

## ORTHOSURGICAL MANAGEMENT OF SEVERE SKELETAL CLASS III MALOCCLUSION BY A SYSTEMATIC APPROACH: A CASE REPORT

### Maxillofacial Surgery

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### ABSTRACT

Class III malocclusions stem from insufficient forward growth of the maxilla, excessive forward mandibular growth, or a combination of both. In severe cases, where growth modification or camouflage is inadequate, surgery to realign the jaws or reposition dentoalveolar segments becomes necessary. Advances in recent years have enabled successful combined surgical and orthodontic treatments for complex dentofacial issues. This case report details the management of a 19-year-old male with skeletal Class III malocclusion, compromised aesthetics, and poor functional adaptation. Treatment included pre-surgical orthodontics with the extraction of four premolars, followed by orthognathic surgery to achieve structural balance, improved aesthetics, and stable functional occlusion.

### KEYWORDS

Skeletal Class III malocclusion, Orthognathic surgery, skeletal discrepancy, mandibular prognathism

### INTRODUCTION

In modern surgical-orthodontic treatment, fixed orthodontic appliances serve three purposes: to facilitate pre-surgical tooth movement, to stabilize teeth and basal bone during surgery, and to enable post-surgical adjustments. Advances in surgical techniques have significantly enhanced the predictability of favourable outcomes for orthognathic surgery. The correction of dentoskeletal malocclusion aims to achieve three key objectives: functional efficiency, structural balance, and aesthetic harmony. [1,2] Class III malocclusions are among the most complex and challenging orthodontic issues to diagnose and treat. Although less common than other malocclusion types, Class III tends to manifest in a more severe form. Its prevalence varies significantly across populations, ranging from 0.8% to 4.0% in Caucasians and up to 12% in Chinese and Japanese populations. [3-5] Orthodontic therapy combined with orthognathic surgery is often essential to achieve optimal outcomes in such cases. Success relies on thorough clinical examinations, accurate diagnosis, and precise treatment planning.[6]

### Case Report

A 19-year-old male patient reported to the Department of Oral and Maxillofacial Surgery, Panineeya Mahavidyalaya Institute of Dental Sciences and Research Center, with the chief complaint of forwardly placed lower front teeth & jaw and inability to talk properly. On examination, he was diagnosed as having dentoalveolar Angles class III malocclusion on severe skeletal class III malocclusion, having prognathic mandible with hyper-divergent growth pattern, proclined upper anterior teeth and inclined lower anterior teeth, retained deciduous 63, palatally placed supernumerary teeth between 11, 12 labially placed 13,23, rotated 16, lower anterior crowding, reverse overjet and overbite, anterior and posterior crossbite, concave profile, acute nasolabial angle, potentially competent lips, retrusive upper and protrusive lower lips.(Fig. 1)

There was no relevant medical or family history. A radiographic examination confirmed the clinical findings. Improvement of esthetics is the prime reason for the patient to seek treatment and is positively and internally motivated.

Patient's posture: upright, Body type: mesomorphic, Gait: Normal  
Dolichocephalic head, Leproprosopic face, apparently symmetrical face. Vertical proportionality. Upper: 55 mm, Middle: 74 mm, Lower: 77 mm

Inter-labial gap: 4mm  
Incisor exposure at rest: 4 mm  
Potentially competent lips



**Figure: 1**

### Extra-oral Examination:

- Concave profile.
- Anterior divergence.
- Average nasolabial angle.
- High clinical FMA.
- Shallow Mentolabial sulcus.

### Functional Examination:

- Respiration is nasal
- No TMJ or jaw function complaint was detected
- Inter occlusal clearance: 3 mm
- Maximum mouth opening: 50mm

- Protrusion: 3 mm
- Right excursion: 5mm
- Left excursion: 3mm
- Normal swallow, altered speech, Forward path of closure.

#### Problem List

- PROFILE - Concave Profile
- o Retrusive upper and protrusive lower lips, potentially competent lips
- SKELETAL - Retrognathic maxilla, Prognathic mandible
- SAGITTAL - Reverse overjet
- VERTICAL - Reverse overbite



Figure: 2

#### Dental

- Proclined upper anterior teeth,
- retained deciduous 63,
- palatally placed supernumerary teeth between 11 and 12,
- labially impacted 13,23,
- mesial-palatally rotated 16,
- lower anterior crowding. (Fig. 2)

SAGITTAL: Reverse overjet

VERTICAL: Reverse overbite

PROFILE: Concave profile, retrusive upper and lower lips, potentially incompetent lips

#### Composite Analysis

Sagittal relation: Skeletal Class III pattern

Discrepancy analysis: Orthognathic maxilla & Prognathic mandible

Vertical relation: Hyperdivergent growth pattern, anti-clockwise rotation of maxilla, Clockwise rotation of occlusal plane, Clockwise rotation of mandibular plane.

#### Treatment Plan

##### Pre-surgical

- Case planned to be started using fixed mechanotherapy PEA (MBT Prescription-0.022" slot)
- Extraction of 63, Palatally placed supernumerary tooth
- Levelling and aligning
- Retraction and space closure

##### Surgical Phase

- Maxilla advancement by 6mm
- Maxilla yaw correction towards left by 2.5mm
- Subapical osteotomy done, followed by anterior mandibular setback of 6mm
- Mandibular setback by 7mm
- Yaw correction towards left by 4mm
- Finishing and detailing
- Retention: Upper and lower fixed retainers.

#### Combined Orthodontic and Surgical Line of Treatment, Involving Three Phases:

- Pre-Surgical Orthodontics Phase: This phase utilized fixed mechanotherapy with a 0.022 MBT prescription pre-adjusted edgewise appliance. Extractions included tooth 63 and premolars. The extraction spaces were employed for de-crowding and decompensation of the skeletal Class III malocclusion in both upper and lower arches.
- Surgical Phase: Procedures included Le Fort I osteotomy for a 6mm forward repositioning of the maxilla, bilateral sagittal split osteotomy (BSSO) for a 7mm mandibular setback, and overall

jaw correction in both the maxilla and mandible.

- Post-Surgical Orthodontics Phase: Focused on final occlusion adjustments and the development of a retention plan.

#### Investigations Prescribed:

- CBCT
- MAJOR SURGICAL PROFILE
- VIRTUAL SURGICAL PLANNING

#### Treatment

The essential steps in pre-surgical orthodontics are to align the arches or arch segments to make them compatible, and establish the anteroposterior and vertical position of the incisors. Pre-surgical orthodontics was begun with the bonding of 0.022" X 0.028".

MBT pre-adjusted edgewise prescription appliance. To achieve sufficient decompensation and ideal maxillary and mandibular incisor inclination, therapeutic extractions of upper and lower first premolars were done which was followed by controlled retraction of the maxillary and mandibular anterior segment. Lower third molars were also extracted to facilitate the orthognathic surgery later on. Initial leveling and alignment were carried out using 0.016" NiTi, 0.016" X 0.022" NiTi, and 0.019" X 0.025" NiTi followed by 0.019" X 0.025" SS for retraction of U/L anterior and 0.021" X 0.025" SS as final stabilizing wires. Pre-surgical phase radiographic records were repeated and compared.

Impressions were also taken and models were hand articulated for examining occlusal compatibility. The final stabilizing wires were placed four weeks prior so that they are passive when the impressions are taken for the fabrication of surgical splints. This ensures that there will be no tooth movement that could result in poorly fitting splints. Following this, Cephalometric prediction tracing was done.

Intra oral scan was performed and 3D virtual planning was done with the orthodontist team and the maxillofacial surgery team together. An intermediate and final position acrylic occlusal splint was fabricated after the 3D planning.

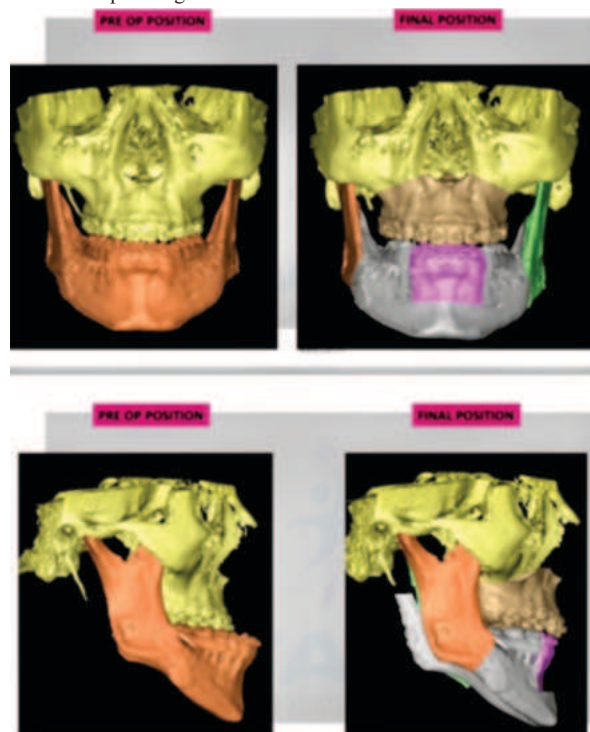


Figure: 3

#### Treatment Plan After Virtual Surgical Planning: (As Shown In Fig.3)

- MAXILLA ADVANCEMENT BY 6 MM
- MAXILLA YAW CORRECTION TOWARDS LEFT BY 2.5 MM
- SUB APICAL OSTEOTOMY DONE, FOLLOWED BY ANTERIOR MANDIBULAR SETBACK OF 6 MM
- MANDIBLE SETBACK BY 7 MM

- MANDIBLE YAW CORRECTION TOWARDS LEFT BY 4 MM

### Surgical Procedure

Le-Forte I surgical procedure was carried out as decided and the maxilla was repositioned 6 mm anteriorly along with maxillary yaw correction towards the left by 2.5mm (Fig. 4). Bilateral sagittal split osteotomy was performed and the mandible was set back by 7 mm and mandibular yaw correction towards left by 4mm (Fig. 5 and 6) followed by subapical osteotomy. (Fig. 7).

Rigid-type fixations were used in both jaws using mini plates and screws on both sides. The patient was hospitalized for 2 days and was advised to maintain a soft diet for the first two weeks after surgery.

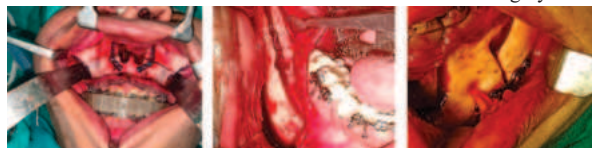


Figure: 4

Figure: 5

Figure: 6



Figure: 7

By 8 weeks, the patient was back on a normal diet. Once initial healing was satisfactory and the patient had attained an average range of motion, active orthodontic treatment was resumed.



Figure: 8

Post-surgical intra-oral and extra-oral photographs and radiographs were taken. (Fig. 9, Fig. 10, Fig.11) The occlusal splint was removed and the heavier 0.021" X 0.025" SS wires were replaced with smaller dimensions 0.017" X 0.025" TMA in the upper arch and 0.016" SS round wire in the lower arch.



Figure: 9

Figure: 10

Figure: 11

Bilateral posterior box elastics with anterior vertical elastics were given. The patient was instructed to wear elastics full time for the next

few weeks which were weaned off as further detailing of occlusion was taking place. (Fig. 8)

After five months of post-surgical orthodontic treatment, fixed appliances were debonded, and retention began with fixed lingual retainers in both arches to preserve the results.

Post-treatment lateral cephalogram was evaluated for treatment changes by superimposition.

### RESULTS

Treatment objectives of attaining class I molar and canine relationship bilaterally with normal overjet and overbite, improved patient profile, and smile aesthetics along with balanced facial soft tissues were achieved.

### DISCUSSION

This case highlights the management of an adult male patient with severe skeletal and dental Class III malocclusion. Angle's Class III skeleton-dental relationship is among the most complex dentofacial abnormalities, presenting challenges in both childhood and adulthood.[7] While borderline cases may be managed with orthodontics alone, significant skeletal Class III discrepancies often require uni-jaw or bi-jaw orthognathic surgery combined with orthodontic appliance therapy.[8] The primary benefits of orthognathic treatment are widely recognized as psychosocial, with most patients pursuing it due to concerns about their dentofacial aesthetics.[9] Post-surgical orthodontics in this case spanned five months, focusing on occlusion refinement and permanent retention. The length of this phase depends on the level of preparation achieved during pre-surgical orthodontics. Long-term stability remains a key objective of orthodontic treatment, with permanent retention widely recommended as the most reliable method to ensure lasting results. Successful outcomes rely on clear treatment goals, meticulous mechanotherapy, precise occlusal adjustments, and thoughtfully selected retention strategies to achieve occlusal stability.[10]

### CONCLUSION

The combination of surgery and orthodontic treatment enables the correction of dentofacial deformities that were previously beyond the reach of orthodontics alone. Managing facial aesthetics is highly complex, but advancements in surgical techniques have significantly expanded the capabilities of orthodontic treatments. This case exemplifies such collaboration, where orthodontic limitations necessitated teamwork with an oral surgeon. Technological progress in diagnostics and treatment modalities has empowered orthodontic-surgical teams to tackle more challenging cases, ultimately improving the quality of life for patients with facial skeletal disharmonies.

**KEYWORDS:** Skeletal Class III malocclusion, Orthognathic surgery, skeletal discrepancy, mandibular prognathism, maxillary deficiency, anterior crossbite, dental compensation, occlusal imbalance, dentofacial deformity, structural balance, functional occlusion, aesthetic improvement, surgical orthodontics, pre-surgical orthodontics, post-surgical stabilization.

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