

Case Report:

Early Correction of Class III Malocclusion with alternate Rapid Maxillary Expansion And Constriction (Alt-RAMEC) and Face Mask Therapy

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Abstract

Maxillary protraction headgear in conjunction with expansion appliances have been widely used in the treatment of Class III malocclusion with maxillary deficiency. However, there are problems associated with protracting the maxilla with conventional tooth-borne anchorage. These include the loss of dental anchorage, which is of concern, especially in situations in which preservation of arch length is necessary. In addition, tooth borne anchorage alone does not allow the application of orthopaedic force directly to the maxillary sutures. Patients with a skeletal Class III malocclusion and maxillary deficiency can be treated successfully using a combined protraction facemask and maxillary expansion appliance.^[1] Recent studies suggested that alternate rapid maxillary expansions and contractions (Alt-RAMEC) can open the circumaxillary sutures more extensively than conventional rapid maxillary expansion.^[2] This case report describes orthodontic treatment of a patient with class III malocclusion with a class III skeletal pattern and maxillary retrusion. Patient, a 12-year-old boy was treated with an orthopedic face mask in conjunction with Alternate Rapid Maxillary Expansion And Constriction (Alt-RAMEC) and standard pre-adjusted edgewise appliance.

Keywords: Class III malocclusion, Face mask, Alternate Rapid Maxillary Expansion and Constriction (Alt-RAMEC)

Introduction

Treatment of class III malocclusion in growing subjects is a challenging part of contemporary orthodontic practice. Many treatment approaches can be found in the literature regarding orthopedic and orthodontic treatment in class III malocclusion, including intraoral and extraoral appliances such as a facial mask (FM),^[1] functional regulator-3 appliance of Frankel^[3], splints, class III elastics and chin cup^[4] and mandibular cervical headgear.^[5] Correction of class III malocclusion can be done effectively using skeletal anchorage too^[6]. Many of the class III malocclusions are the result of mandibular prognathism; however, some class III malocclusions are the result of a deficient maxilla and the treatment plan of choice would be to protract the maxilla downward and forward.^[7]

Successful orthopedic correction through growth modification has increased the nonsurgical correction of the growing class III patient. Rapid Maxillary Expansion and Facemask therapy is the most common orthopedic treatment protocol for class III malocclusion^[1] as the dentoskeletal changes induced by therapy consist of a combined effect of the protocol on both maxillary and mandibular components. Recent studies suggested that alternate rapid maxillary expansions and contractions (Alt-RAMEC) can open the circumaxillary sutures more extensively than conventional rapid maxillary expansion.^[2] Optimal timing for the orthopedic approach to class III malocclusion is related to early treatment, at either a prepubertal or a pubertal phase of development.^[8]

Case Report

A 12-year-old boy came to the department of orthodontics with a complaint of anterior cross bite. The patient had no relevant past dental or medical history and no habits. His pretreatment records [Figures 1] showed the patient had a mesocephalic head shape, mesoprosopic facial form, non-consonant smile arc, concave soft tissue profile, competent lip seal. He had Angle Class III molar relationship with reverse overjet of 2 mm and overbite of 5 mm. The patient had the mixed dentition stage with anterior crossbite was present in relation to C21 I2C. There was a crowding in the maxillary and mandibular arch. Cephalometric analysis showed a skeletal Class III pattern with retrognathic maxilla and average growth pattern, lower incisor retroclination [Table 1].

The objective of the treatment was correction of sagittal discrepancy by growth modulation and improve the facial appearance of the patient and correct the anterior crossbite. The other objectives were to achieve a stable functional occlusion by establishing class I molar and class I canine relationship with normal overjet and overbite, improve the soft tissue profile, improve the smile, improve the tooth lip relationship of the patient. Patient was treated with a combination of face mask and Alt-RAMEC until 2 mm positive overjet was achieved. The expansion screw was activated and deactivated three turns (0.25 mm/turn) at weekly visits until the desired result had been achieved. The face mask was adjusted to rest on the forehead and the chin of the patient. [Figure 2] Elastics (5/16 inch by 14 ounces) were worn from hooks located 2-3 cm in front of the lips to the intraoral attachments located on the expansion appliance. The force generated by the elastics was 600g bilaterally. Lingual arch was inserted in the lower arch from the beginning so as to use the E-space gained after exfoliation of primary deciduous molars to relieve the crowding in lower anterior region.

After duration of 9 months of orthopedic correction [Figure 3], the pre-adjusted edgewise appliance 0.022" MBT (3M Gemini) was fixed to the upper and lower arch. First molars were banded and Pre-adjusted 0.022" MBT appliance (3M Gemini) was bonded to maxillary teeth and mandibular teeth and 0.016" Nickel Titanium round arch wire was placed for initial leveling and aligning. Maxillary and mandibular second molars were banded. The archwire were gradually progressed by 0.017"x0.025" HANT, 0.017"x0.025" S.S wire, 0.019" x 0.025" HANT and 0.019" x 0.025" S.S wires. 0.014" S.S. wires were used for final occlusal settling. After the completion of finishing and detailing the appliance was debonded. Total treatment duration of active treatment was 24 months. Patient's profile was improved and a class I molar and canine relationship were achieved. The normal overjet and overbite were also achieved. [Figures 4] Maxillary Hawleys retainer and braided lingual retainer were bonded to the mandibular anterior teeth. Retention with Frankel III appliance was given and the patient is recalled for follow-up till the growth of the mandible is complete.

Table 1			
	Pre Treatment	After Correction of Crossbite	Post Debonded
SNA	76	79	81
SNB	79	78	79
ANB	-3	+1	+2
Nasion [⊥] to point A	-8	-4	-3
Pog to N [⊥]	-1	-2	-2
NA-Apg	-7	0	5
Wits appraisal	-12	-4	-1
β angle	40	36	36
Jaraback's ratio	63.18	62.7	62.8
Y-Axis	58	60	60
FMPA	26	28	28
Facial Angle(NPg-FH)	91	88	89
Facial Axis Angle(Ba-Na to ptm-Gn)	88	87	88
SN-GoGn	34	35	35
Saddle angle (N-S-Ar)	123	124	125
Articular Angle(S-Ar-Go)	145	144	144
Gonial Angle(Ar-Go-Gn)	125	127	127
Upper Gonial Angle(Ar-Go-Na)	52	52	52
Lower Gonial Angle(N-Go-Me)	73	75	75
I to NA(angular/linear)	22, 5mm	24, 6mm	26, 6.5mm
I to NB(angular/linear)	18, 3mm	17, 3mm	24, 4mm
I to SN	99	103	105
IMPA	82	81	89

[Table 1 showing the cephalometric readings of pretreatment, after orthopaedic correction and postdebonded lateral cephalogram.]



Figure 1A – Pretreatment Photographs



Figure 1B - Pretreatment Radiographs



Figure 2 – With Facemask Photographs.

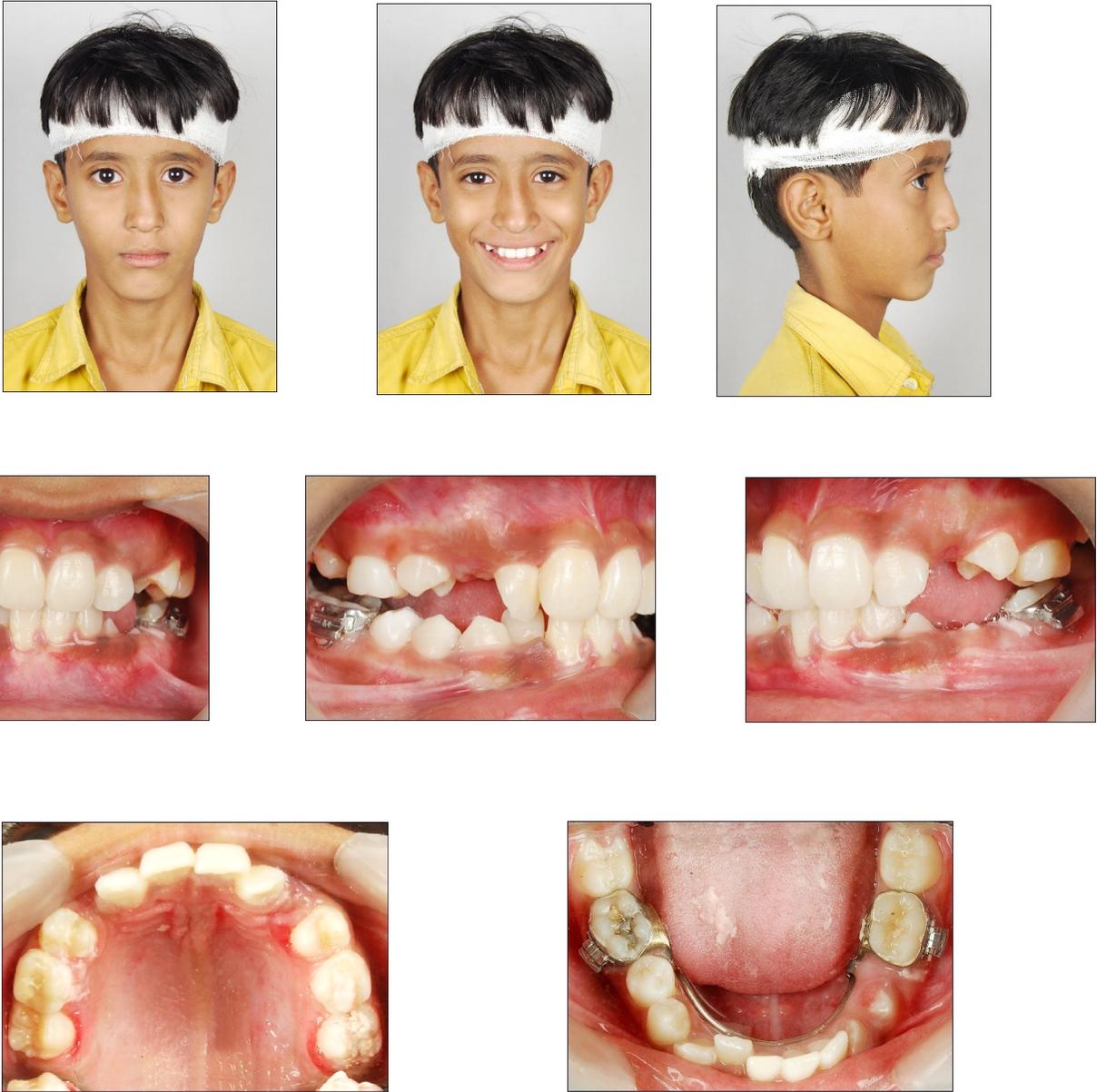


Figure 3A – After Orthopaedic correction.

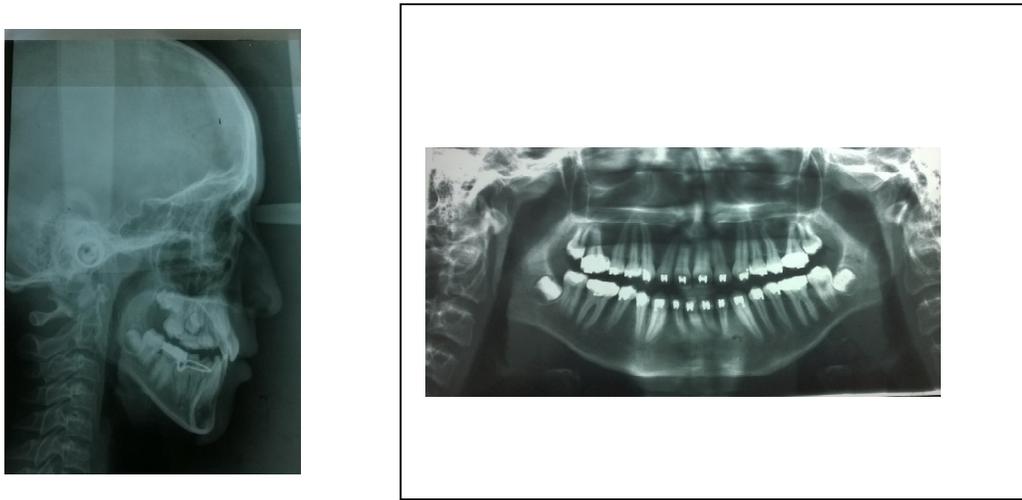


Figure 3B – Radiographs after Orthopaedic correction.



Figure 4A – Post debonded Photographs.

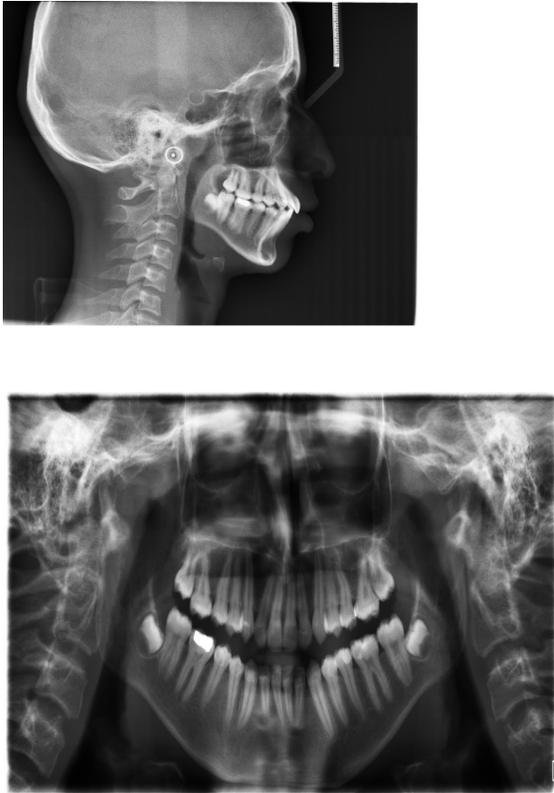


Figure 4B – Post debonded Radiographs

Discussion

This case report showed the results of the treatment of patients with class III malocclusion at an early stage with an efficient orthodontic therapy of Alt-RAMEC plus maxillary protraction.

Class III combination therapy is a comprehensive non-surgical treatment strategy designed for developing skeletal class III malocclusions by incorporating orthodontic and orthopedic mechanics to effectively improve the patient's occlusion and profile. In properly selected cases, this modality of treatment can be a successful alternative that satisfies a patient's request to avoid surgery or premolar extraction. A reverse pull headgear or facemask was used in the present case, in a growing child, to correct Class III malocclusion due to maxillary deficiency. The history of the reverse pull facemask dated back to Germany, more

extensively than conventional rapid maxillary expansion. Significant forward movement of the maxilla (SNA) noted in the Alt-RAMEC patients with facemask,^[2] combined with downward and backward rotation of the mandible, contributed to the correction of the anterior crossbite and molar relationship.

Maxillary protraction usually requires 300 to 600 g of force per side, 12 hours a day, depending on the age of the patient.^[10] The facemask projects a downward and forward pull on the maxilla with protraction elastics attached near the maxillary canines, with a downward and forward pull of 15° from the occlusal plane. It has been shown by Melsen in her histological findings that the midpalatal suture was broad and smooth during the 'infantile' stage (8 to 10 years of age) and became more squamous and overlapping in the 'juvenile' stage (10 to 13 years). Also, the circummaxillary sutures were

smooth and broad before age eight and became more heavily interdigitated around puberty.^[8] Thus, the treatment was initiated at an early age in early mixed dentition as the patient reported to the department to enhance forward displacement of the maxilla by sutural growth. The patient, however, still has to be recalled for follow-up till the growth of the mandible is complete as there are variations in the rate, growth direction, and rotation of the maxilla from child to adulthood.

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