

ALTERNATE RAPID MAXILLARY EXPANSIONS AND CONSTRICTIONS TECHNIQUE USED IN TREATMENT OF CLASS III MALOCCLUSION WITH MAXILLARY HYPOPLASIA IN AN ADOLESCENT — CASE REPORT

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ABSTRACT

Maxillary hypoplasia usually exists in class III malocclusions and is observed in adolescents. Mutual use of rapid maxillary expansion and facemask has been a classical method for maxillary protraction in growing children with mild to moderate skeletal class III relationship, an average of 2-3 mm of maxillary advancement is attained through this conventional method.

Sutural maxillary disarticulation whether done via toothborne or tissueborne expansion devices needed before 2-3 weeks or along with maxillary protraction, and this is usually delivered via an extra oral facemask. Recently, a rather an innovative technique involving alternate rapid maxillary expansions and constrictions (Alt-RAMEC) for 5 to 7 weeks followed by protraction via facemask for 4-6 months is considered successful in patients beyond puberty with mild to moderate maxillary deficiency.

In this case report a 13 years old boy beyond his growth spurt, showing moderate maxillary hypoplasia and class III profile was treated with this innovative Alt-RAMEC technique combined with facemask conventional wear.

Key Words: Maxillary protraction, Alt-RAMEC, class III malocclusion.

INTRODUCTION

Class III malocclusion is a rather uncommon presentation. It is found between 3-14% of a population.¹ Nevertheless, class III depicts in many anatomical forms and may result from various anomalies in facial skeleton, dentoalveolar complex and the cranium² as any type of malocclusion. Orthodontic treatment can be an interceptive/functional approach or toward camouflage or less often toward surgical correction.³

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Maxillary deficiency or hypoplasia is usually present in class III malocclusions.⁴ Mild to moderate maxillary hypoplasia could be protracted orthopedically successfully.⁵ Use of intraoral rapid maxillary expansion with an extraoral facemask has been a quite acceptable technique to enhance maxillary protraction in growing children with class III malocclusion.^{6,7} Maxillary arch expansion provided via tooth or tissue borne appliances is presumed to disarticulate the coronal and sagittal circummaxillary sutures to produce an average of 1.5 to 3mm of maxillary skeletal protraction.⁸

To gain skeletal changes rather than dental compensations, clinicians recommend treatment to be started between 8-10 years of child's age⁹ as circummaxillary suture aren't fully interdigitated yet, and maxillary protraction would progress accordingly rather smoothly. However, moderate class III malocclusion with maxillary hypoplasia usually may need more than 4 to 5 mm of advancement, and patients may show rather after the age of 11 years, if we opt to carry on with conventional treatment at this age. Maxillary overexpansion would



Fig 1: Pretreatment extra oral and intra oral photos for Y.A 13 years old boy

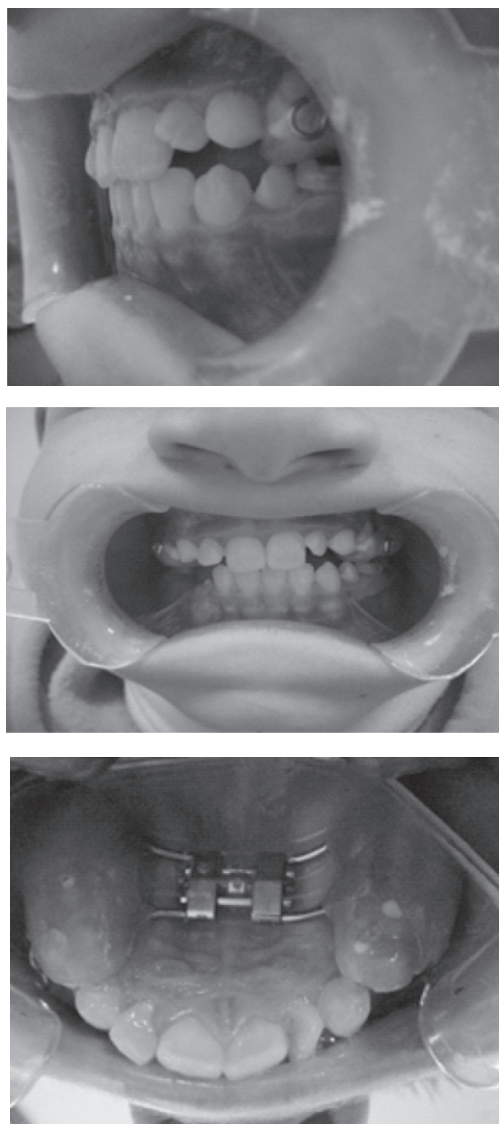


Fig 2 At the end of week 5 of application of RAMEC protocol facemask cribs were added

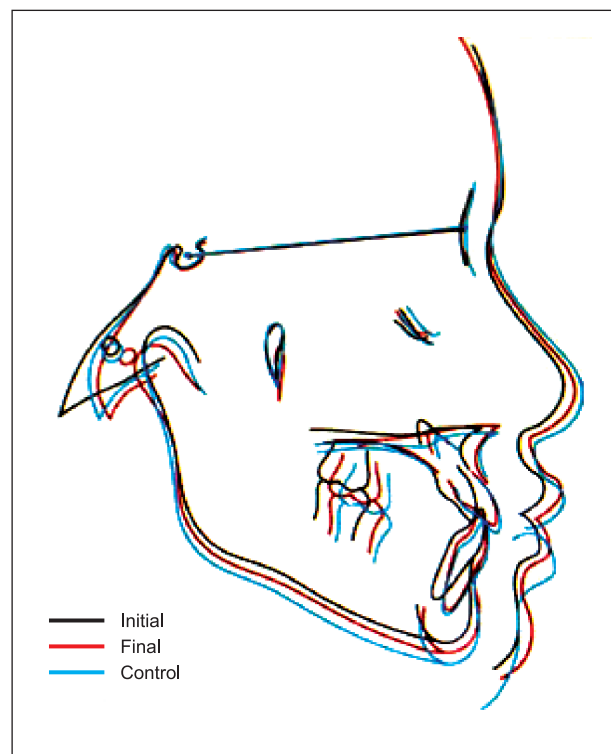


Fig 3: Cephalometric superimpositions pretreatment and post RAMEC and protraction, black and red lines respectively. Blue line shows the control template tracing

occur and dental changes such as upper incisors proclination rather than skeletal maxillary advancement may manifest as side effects of this treatment.¹⁰

Researches Loiu et al¹¹ advocated treatment via a rather innovative technique involving alternate rapid maxillary expansions and constrictions Alt-RAMEC. The idea behind it is to further disarticulate the maxillary sutures without the side effects of maxillary



Fig 4 At the end of week 5 of application of RAMEC protocol facemask cribs were added

flaring or overexpansion. This would further enhance maxillary protraction as evidence based clinically.¹² In this case report, an adolescent with moderate maxillary hypoplasia was treated with Alt-RAMEC technique along with facemask therapy.

CASE REPORT

Y.A a 13 years old male presented with class III incisor relation on a class III skeletal base. He had a reduced lower facial height causing an anterior complete overbite, edge to edge posterior occlusion and a unilateral crossbite (Fig 1). He complained of his under bite and his appearing smile. He was in his late mixed dentition stage with no family history of mandibular prognathism.

Treatment was started with rapid maxillary expansion using banded hyrax expander, the protocol of alternate rapid expansion constriction Alt-RAMEC which consist of screw opening four times per day for a week followed by screw closure four times per week. This was repeated for 5 weeks. Later, cribs were added to start protraction via facemask. (Fig 2) Patient cooperation was a key factor in treatment progress, and efforts were made to educate patient and parents about wear and compliance with treatment.

His cephalometric tracing showed treatment progress (Fig 3) with favorable changes in SNA, ANB, and soft tissue subnasale and upper lip advancement which reduced his profile concavity at end of week 10 of initiation of treatment.

Post RAMEC protocol of sutural disarticulation and facemask protraction facial photos show interceptive treatment changes (Fig 4). Retention was provided via a rigid 0.036 mils stainless steel transpalatal arch cemented on first molar along with soldered extended arms for further retention of whole maxillary arch. Later, stage two of treatment consisted of upper and lower fixed orthodontic appliances for alignment, leveling, and finishing. Patient still under orthodontic follow ups.

DISCUSSION

Class III patients have an uncomplimentary facial appearance, which could affect their psychological well-being.¹³ Therefore, the enhancement of facial harmony is an important issue for the patient's psychosocial development. Facemask use has been an integral part in the correction of Class III malocclusion since the mid of 20th century.^{14,16} The main changes of the conventional facemask remedy are the resultant maxillary forward advancement and the remodeling of circummaxillary

sutures.^{17,18} Rapid maxillary expansion (RME) has been used in combination with facemask because it interrupts and disarticulate the circummaxillary and intermaxillary sutures and therefore enables the skeletal protraction effects of facemask.^{19,20} However, there has been claims that circummaxillary sutures may not be disarticulated sufficiently via RME alone, others as Burstone and Marcotte²¹ concluded that final maxillary advancement was rarely more than 1-2 mm. Liou^{22,23} advocated the technique of alternate RME and constriction (Alt-RAMEC) as a solution.

Every orthopedic appliance has minor to moderate side effects, and these effects exaggerate beyond the peak of growth or puberty. This 13 years old male patient had moderate maxillary deficiency, a class III concave profile and a transverse maxillary arch form with unilateral crossbite. This means, if we had decided to use the classical method of maxillary protraction, we might have ended up with proclined upper labial segment and an over expanded maxillary arch, eventually leading to maximum of 3mm of maxillary forward advancement and this may appear unsatisfactory to attain a harmonious profile post facemask therapy.

In this case report, 6mm of maxillary advancement was attained (Fig 3). Soft tissue changes both horizontally and vertically reduced patient's profile concavity and minor effects on mandibular rotation and dental compensations. Further, cephalometric superimposition with a control template shows how advantageous Alt-RAMEC protocol can be for patients beyond their growth spurt and with minor to moderate class III combined with maxillary hypoplasia.

The reason we used this technique in this young male was to avoid the dental compensation issues which can occur at this age. We depended on the idea that as long as we don't procline his upper incisors or overexpand his maxilla, we can try this technique to protract the maxilla and may avoid later the surgical option.

CONCLUSION

Facemask use after the innovative technique of the Alt-RAMEC protocol resulted in significant advancement of the maxilla, with a mild counterclockwise rotation and unnoticed maxillary incisors proclination and minor dental compensations drawbacks. Further, an obvious soft tissue changes leading to improvement in overall facial profile.

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