early intervention may yield the best results.<sup>2,8</sup> Thus his case study details the effective

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management of a 16-year-old patient with disocclusion with maxillary deficiency through the use of the aforementioned technique.

**Case Presentation** The primary complaint of a 16-year-old female patient who came in with her parents was that her front teeth were positioned irregularly, with her lower teeth coming out ahead of her upper teeth. There was no pertinent family history or prenatal or postnatal history provided. No relevant medical history that could affect the orthodontic treatment. Upon performing an extraoral examination, the patient displayed an acute nasolabial angle, concave profile, anterior divergence, and positive lip step. Intraoral examination showed anterior crossbite of -1.5 mm with an abnormal reverse overbite of 1 mm with class III molar relation bilaterally with posterior crossbite (Figure 1).



**Figure 1:** Pretreatment extra-oral and intra-oral photographs, orthopantomogram, lateral cephalogram

Based on the cephalometric analysis, the mandible had mild prognathism ( $SNB = 83^\circ$ , N perpendicular to Pog = +1.5 mm) and a retrognathic maxilla ( $SNA = 79^\circ$ , N perpendicular to A = -1 mm) in a Class III sagittal relationship and Hyperdivergent skeletal pattern ( $SN-GoGn = 25^\circ$ ). Upper incisors measured at 3 mm and  $22^\circ$  suggesting upright incisors, while lower incisors showed retroinclination ( $L1\ NB = -2\ mm$  and  $14^\circ$ ). Rickett's E line was the normally position for the lower lip, while the upper lip was repositioned (Table 1).

**Table 1:** Cephalometric values

Parameter	Pre-treatment	Post-treatment
SNA	$79^\circ$	$80.5^\circ$
SNB	$83^\circ$	$82^\circ$
ANB	$-5^\circ$	$-2.5^\circ$
GoGn-Sn	$29^\circ$	$32^\circ$
U1-SN	$103^\circ$	$110^\circ$
IMPA	$80^\circ$	$80^\circ$
INCLINATION ANGLE	$80^\circ$	$81^\circ$
UI-NA (Degrees/mm)	$22^\circ/3\ mm$	$29^\circ/6\ mm$
LI-NB (Degrees/mm)	$14^\circ/-2\ mm$	$18^\circ/-1\ mm$
H ANGLE	$13^\circ$	$11^\circ$
UPPER LIP - E LINE	-6mm	-4mm
LOWER LIP - E LINE	-2mm	-2mm

### 1.1. Treatment objectives

1. To correct the transverse and anteroposterior maxillary deficiency
2. To achieve optimal overbite and overjet
3. To level and align arches
4. To attain a pleasing profile and smile

### 1.2. Treatment plan

In order to address the transverse and anteroposterior maxillary deficiencies, fixed appliance therapy was chosen as the initial treatment plan. A preadjusted edgewise appliance of 0.022" slot MBT prescription with slow maxillary expansion using Nickel-Titanium expander and maxillary protraction using Petit type facemask was planned.

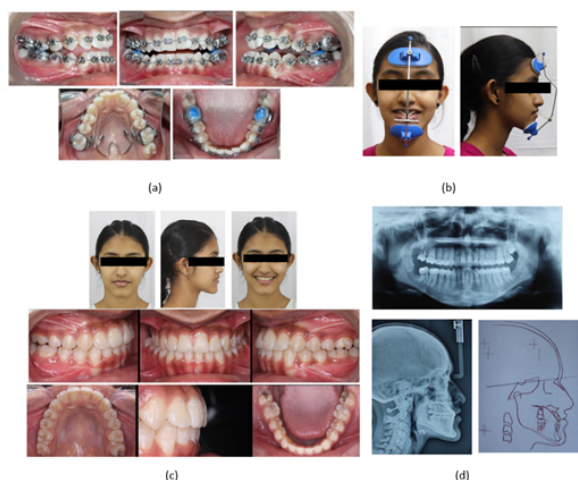
### 1.3. Treatment progress

At the outset of fixed appliance therapy, a preadjusted edgewise appliance system of 0.022" slot MBT prescription with 32 size Ni-Ti expander was used (Figure 2). For six months, there was gradual maxillary expansion until the posterior crossbite was removed and the patient was kept on a palatal retention plate for three months. A Petit type facemask was installed when the fixed treatment advanced to 0.019"  $\times$  0.025" stainless steel wires (Figure 2). The patient was instructed to wear the device for as many hours each day, aside from school hours daily. According to the patient, the wear lasted roughly 14–16 hours. The direction of pull was forward-pointing and downward, with a roughly  $30^\circ$  angle toward the maxillary occlusal plane.<sup>1</sup> Beginning with 150 g of force applied to each side, the force was increased to 300 g on each side starting in the fourth week and maintained for up to six months. Once the desired

positive overjet is obtained, the facemask is removed, and fixed orthodontic treatment is continued to complete and settle the occlusion. The entire course of treatment takes 23 months.

#### 1.4. Treatment results

The lateral cephalogram showed that there had been a substantial alteration in the maxillomandibular relationship. Table 1 shows that the mandible had a slight rotation to the back and downward and the SNA, SNB, ANB, and Wits assessments improved (Figure 2). At the end of the treatment, a discernible improvement was also observed with regard to lip step, indicating that the desired expansion with positive overjet (pre-treatment = -1.5mm, to +2mm) had been achieved. Overjet and overbite were ideal; molar and canine relationships were Class I (Figure 2).



**Figure 2:** (a) Strap up and installation of Ni-Ti expander, (b) Facemask therapy, (c) Post treatment intraoral and extraoral photos, (d) Post treatment OPG, Lateral cephalogram and superimposition

## 2. Discussion

In this patient facemask with expansion therapy affected many areas of her dentofacial complex. The maxilla and mandible both undergo skeletal and dental changes as a result of the facemask treatment. The protractive force in this patient improved the maxilla-mandibular relationship sagittally and also led to dental changes by causing the maxilla to move forward and downward and the mandible to rotate backward and downward.<sup>5</sup> The only drawback of this approach is that it increased the vertical dimension to some extent. When it comes to dental changes, the upper incisors proclined because of the protractive force, while the lower incisors retroclined because of the force applied by the chin

cup, which was partially corrected with a fixed appliance.

Following facemask therapy, the average forward movement of point A was measured to be 1.54 mm in a prospective long-term study cited by Williams et al and the average forward movement of maxillary teeth was found to be 2.73 mm.<sup>1,4,9</sup> They claimed that both the orthodontic and dental contributions were responsible for the positive overjet that was attained. Furthermore, they asserted that even though the mandible and mandibular teeth underwent fewer statistically significant changes, those changes nevertheless contributed to the Class III correction.

With respect to the patient in the current case report maxilla showed a 0.5 mm horizontal change at point A after treatment, while the maxillary incisors showed a 3 mm change. This suggests more dental movement than skeletal movement, possibly because the attempt was made in an older patient.

## 3. Conclusion

Current case report highlights the efficacious management of skeletal mesio-occlusion in a growing adult with maxillary deficiency and mandibular prognathism through fixed appliance using a facemask and Ni-Ti expander. The results are stable and the patient's cooperation is excellent.

## 4. Source of Funding

None.

## 5. Conflict of Interest

None.


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