

Severe Skeletal Class III Orthosurgical Correction

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ABSTRACT

Establishment of a treatment plan is based on efficacy and easy application by the clinician and acceptance by the patient. Treatment of adult patients with class III malocclusion might require orthognathic surgery, especially when the deformity is severe, with a significant impact on facial esthetics. Here is a case report being presented having severe skeletal dysplasia showing class III skeletodental relationship with compromised esthetics and poor functional adaptation. It was treated through bi-jaw surgery to accomplish acceptable esthetics and stable functional occlusion.

Keywords: Orthognathic surgery, Skeletal malocclusions, Functional rehabilitation.

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INTRODUCTION

Dentoskeletal class III malocclusion is a structural deviation in the sagittal relationships of the maxillary and mandibular bony arches. It is associated with skeletal characteristics such

as maxillary retrusion, mandibular protrusion, or by their combination, along with dental characteristics of molar and/or canine mesiocclusion, associated with anterior crossbite and increased facial divergence.¹ Class III malocclusion is considered one of the most complex and difficult orthodontic problems to diagnose and treat. Class III malocclusion, though less prevalent than other phenotypes, expresses in a more severe form. A complicating factor for diagnosis and treatment of class III malocclusion is its etiologic diversity.² The prevalence of this type of malocclusion in white populations is less than 5%, but it rises to as much as 12% in Chinese and Japanese populations, with a relatively high prevalence of class III malocclusion observed also in Mediterranean and Middle Eastern populations.³ Treatment of skeletal class III malocclusion in an adult requires dentoalveolar compensation or combined orthodontic and surgical procedures, with the aim to achieve normal occlusion and improved facial esthetics.⁴⁻⁶

CASE REPORT

A 25-year-old male patient reported to our department complaining about unacceptable facial appearance and



Fig. 1: Pretreatment extraoral at rest



Fig. 3: Pretreatment extraoral profile view



Fig. 2: Pretreatment extraoral at smile



Fig. 4: Pretreatment sagittal extraoral view

larger sized lower jaw along with inability to talk properly (Figs 1 to 4). On examination, he was diagnosed as having skeletal class III malocclusion, having severely prognathic mandible, concave profile, increased lower facial height and reverse overbite with increased reverse overjet (Figs 5 to 7]. There was no relevant medical and family history. Radiographic examination confirmed the clinical findings (Figs 8 and 9).

List of Problems

Severe prognathism of the mandible.

Increased lower facial height.

Increased reverse overjet and underbite (Reverse overbite).

Class III molar and incisor relationship.

Concave profile and compromised esthetics.

Speech difficulty.

Mild facial asymmetry toward right side showing chin deviation.

Treatment Plan

Combination therapy involving three phases:

Presurgical orthodontics phase involving leveling and alignment.

Surgical phase involving, Le Fort I osteotomy for maxillary superior and forward placement and bilateral sagittal split osteotomy(BSSO) for mandibular setback.

Postsurgical orthodontics phase for final settling of occlusion.

Nonextraction fixed mechanotherapy using Roth 0.022 slot preadjusted edgewise appliance.

Longterm retention plan.

TREATMENT RATIONALE

Lefort I osteotomy was planned to protract the maxilla along with impaction, in order to facilitate autorotation of mandible and thereby decreasing lower facial height and achieving soft tissue balance. Presurgical orthodontics lasted for about 11 to 12 months to eliminate the dental compensation and increase the severity of malocclusion to achieve stable results through surgery.

Treatment Progress

After initial prophylactic measures, the case was strapped up using 0.022×0.028 " Roth preadjusted edgewise prescription appliance. Initially 0.016" NITI wires were used to level and



Fig. 5: Pretreatment intraoral frontal view



Fig. 7: Pretreatment left side intraoral view



Fig. 6: Pretreatment intraoral right side view

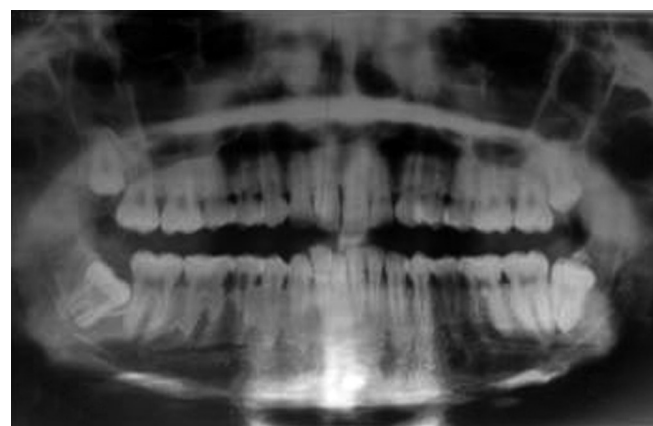


Fig. 8: Pretreatment OPG radiograph



Fig. 9: Pretreatment cephalogram



Fig. 10: Presurgical cephalogram



Fig. 13: Stabilization of the mandible through BSSO procedure

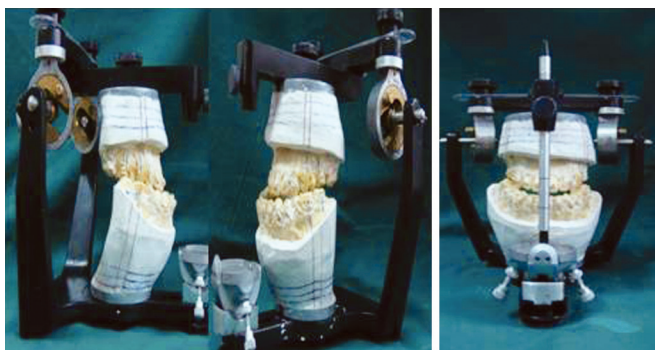


Fig. 11: Facebow records transferred on the Hanau articulator



Fig. 14: Le Fort 1 osteotomy for maxillary advancement



Fig. 12: Mock surgery and splint was preparation

align the arches and progressively the arches were stabilized using 0.019 × 0.025” SS archwires. The reverse overjet was increased from 9 to 12 mm through dental decompensation (Fig. 10). Presurgical orthodontic phase was followed by immediate presurgical phase where in utilizing the face bow transfer, two acrylic splints for maxillary advancement and mandibular set back procedures were prepared after doing the mock surgery on the three point semiadjustable Hanau articulator (Figs 11 and 12). Surgical phase was carried as planned for Le Fort I osteotomy, advancing the maxilla by 6 mm, BSSO was done setting the mandible back by 8 mm. The jaws were stabilized using rigid intermaxillary fixation (Figs 13 and 14). The postsurgical phase was started 8 weeks after the surgery (Fig. 15), archwires were changed.



Fig. 15: postsurgical cephalogram

The arches were again levelled and aligned using smaller to larger cross section wires and using settling elastics to settle the occlusion. This phase lasted for 4 to 5 months. The overall treatment period lasted for about 22 to 24 months. After achieving the satisfactory results as, Angles class I



Fig. 16: Post-treatment extraoral frontal view



Fig. 17: Post-treatment extraoral profile view



Fig. 18: Post-treatment extraoral sagittal view

molar and canine relationship along with acceptable overjet and overbite, the appliance was debonded and the Hawley's upper and lower retainers with instructions to wear for full time were delivered. Patient was recommended for long time retention plan to accommodate for the surgical relapse.

RESULTS

The results showed a great improvement in the overall facial and dental appearance showing Angle's class I molar and canine relationship with acceptable overjet and overbite along with balanced facial soft tissues (Figs 16 to 21 and Table 1).

DISCUSSION

Angle's class III skeletodental relationship is one of the most complicated problem in both the childhood and adulthood of all the dentofacial abnormalities.⁷⁻⁹ Class III skeletal problems are treated with both orthodontic and orthopedic treatment mechanics for growing children where as it requires orthodontic and complex surgical treatment for correction of dentofacial class III problems in adult patients to achieve acceptable esthetics and functional stable occlusion.¹⁰ Most people with class III malocclusion have dentoalveolar and skeletal problems. Though mild cases can often be treated with orthodontics only, patients with significant class III

Table 1: Pre and postsurgical cephalometric values

<i>Cranial base</i>	<i>Average value (Males)</i>	<i>Pretreatment value</i>	<i>Post-treatment value</i>
Ar-Ptm	37.1 ± 2.8 mm	34 mm	34 mm
Ptm-N (II to HP)	52.8 ± 4.1 mm	54 mm	54 mm
<i>Horizontal skeletal</i>			
N-A-Pg angle	3.9 ± 6.40 mm	-13°	-1°
N-A (II to HP)	0 ± 3.7 mm	-2 mm	+ 2.5 mm
N-B (II to HP)	-5.3 ± 6.7 mm	+20 mm	+5 mm
N-Pg (II to HP)	-4.3 ± 8.5 mm	+23 mm	+7 mm
<i>Vertical skeletal and dental</i>			
N-ANS (I to HP)	54.7 ± 3.2 mm	55 mm	53.5 mm
ANS-Gn	68.6 ± 3.8 mm	76 mm	71 mm
PNS-N	53.9 ± 1.7 mm	54 mm	52 mm
MP-HP	23.0 ± 5.9°	28.5°	25°
UI-NF	45.0 ± 2.1 mm	29.5 mm	27 mm
LI-MP	30.5 ± 2.1 mm	51 mm	49 mm
U6-NF	26.2 ± 2.0 mm	27 mm	25 mm
L6-MP	35.8 ± 2.6 mm	46 mm	42 mm
<i>Maxilla-Mandible</i>			
PNS-ANS	57.7 ± 2.5 mm	52.5 mm	52.5 mm
Ar-Go	52.0 ± 4.2 mm	57 mm	53 mm
Go-Pg	83.7 ± 4.6 mm	90 mm	83.5 mm
B-Pg	8.9 ± 1.7 mm	6.5 mm	8.5 mm
Ar-Go-Gn	119.1 ± 6.5°	142°	137.5°



Fig. 19: Post-treatment intraoral frontal view



Fig. 20: Post-treatment intraoral left side view



Fig. 21: Post-treatment intraoral right side view

skeletal discrepancies are often treated with mandibular, maxillary, or bimaxillary orthognathic surgery in conjunction with orthodontic appliance treatment.¹¹ Orthognathic surgery is usually reserved for dentoskeletal disproportions that are so severe that they cannot be corrected using orthodontic appliances alone. It is generally accepted that the main benefits of orthognathic treatment are likely to be psychosocial in nature and that majority of the patients seek treatment because of concerns about their dentofacial esthetics.¹² Johnston et al¹³ reported that patients requiring

orthognathic surgery were less happy with the appearance of their face, teeth and profile when compared with controls. Athanasiou¹⁴ in a retrospective cephalometric study of 50 consecutive patients treated with mandibular setback surgery reported straightening of the skeletal and soft-tissue facial profiles and improvement of lip posture. They considered achievement of normal incisal relationship leads to a better lip competence and posture.

CONCLUSION

Combined orthodontic and surgical management of skeletal class III malocclusion in adult patients is a stable and accepted treatment modality that allows the achievement of both profile correction as well as acceptable occlusion. The decision for a one-jaw vs two-jaw surgery should depend on patient's chief complaint, objective evaluation of the patient's profile, the extent of the skeletal discrepancy and stability factors.

Orthognathic surgical procedures provide much satisfaction to the patient and clinician regarding the treatment success and the improvement in their life style by changing the overall facial and dental appearance of the patient.¹⁵ These procedures have become the ultimate choice for the patients suffering from dentofacial deformity and lack of self confidence as these procedures are done on day to day basis with minor discomfort and shorter postsurgical hospitalization.

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