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Case Report

Correction of the class III skeletal base with different mechanics: Three-year follow-up

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ABSTRACT

Class III malocclusion worsens with age, necessitating early orthopaedic therapy to restore facial equilibrium and regulate maxillofacial growth and development. A 12-year-old prepubertal male with a Class III skeletal base, anterior crossbite, retrognathic maxilla, and prognathic mandible is described in this report. To treat the anteroposterior plane and improve the profile, the ALT-RAMAC approach was used with reverse pull headgear. Following that, fixed mechanotherapy was used to get the desired effects. After that, the patient was monitored for another three years.

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1. Introduction

One of the major causative problems related to skeletal class III dysplasia is age, with discrepancies worsening with age.[1,2] It also impacts soft tissue alterations, which might have an impact on a patient's morale and mutual interactions. Thus, early orthopaedic interruption of the Class III skeletal base before puberty produces great results by establishing an appropriate soft tissue profile, slowing growth, and avoiding future surgical therapy.[3,4] Early Class III procedures have several advantages, including establishing dentition in a proper occlusion, removing damage from anterior occlusion, which can create gum problems, allowing for rapid growth, and giving the patient more confidence in themself.

On average, maxillary insufficiency accounts for 60% of class III issues. According to some researchers, these class III malocclusions are best treated with maxillary expansion and protraction as well as a facemask.[5] The ALTRAMAC technique and facemask therapy has the following effects on patients: it corrects the disparity between centric occlusion and relation in patients, maxillary protraction by influencing the suture, maxillary teeth proclination and mandibular dentition tipping to the lingual side.[6,7] Because of the posttreatment relapse, these alterations are more likely in pubertal patients, although they must be closely followed during their pubertal development spurts.

As a result, this research covers the orthopaedic correction of skeletal Class III using the Altramac technique and reverse pull headgear, as well as the 3-year posttreatment follow-up.

2. Case Report

Prepubescent male, 12 years old, with skeletal class III, retrognathic maxilla, prognathic mandible, horizontal grower, and straight path of closure. He had Angle's class I malocclusion: increased inclination of maxillary anteriors and retroclined mandibular incisors; buccally placed upper canines, negative overjet and overbite, deep curve of the spee. The upper and lower midlines did not coincide. Patient's profile was concave, with an obtuse nasolabial

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angle. The cephalometric measurements mentioned in Table 1.

2.1. Problem list

2.1.1. Skeletal problem

1. Class III skeletal base
2. Retrognathic maxilla
3. Prognathic mandible

2.1.2. Dental problem

1. Increased inclination of the maxillary anteriors
2. Retroclined mandibular incisors
3. Buccally positioned 13, 23
4. Negative overjet and overbite
5. Non coinciding midlines
6. Deep curve of spee

2.1.3. Soft tissue problems

1. Concave profile
2. Obtuse nasolabial angle
3. Retruded upper lip

2.1.4. Treatment objectives

1. To achieve a Class I skeletal base
2. To maintain Class I molar and canine relations on both sides
3. To correct overjet and overbite
4. Normal inclination of the upper and lower anteriors
5. To achieve levelling and alignment
6. To correct the midline
7. To achieve a harmonious soft tissue profile

2.2. Treatment plan

2.2.1. Growth prediction

(i) CVMI 3 (transition stage): 65–85% growth remaining

The treatment plan is divided into two phases:

1. Phase: Dentofacial orthopaedic therapy with the Hyrax appliance and a protraction face mask.
2. Phase: Fixed mechanotherapy

The patient was treated with a protraction face mask and the Hyrax appliance, which was activated by alternate expansion and contraction along with extraoral elastics till a class I skeletal base was achieved. Phase 1 therapy was completed in 9 months. After three months of retention with the Hyrax appliance, phase 2 was started.

2.3. Phase 2

After the first phase was completed, the second phase began with fixed mechanotherapy in a pre-adjusted edgewise MBT.022-inch slot. Initially, 0.016 Heat Activated Nickel

Fig. 1: (Lateral cephalogram)

Fig. 2: (OPG)

Fig. 3: (Extraoral photograph)

Fig. 4: (Intraoral photograph)

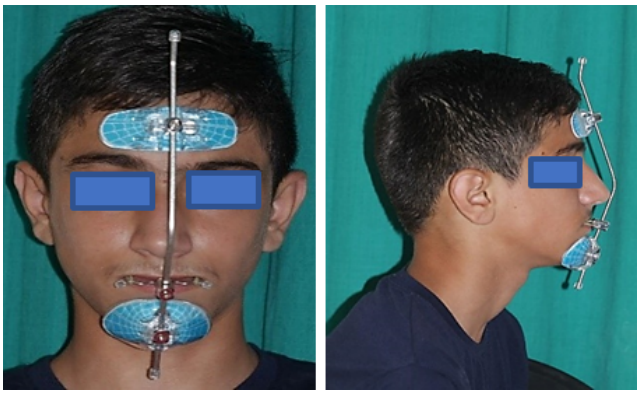

Fig. 5: (Face mask therapy)

Fig. 6: (Hyrax appliance)

Fig. 7: (After completion of phase 1Extraoral photograph)

Fig. 8: (After completion of phase 1 intraoral photograph)

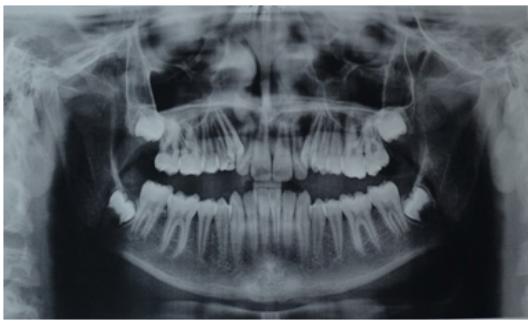

Fig. 9: (Post orthopedic OPG)

Fig. 10: (Post orthopedic laterlacephalogram)

Titanium wire is used for levelling and alignment, then 0.018 Stainless steel wire in the upper arch with an open coil spring placed between 11, 13, and 21, 23 for alignment of 12 and 22, then unilateral distalization is done on the right side with the help of a K loop because, after orthopaedic correction, molars were in end-on relation. So, distalization is done with the help of a K loop to achieve a class I molar relationship on the right side. Thereafter, finishing and detailing were done with the help of 0.016 Nickel Titanium (NiTi) wire, and phase 2 was completed in 14 months.

Fig. 11: (Initial levelling and alignment)

Fig. 12: (Distalization with K loop)

3. Post Treatment Records

Fig. 13: (Post treatment intraoral and extraoral photograph)

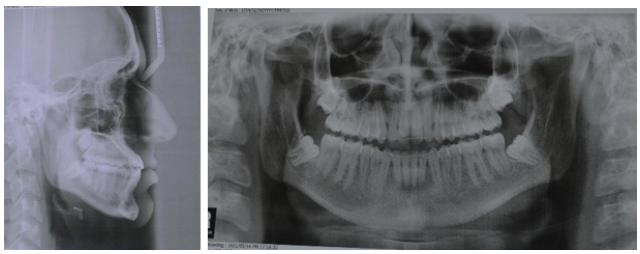

Fig. 14: (Post treatment radiographs)

Post-treatment cephalometric value mentioned in Table 1.

3.1. Objective achieved

1. Class I skeletal base achievement
2. Maintenance of class I molar and canine relationships
3. Normal overjet and overbite are achieved
4. Levelling and alignment are achieved
5. Achievement of a harmonious soft tissue profile

3.2. Planned retention

Bonded lingual retainer along with Begg's wrap-around retainer.

Fig. 15: (Present stage photograph and radiographs)

Fig. 16: Superimposition after face mask therapy

Table 1: Comprehensive cephalometric evaluation.

Measurements	Normal	Pretreatment	After completion of phase 1	Post treatment	After 3 year follow up
SNA	82^0	78^0	83^0	83^0	83^0
SNB	80^0	83^0	81^0	82^0	82^0
ANB	2^0	-5^0	2^0	1^0	1^0
Beta angle	$30.4+/- 2.4^0$	34^0	32^0	31^0	31^0
Yen angle	$123+/-5^0$	132^0	128^0	128^0	128^0
Pie angle	1^0-5^0	-3^0	1^0	1^0	1^0
W angle	$55+/-4^0$	61^0	58^0	57^0	57^0
N perpendicular to point A	0±2mm	-6mm	-1mm	0mm	0mm
N perpendicular to point- Pog	0-4mm	+4mm	1mm	3mm	4mm
Eff. Mid facial length	92.1±2.7	72mm	80mm	82mm	82mm
Eff. Mandibular length	120±3.4	104mm	108mm	109mm	110mm
Witts appraisal	0mm	-8mm	3mm	1mm	2mm
SN-GO-Gn	32^0	25^0	29^0	29^0	25^0
Upper incisor to NA	22^0/4	33^0/8	30^0/3	31^0/5	32^0/5
Lowe incisor to NB	25^0/4	20^0/2	18^0/2	28^0/5	28^0/5
IMPA	90^0	84^0	98^0	100^0	100^0
Inter incisal angle	131^0	140^0	132^0	115^0	115^0
Y- axis	66^0	61^0	64^0	63^0	62^0
Upper lip to S-line	0mm	-4mm	0mm	0mm	0mm
lower lip to S-line	-1mm	0mm	1mm	1mm	1mm
Nasolabial angle	90-110^0	121^0	115^0	100^0	100^0
Inter canine width		U -36mm L -30mm	U -35mm L -28.5mm	U- 37 mm L-31 mm	U- 37mm L-30mm
Inter molar width		U -51mm L -44mm	U -50mm L -43.5mm	U- 52mm L-44 mm	U-51mm L-44mm

Fig. 17: Superimposition post treatment

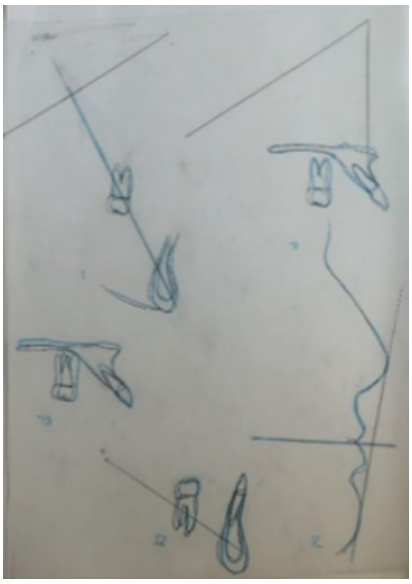

Fig. 18: Superimposition after face mask therapy post after3 year follow up

3.3. After 3year follow up

After 3 years, during a follow up examination, a lateral cephalogram and an OPG were taken. Then, after a cephalometric evaluation, the patient had stable results from face mask therapy.

After 3 year cephalometric values mentioned in Table 1

3.4. Treatment outcome

Patient acceptance was good with both the reverse pull headgear and the Hyrax appliance. Well-aligned arches were present. The cranial base to point A angle increased while the cranial base to point B angle decreased, giving a normal jaw relationship (ANB = 1^0). Average overbite and overjet were attained; the upper and lower midlines coincided. The mandibular plane angle also changed from 25^0 to 29^0; the nasolabial angle also decreased from 121^0 to 100^0

4. Discussion

The objectives for achieving forward positioning of the maxillary base alter the mandibular development rotation in a backward manner. These were achieved by using a face mask and the ALTRAMAC method.[7,8] This approach is advised for patients with early mixed and deciduous dentition, and it has been found to be stable after three years of therapy. According to the majority of investigators, antero-posterior traction of the maxillary base in Class III malocclusion reveals that due to an increase in vertical skeletal relationships, a good sagittal skeletal relationship is achieved, which is not favourable in vertically growing Class III patients.[9–11] For many years, fast palatal expansion was an appropriate method of forward placing the maxillary base. Rapid palatal expansion influences the circum-maxillary sutures and may provide a beneficial direction for maxillary growth.[4] Over the last few years, many researchers have documented various treatment outcomes and explained that there were no significant differences between the two groups of expansion and non-expansion in reverse pull headgear treatment.[7,8,11–15]

Then, in 2005, Liou presented another expansion protocol for the treatment of patients with class III cleft palate and maxillary transverse and anteroposterior deficit (ALT-RAMAC). It is necessary for the patient to alternately expand and constrict the maxilla by 1 mm each day on a weekly basis utilising a double-hinged expander. This is repeated for 7-9 weeks. It tears the midpalatal, posterior, and lateral sutures. With facemask therapy, it dramatically increases maxillary mobility and enables forward movement. In Alt-RAMEC protocol maxilla is expanded by 7 mm on week one using an expansion device that expands 1 mm per day, and on week two the screw is closed at a rate of 1 mm/s. The Alt-RAMEC protocol is finished at the end of the 9-week cycle in the remaining weeks, during which the screw of the expansion device is opened for 1 week and shut for 1 week. When this protocol is finished, protraction force is used to advance the maxillae.[7]

The findings show that the effects of ALTRAMAC and facemask therapy were good, that the outcomes were stable, and that the patient and his family were pleased with the treatment. The upper lip is improved by maxillary anterior proclination (Upper incisor to NA: 310/5), and there is a decrease in anterior divergence of the face due to mandibular and maxillary growth modification.

Renkema and colleagues discovered that proclination of incisors did not increase the risk of gingival recession in teenagers five years after treatment.[16] Ruf, Hansen, and Pancherz reported that lower incisor orthodontic proclination does not appear to cause gingival recession in children and adolescents.[17] Aziz T, Flores-Mir C. discovered no relationship between appliance-induced mandibular incisor labial movement and gingival recession.[18] In the latter type of patient, Artun and Krogstad (1987) evaluated the effect of incisor proclination longitudinally and reported that proclination generated small recessions but had no influence on gingival measurement in the medium or long term.[19]

5. Source of Funding

None.

6. Conflict of Interest

None.

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