

Combined Orthodontic and Surgical Management of a Skeletal Class III Malocclusion with Mild Asymmetry—a Non Extraction Approach

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Abstract Severe orthodontic problem that could neither be treated with growth modification or camouflage often requires combined surgical and orthodontic treatment. As the envelope of discrepancy indicate the limitation in orthodontics a multidisciplinary approach is mandatory while treating a skeletal Class III malocclusion in adults. This case reports describes the management of a 22 year old female patient with skeletal class III malocclusion and mild facial asymmetry treated with a non extraction approach, Decompensation was done before surgery followed by a bilateral sagittal split osteotomy. In reviewing the patient, the goals set at the beginning of treatment were successfully achieved, providing the patient with adequate masticatory function and pleasant facial esthetics.

Keywords: skeletal class III malocclusion, facial asymmetry, non extraction

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1. Introduction

Unesthetic facial profile and Functional disturbances are the most common cause for seeking treatment in skeletal class III malocclusion. Skeletal class III malocclusion may be due to mandibular prognathism or maxillary retrognathism or a combination of the two [1]. Growth modification with chin cup or face mask can be used to correct class III malocclusion during growth and the treatment options are limited in mild sagittal discrepancy were as in adult patients Extractions is required to eliminate the dental compensations before surgery and combined orthodontic and surgical approach is required in moderate to severe discrepancies [2].

Rehabilitation of skeletal malocclusions in adults involves a presurgical orthodontic phase followed by surgical setback of mandible or advancement of maxilla followed by a phase of post surgical orthodontics for finishing and detailing of occlusion while retaining the surgical correction. This combined phase of treatment helps in achieving proper functional and esthetic stability [3]. Skeletal class III malocclusion with mandibular prognathism is often associated with varying degrees of facial asymmetry since the path of closure of mandible is altered to achieve maximum intercuspation despite the sagittal discrepancy.

2. Case Report

2.1. Diagnosis

A 22 yr old female patient with a complaint of protrusive lower jaw presented with a Class III skeletal relationship with prognathic mandible, increased lower facial height, concave profile. Intra oral examination revealed a class III molar & canine relationship, inadequate over jet and overbite, mild crowding in the upper arch and moderate crowding in the lower arch. The patient had no relevant family and medical history. The upper midline coincided with the facial midline while the mandibular midline was shifted to right by 4 mm [Figure 1 & Figure 2]. She was well motivated for the treatment. Model analysis revealed an arch length tooth material discrepancy of 2 mm in the upper jaw and 6 mm in the lower jaw. Bolton's analysis showed a mandibular tooth material excess of 3 mm. The cephalometric analysis confirmed the clinical findings.

2.1.1. Problems List

- Prognathic mandible
- Increased lower facial height
- Class III canine and molar relationship
- Imbrication in lower anteriors
- Concave profile and compromised esthetics

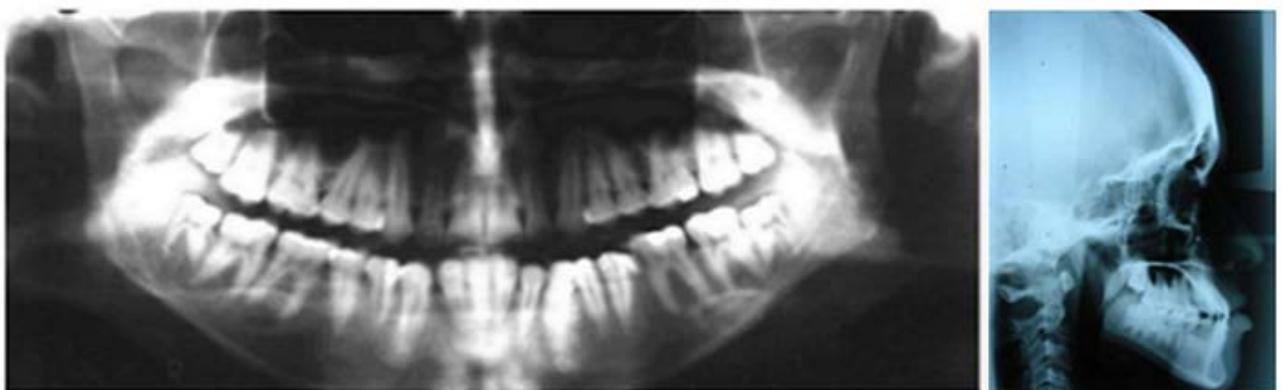
2.1.2. Treatment Plan

1. Pre-treatment prophylaxis
2. Combination therapy
3. Pre surgical phase—Decompensation

4. Non extraction Orthodontic therapy with 0.022' Roth Pre-adjusted Edgewise Appliance
5. Surgical plan: Bilateral 1 sagittal split osteotomy for mandibular setback
6. Finishing and Detailing
7. Long term retention plan

Table 1. Cephalometric measurements

VARIABLES	PRETREATMENT	POST TREATMENT	CHANGE
SNA (°)	84°	84°	0°
SNB (°)	87°	82°	5°
ANB (°)	-3°	2°	4°
SN to maxillary plane (°)	13°	13°	0°
Wits appraisal (mm)	-10 mm	+1 mm	9 mm
Upper incisor to maxillary plane angle (°)	130°	130°	0°
Lower incisor to mandibular plane angle (°)	73°	84°	11°
Interincisal angle (°)	131°	122°	9°
Maxillary mandibular planes angle (°)	22°	24°	2°
Upper anterior face height (mm)	56 mm	56 mm	0 mm
Lower anterior face height (mm)	70 mm	71 mm	1 mm
Face height ratio (%)	66.11%	63.49%	2.62%
Lower incisor to APo line (mm)	+3 mm	+2 mm	1 mm
Lower lip to Ricketts E Plane (mm)	+2 mm	+1 mm	1 mm

**Figure 1.** Pre-treatment intra oral**Figure 2.** Pre treatment OPG & Lateral Cephalometry

3. Treatment Alternatives

In completion of growth orthodontic treatment for patients has different alternatives approach for Class III skeletal malocclusion. Acceptable camouflage for class III

patients is done by proclining the maxillary anterior and retroclination of mandibular incisors resulting in downward and backward rotation of the mandible. The use of Class III elastics, were also used commonly for camouflage however, in more severe cases, extractions are necessary as a camouflage method. The most commonly used pattern of extractions is the removal of the lower first premolars or the extraction of the upper or lower second molar, the camouflage treatment should present little residual growth potential, and mild to moderate crowding in order to be able to use the space of the extractions, thus allowing for the achievement of the orthodontic camouflage and improving the dento-skeletal relationships [4].

Sato stated that discrepancy as a major factor affecting the occlusal plane in class III patients and he promoted Kim technique for its correction-MEAW Technique (Multi-loop Edgewise Arch-Wire) [5,6].

In case of maxillary retrusion in young patients Rey et al suggested an orthopedic maxillary protraction with a face mask which produces an average maxillary advancement of 1-2 mm [7]. As the patients age was a factor to be considered A presurgical orthodontic phase without extraction of maxillary first premolars and mandibular second premolars a de compensation of the dento alveolar segment followed by mandibular setback was planned for the patient.

4. A Pre Surgical Treatment Plan

The pre-surgical Orthodontics was planned to increase the reverse over jet to facilitate the proper positioning of the jaws during the surgery.

Only orthodontic treatment with extraction of lower first premolars would have addressed the dental problems and the negative lip step but may result in over retraction of already upright lower incisors and lead to periodontal problems and hence the cephalometric prediction suggested that surgical movement would optimize the dental and facial balance.

5. Treatment Progress

Initially straight wire orthodontic appliance (Edgewise prescription-slot 022" x 0.28"), assembled in both the arch. A sequence of 0.014" to 0.020" stainless steel alignment and leveling arch wires was used and correction of the maxillary midline based on the median sagittal plane was done to permit alignment and leveling.

Alignment and leveling of the mandibular dental arch (0.014" to 0.020" archwires) was performed simultaneously. In the maxillary arch, buccal root torque to the molars was decreased, thus contributing for correcting the transverse relationship between the dental arches. The inter-cuspalation was checked by occluding the plaster models that were obtained periodically with a reverse over jet of 5 mm sufficient enough before performing the surgery. After obtaining satisfactory inter-cuspalation of the plaster models, soldered hooks were placed on a 0.019 x 0.025 stainless steel arch wires in all inter-bracket spaces and the patient was forwarded to orthognathic surgery.



Figure 3. Post-treatment intra oral



Figure 4. Post-treatment OPG & Lateral cephalometry

6. Mandibular Set Back

The patient underwent pre surgical orthodontics in order to achieve the alignment and to facilitate surgical intervention. This interdisciplinary approach and the

direction of growth influence a long term results in female patients [8].

Mandibular advancement was corrected with sagittal osteotomy of the mandible ramus, setback of the mandible (Obwegeser DalPont). Rigid internal fixation with plates and screws were used for stabilisation of the osteotomy sites. Heavy intermaxillary elastics were placed to permit adequate inter cuspatation with the maxillary dental arch, in order to obtain a good facial balance. Surgery was planned according to facial analysis, predictive cephalometric tracing, and preparation of the surgical guide.

Postsurgical orthodontic treatment was required in order to establish normal occlusal relations. The evaluated parameters significantly improved following orthodontic/surgical treatment. The orthodontic treatment was continued after the surgical intervention and provided good inter maxillary contacts and alignment.

After surgery, the patient returned for orthodontic finishing for obtaining Class I molar relationship and Class I canine relationship, normal overjet and overbite. After the active treatment phase, a wraparound-type retention plate was used in the maxillary arch and a stainless steel 3 x 3 lingual canine-to-canine retainer was placed in the mandibular arch.

7. Treatment Results

At the end of treatment, it was observed functional occlusion, normal over jet and overbite, and adequate inter cuspatation, with Class I molar relationship and Class I canine relationship, coincident midlines, normal lateral and protrusive excursions. Mandibular prognathism and asymmetry were eliminated and facial esthetics was considerably improved. [Figure 3 & Figure 4] show the results obtained with the orthognathic surgery and orthodontic finishing stage. Total and partial superimposition of initial and final cephalometric tracings revealed the changes occurred with the treatment.

8. Discussion

Malocclusion and dentofacial deformity appear to have a direct bearing upon personality structure, attitudes toward one's appearance, and behaviour [9]. The success of orthodontic treatment in patient with a Class III malocclusion depends on his or her individual growth and the adequate timing of the treatment. If the maxilla does not grow vertically, the mandible rotates upward and forward, producing an appearance of mandibular prognathism that may be attributed to both the position and the size of the mandible. Hence it is very important to understand the components of facial deformity in order to outline an accurate and effective treatment plan [10,11,12,13].

The analysis of posteroanterior cephalometric radiographs determines if the asymmetry is related to the maxilla, mandible or both, in the sagittal or transverse

directions, and if the anomaly is also associated with dental compensations. When the skeletal problem compromises the facial aesthetics, the surgical-orthodontic treatment is the most indicated for patients who do not present with growth potential. A correct diagnosis and planning as well as an appropriate execution of the treatment plan are determinant factors for having success and long-term stability. In the case presented in this report, the orthodontic-surgical treatment was well indicated for correction of the Class III skeletal malocclusion and the patient's facial asymmetry, proving adequate masticatory function and pleasant facial aesthetics.

9. Conclusion

Treatment of Class III malocclusion without extraction in adults is challenging, hence a thorough understanding of the diagnosis, biomechanics and surgical procedure is essential to give the patient positive leads to satisfactory facial aesthetics. It is also evident that the self-confidence level of the individual was raised considerably following the total change in the perception.

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