

# Surgical–orthodontic treatment of a skeletal class III malocclusion

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## ABSTRACT

For patients whose orthodontic problems are so severe that neither growth modification nor camouflage offers a solution, surgery to realign the jaws or reposition dentoalveolar segments is the only possible treatment option left. One indication for surgery obviously is a malocclusion too severe for orthodontics alone. It is possible now to be at least semiquantitative about the limits of orthodontic treatment, in the context of producing normal occlusion as the diagrams of the "envelope of discrepancy" indicate. In this case report we present orthognathic treatment plan of an adult female patient with skeletal class III malocclusion. Patient's malocclusion was decompensated by orthodontic treatment just before the surgery and then normal jaw relationship achieved by bilateral sagittal split osteotomy.

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## INTRODUCTION

Class III malocclusion is considered to be one of the most difficult and complex orthodontic problems to treat. Prevalence of class III malocclusion in Caucasians ranges from 0.8 to 4.0% and rises up to 1213% in Chinese and Japanese populations, while in North Indian population, class III malocclusion is found in up to 3.4% of the population.<sup>[1-3]</sup>

Individuals with class III malocclusion frequently show combinations of skeletal and dentoalveolar components. Several distinct cephalometric features have been reported in class III patients, such as a short anterior cranial base length, acute cranial base angle, a short and retrusive maxilla, proclined maxillary incisors, retroclined mandibular incisors, an excessive lower anterior face height and obtuse gonial angle.

Skeletal class III malocclusion may either be associated

with maxillary retrusions, mandibular protrusion, or a combination of the two.<sup>[4,5]</sup> These complex cases require careful treatment planning, an integrated approach and patient cooperation.<sup>[6]</sup> A poor facial appearance is often the patient's chief complaint, but it may be accompanied by functional problems, temporomandibular disorders, or psychosocial handicaps.<sup>[7]</sup> In this case report, we present the treatment of an adult girl with skeletal class III malocclusion.

## CASE REPORT

A 21-year-old female presented with the chief complaint of an unesthetic facial and dental appearance [Figures 1-4]. Her parents pointed that she was greatly dissatisfied by her appearance. She had a severe class III malocclusion with 2-mm anterior crossbite and 2-mm reverse overbite. The family had no history of skeletal class III malocclusion. When viewed from the front, the patient's face was oval. Lateral view and oblique view showed pronounced mandibular prognathism and midface deficiency with concave profile. Intraorally, the molar relationship was class III with a complete anterior crossbite [Figures 5–9].

Cephalometric analysis [Table 1] showed maxillary deficiency and mandibular protrusion. The ANB angle was  $-4^\circ$ , suggesting a skeletal class III malocclusion.

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Figure 1: Pretreatment extraoral frontal view



Figure 2: Pretreatment extraoral oblique view



Figure 3: Pretreatment extraoral lateral view



Figure 4: Pretreatment extraoral smile view



Figure 5: Pretreatment intraoral frontal view



Figure 6: Pretreatment intraoral right lateral view

**Table 1: Cephalometric findings before and after surgery**

Angle (degrees)	Mean	Pre	Stage	Post
SNA	82	77	77	78
SNB	80	81	81	76
ANB	2	4	4	2
SND	76	79	79	75
IMPA	90	79	91	90
E line (lower lip, in mm)	-2	0	+2	-2

The skeletal problem was due to a combination of maxillary deficiency and mandibular prognathism [Figures 10–12].

#### Treatment

Bilateral sagittal split osteotomy with presurgical and postsurgical orthodontics was planned to achieve



Figure 7: Pretreatment intraoral left lateral view



Figure 8: Pretreatment intraoral maxillary occlusal view



Figure 9: Pretreatment intraoral mandibular occlusal view



Figure 10: Pretreatment lateral cephalogram

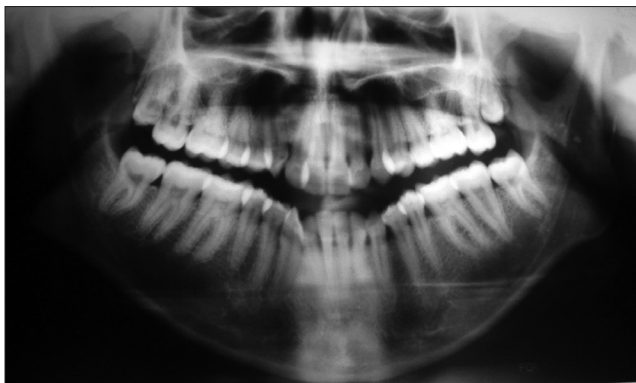


Figure 11: Pretreatment orthopantomogram



Figure 12: Pretreatment posteroanterior cephalogram

esthetically acceptable and functionally optimum occlusion with straight facial profile and minimum traumatic surgical exposure to the patient. Presurgical orthodontics in both the arches was done to relieve maxillary and mandibular crowding. Maxillary and mandibular arches were aligned upto  $0.019 \times 0.022$  stainless steel wire with  $0.022$  slot edgewise appliances.

The mandibular incisors were decompensated by proclining them in normal inclination and the archforms were coordinated [Figures 13–17]. Mandibular third molars were extracted one month prior to the orthognathic surgery.



Figure 13: Presurgical orthodontics, intraoral frontal view



Figure 14: Presurgical orthodontics, intraoral right lateral view



Figure 15: Presurgical orthodontics, intraoral left lateral view



Figure 16: Presurgical orthodontics, intraoral maxillary occlusal view



Figure 17: Presurgical orthodontics, intraoral mandibular occlusal view

Before orthognathic surgery, the template was prepared using tracing paper. Skeletal profile of maxillae and mandible was traced. Profile tracing was then transferred using a carbon paper to a thin cardboard. This outline was then cut to produce

cardboard template. From these templates, trial sections were made until desirable location and amount for osteotomy was found. The cut section of mandible was then fitted back to tracing in desired occlusal relation and the probable postsurgical changes were checked. In this case, 8 mm of mandibular setback brought class I molar relation with an esthetically pleasing profile. Hence, 8 mm setback of mandible was planned for osteotomy.

#### Surgical procedure

Retromolar area was exposed using modified third molar incision. Bilateral sagittal split osteotomy with short lingual split was carried out using surgical saws.<sup>[8]</sup> Medial pterygoid muscle was detached after performing the split and 8 mm setback was achieved.

Fixation was done using four hole miniplates and screw on both sides. Intermaxillary elastics were placed on braces for 14 days in immediate postoperative



Figure 18: Postsurgical extraoral frontal view



Figure 19: Postsurgical extraoral oblique view



Figure 20: Postsurgical extraoral lateral view



Figure 21: Posttreatment extraoral smile view



Figure 22: Postsurgical extraoral frontal view



Figure 23: Postsurgical intraoral right lateral view

phase. The patient was followed closely after the procedure and was guided to perform opening and lateral movements. Orthodontic treatment was resumed 6 weeks after surgery. One year later, fixed appliances were removed and a retention appliance

was delivered [Figures 18–28].

Patient's cooperation was excellent throughout the treatment. Cephalometric findings show the normal jaw relationship [Table 1, Figure 29].



Figure 24: Postsurgical intraoral left lateral view



Figure 25: Postsurgical intraoral maxillary occlusal view



Figure 26: Postsurgical intraoral mandibular occlusal view



Figure 27: Postsurgical lateral cephalogram



Figure 28: Postsurgical orthopantogram

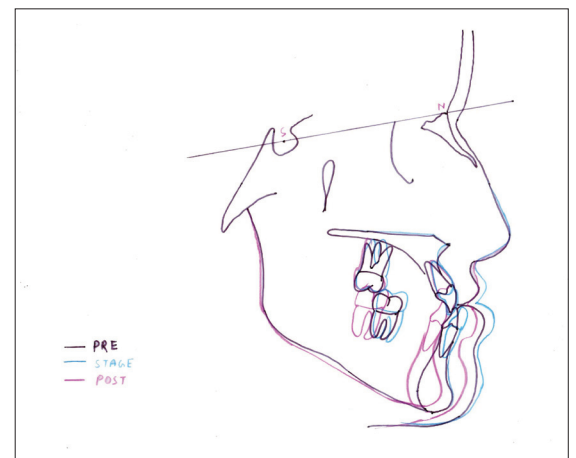


Figure 29: Superimposition of pre- and post-treatment cephalometric tracings

## DISCUSSION

This case report describes the treatment of an adolescent girl with dental and skeletal class III relationships. Surgical-orthodontic treatment was the best option for achieving an

acceptable occlusion and a good esthetic result in this case. An experienced multidisciplinary team approach ensures a satisfactory outcome. Presurgical orthodontics removes all the dental compensations and suggests the location and extent of the skeletal discrepancy. Normal skeletal base

relationship is achieved by osteotomy and setback of the prognathic mandible, postsurgical orthodontics guides the normal occlusal rehabilitation by correcting any emerging dental discrepancies.

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