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Case Report

Orthosurgical synergism in the management of severe skeletal Class-III malocclusion- A case report

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ABSTRACT

Background: What is now known as a Class-III malocclusion was initially recognized by Pierre Fauchard. True Class-III malocclusion is a genetically based condition that manifests in childhood. As the youngster reaches the teenage growth spurt, it becomes more obvious. Typically, we will discover a parent or grandparent who is dealing with the same issue. Class-III malocclusion, however, is not a disease. The abnormality itself is a compensatory mechanism to make up for variation that has happened at some point during the course of the individual's development.

Case Report: The case presented here demonstrates the importance of presurgical decompensation, surgical planning, including cephalometric predictions, and mock surgery in the management of severe skeletal Class-III malocclusion. The treatment included comprehensive orthodontic and surgical workup that included bilateral sagittal split osteotomy for mandibular setback of 3mm and LeFort-I osteotomy for maxillary advancement of 3mm.

Results: Class-I jaw relationships with a pleasing profile and correctly aligned arches were attained after 2 years of detailed treatment. This led to an aesthetic improvement and a significant increase in the patient's confidence.

Conclusion: Class-III skeletal malocclusions can be corrected surgically or through camouflage. However, an ortho-surgical approach may be necessary if the issue cannot be resolved with orthodontics alone. When done correctly, bi-jaw surgery has repeatedly been shown to be quite successful.

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1. Introduction

One of the most challenging malocclusions to cure is true Class-III malocclusion. Maxillary retrusion, mandibular protrusion, or a combination of the two are the causative factors for skeletal Class-III anomalies.¹⁻⁴ In order to avoid acting in the wrong direction while treating individuals with

Class-III defects, the skeletal profile and treatment goals must be thoroughly determined.^{5,6}

According to the position of the maxilla in respect to the craniofacial skeletal reference points, the Class-III malocclusion can be divided into three forms, and various surgical procedures are advised to address each type of discrepancy. Type A has a normal maxilla and an overgrown mandible. It is called true mandibular prognathism. Since the mandible causes the anterior crossbite or Class-III

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malocclusion, it is known as true mandibular prognathism. Therefore, to attain a normal or excellent facial appearance, mandibular surgery alone (for instance, sagittal split ramus osteotomy) is adequate.

Type B has maxillary and mandibular excess, but the mandible has grown more than the maxilla, resulting in an acute nasolabial angle and an anteriorly positioned point A. Asians are more likely to have a Class-III malocclusion of this kind. A new bimaxillary protrusive facial type (ante-face) would develop with mandibular surgery alone, even though a normal (Class-I) dentoalveolar occlusion and a normal overbite and overjet would have been achieved. Therefore, Type B patients need maxillary surgery with posterior movement in addition to mandibular surgery. Hypoplasia of the maxilla is a characteristic of Type C Class-III malocclusion. Concave facial features and an abnormally broad nasolabial angle are present, however, these features are typically hidden by dentoalveolar compensation, such as overly protruding maxillary front teeth. To rectify this, Le Fort osteotomies are most frequently employed. This involves anterior repositioning of the maxilla with maxillary osteotomy in order to provide a normal position of the upper lip and a normal nasolabial angle. The goal of mandibular surgery is to restore an ideal overbite and overjet. An overly retro-positioned face would arise from mandibular surgery alone.⁷

In view of the above-mentioned, a case report of a Type C patient is being highlighted who was successfully treated with bi-jaw surgery, the end results of which not only enhanced the functional efficiency and esthetic of the patient but also brightened the psycho-social state and boosted her confidence.

2. Case Description

A female patient who was 17 years old came to the Department of Orthodontics with the main complaint of difficulty in eating and unevenly positioned upper front teeth. The patient had no contributory medical history. On extra-oral examination (Figure 1) patient had a leptoprosopic facial form, grossly symmetrical face, concave profile, competent lips, acute nasolabial angle, and slightly high mandibular plane angle. Intra-oral examination (Figure 2) revealed Class-III Molar, Canine, and Incisor relationship with overjet -2mm and overbite of -1mm each and complete maxillary arch in crossbite relation with lower arch except for maxillary molars. Hypoplasia of 11, 12, 13, 21, 22, 23 and 43 were also noted.

In terms of cephalometric parameters, the patient had Skeletal Class-III Jaw Bases (Figure 3), which was caused by retrognathic small-sized maxilla and prognathic large-sized mandible with average towards vertical growth pattern, proclined upper anteriors, and retroclined lower anteriors. The orthopantomogram (Figure 4) showed no bone or dental pathology. Soft tissue problems consisted

of decreased prominence of upper lip, increased superior sulcus depth, and protrusive lower lip.

2.1. Prioritized problem list

1. Skeletal Class-III Jaw Bases
2. Concave Facial Profile with Paranasal Flattening and Increased Superior Sulcus Depth
3. Sunken Upper Lip and Protrusive Lower Lip
4. Class-III Molar and Canine Relationship
5. Anterior and Posterior Crossbite and Anterior Open Bite
6. Proclined and Forwardly placed Upper Incisors and Retroclined Lower Incisors
7. Hypoplastic defects w r t 11, 12, 13, 21, 22, 23 and 43 teeth

2.2. Treatment options

Considering the severity of discrepancy, camouflage treatment alone was inadequate to address the treatment needs. Orthognathic surgery approach was inevitable but bi-jaw surgery was preferred over single jaw maxillary or mandibular surgery due to the presence of source of discrepancy in both the jaws and to achieve a balanced profile with no soft tissue deformity and stable results.

3. Treatment Plan and Progress

3.1. Presurgical orthodontic phase

A presurgical phase of orthodontics comprised of decompensation of the arches by maxillary first premolar extraction with critical anchorage in the upper arch. Upper arch space was utilized for relieving crowding, rotations, and retraction of anterior teeth to create reverse overjet. The lower arch was also leveled and aligned (Figure 5). 0.021" X 0.025" stainless steel wires with soldered interproximal spurs were ligated in the upper and lower arches at the end of the presurgical phase.

3.2. Surgical planning

Surgical planning (Figures 6, 7 and 8) involved cephalometric template predictions followed by mock surgery. A semi-adjustable articulator was used to first simulate maxillary advancement of 3mm and an intermediate splint was fabricated. This was followed by a mandibular setback of 3mm and the fabrication of the final surgical splint.

3.3. Surgical phase

The second phase, or surgical phase, required advancing the maxilla by 3 mm using a Le Fort-I osteotomy (Figure 9), and stabilizing the new position of the maxilla with L-plates in the back and I-plates in the front with the aid of

an intermediate splint. Then, utilizing bilateral sagittal split osteotomy (BSSO) (Figure 10), the mandible was moved backward by 3mm. The I-plates were then placed and the mandible was stabilized using the Final Splint.

3.4. Postsurgical Orthodontics

4. Treatment Results

In the total treatment duration of 24 months, a balanced profile with Class-I jaw bases and ideal aesthetics were attained. The fullness of the paranasal areas and the support of the upper lip were improved. Also, post-treatment there was no sagging of the throat.



Fig. 1: Pre-treatment extraoral photographs



Fig. 2: Pre-treatment intraoral photographs

Yet, the enhanced patient's perception of her appearance that consequently emboldened her inner sense is the true determinant of treatment success. \$ show the post-treatment photographs, lateral cephalogram, and orthopantomogram of the patient. Figure 15, shows post-treatment tracing & Figure 16, shows pre and post-treatment superimposition.

Table 1 compares the pre-treatment and post-treatment cephalometric values of the patient.



Fig. 3: Pre-treatment lateral cephalogram

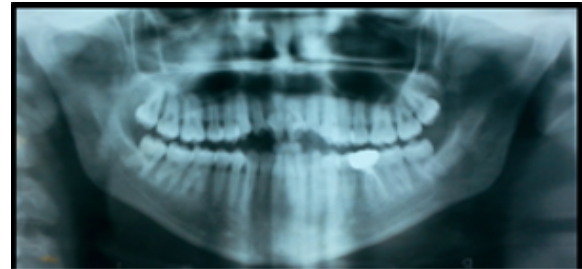


Fig. 4: Pre-treatment orthopantomogram



Fig. 5: Intraoral photographs at the end of presurgical orthodontic phase



Fig. 6: Pre-surgical preparations showing Mock surgery on articulated models;



Fig. 7: Pre-surgical preparations showing surgical splint

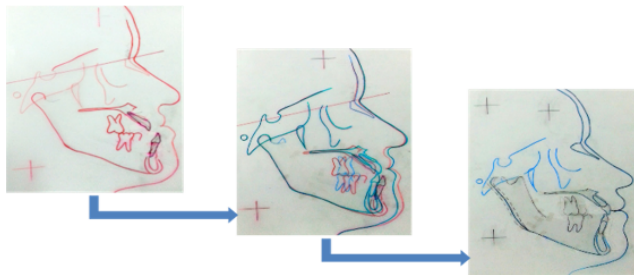


Fig. 8: Pre-surgical pre-parations showing Cephalometric surgical predictions

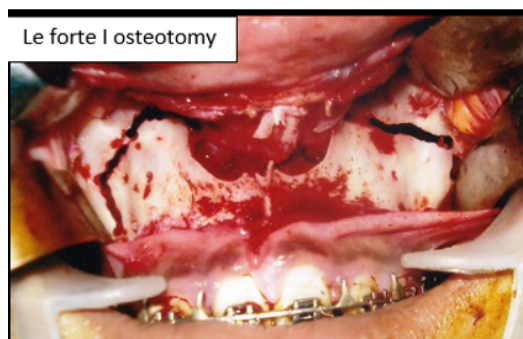


Fig. 9: Intra-operative surgical phase showing le fort-I osteotomy



Fig. 10: Intra-operative surgical phase showing bilateral sagittal split osteotomy



Fig. 11: Post-treatment extraoral photographs



Fig. 12: Post-treatment intraoral photographs

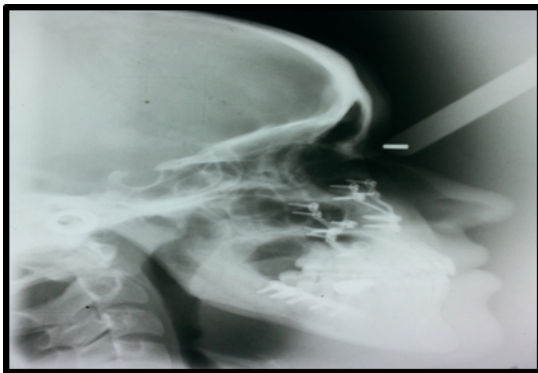


Fig. 13: Post-treatment lateral cephalogram

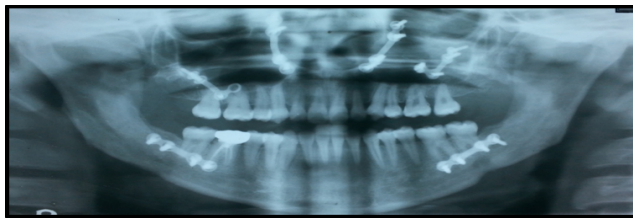


Fig. 14: Post-treatment orthopantomogram

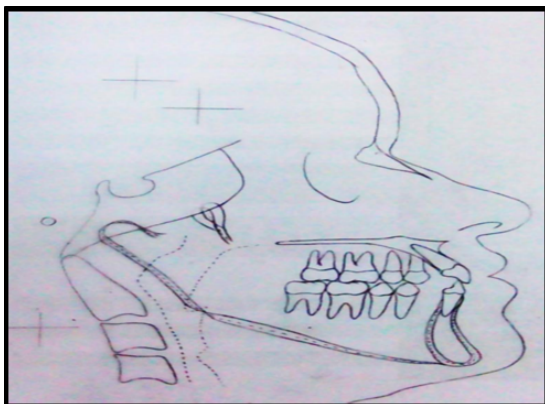


Fig. 15: Post treatment tracing

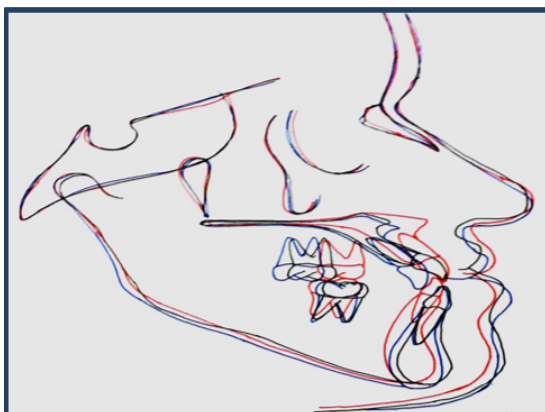


Fig. 16: Superimposition

Table 1: Pre-treatment and post-treatment cephalometric values

Parameters	Norms	Pre Treatment Values	Post Treatment Values
SNA (⁰)	82+/-2	77	84
SNB (⁰)	80+/-2	86	82
ANB (⁰)	2+/-2	-9	2
Pog ⊥ to N ⊥ (FH) (mm)	-4 to 0	11	4
SN-GoGn (⁰)	32	39	38
FMA (⁰)	25	29	28
U1-SN (⁰)	102 +/- 2	130	105
U1-NA (⁰ /mm)	22/4	48/18	23/6
L1-(N-Pog) (mm)	-2 to +2mm	5	5
L1-NB (⁰ /mm)	25/4	24/6	23/6
Interincisal Angle (⁰)	131 +/- 5	117	138
Facial Convexity:			
a. Hard Tissue (⁰)	-8 to 10	-18	4
b. Soft Tissue (⁰)	12+/-4	-2	7
Nasolabial Angle (⁰)	102+/-4	80	90
a. Upper Component	25	6	7
b. Lower Component	85	74	83
E Line:			
a. Upper Lip (mm)	-2 to -4	-10	-5
b. Lower Lip (mm)	-1 to -2	-3	-1
Overjet (mm)	2-3	-1	2
Overbite (mm)	1-2	-1	2

5. Discussion

Only in Class-III cases of mild isolated maxillary hypo-development without mandibular protrusion and without a considerable vertical alteration does orthopedic treatment become effective. In all other circumstances, surgical correction should be performed once the growth phase is complete.⁸ Even if theoretically and technically achievable, camouflage modifications are not always linked to an improvement in facial aesthetics. In practice, there are just a few instances where dental camouflage actually improves appearance. Otherwise, as with the exclusive orthodontic management of Class-III cases, it has no appreciable impact on facial aesthetics.⁸

If orthodontic treatment alone is unable to cure an adult’s dentoskeletal disparity, if dental camouflage would

be technically or periodontally contraindicated, or if it would not significantly improve appearance, surgery is the only reliable course of action. Therefore, it is reasonable to conclude that the vast majority of adult Class-III patients need an ortho-surgical approach, primarily to give their cosmetic issues the best possible resolution.⁹

In the present case described, the bijaw surgery was chosen as a treatment of choice considering the patient's chief complaint, the severity of malocclusion, and the patient's motivation towards the treatment. It was important to note that the successful treatment also involved the enhancement of function.

6. Conclusion

Class-III skeletal malocclusions can be corrected surgically or through camouflage. However, a combined orthodontic-surgical treatment should be performed if the issue is too severe for orthodontic correction alone and when the underlying skeletal deformity affects facial aesthetics. When performed carefully, bi-jaw surgery has repeatedly shown to be a remarkable success.

7. Source of Funding

None.


8. Conflict of Interest

None.


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