

CORRECTION OF ADULT SKELETAL CLASS III BY MEANS OF COMBINED ORTHODONTIC AND SURGICAL APPROACH: A CASE REPORT

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ABSTRACT

Class III malocclusions are considered to be one of the most difficult problems to treat. Their causes are multifactorial including genetic and/or environmental factors. Class III malocclusions are generally classified into 2 categories: skeletal and dental. The diagnosis is important due to the different treatment approaches pertaining to varied malocclusion and age. Generally, a dental class III can be treated with orthodontics alone, while a true skeletal class III requires a combination of orthodontics and surgery. The following is a case report of an adult male patient with skeletal Class III malocclusion who was treated by ortho-surgical approach in Department of Orthodontics in collaboration with Department of Oral and Maxillofacial Surgery, Dr. R. Ahmed Dental College and Hospital, Kolkata.

KEY WORDS

Orthognathic; orthodontics; Class III; BSSO

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INTRODUCTION

A developing skeletal class III malocclusion is one of the most challenging problems confronting the practicing orthodontists.^{1,2} Compared to class I and class II, a true class III malocclusion is rare. This type of malocclusion is a growth-related problem that often becomes severe if left untreated, and should be corrected as soon as its initial signs are recognized, such as edge to edge bite or cross bite.³ Jaw growth is a slow and gradual process, and in some individuals, the upper and lower jaws may grow at different rates affecting chewing, speech, long-term oral health, and appearance according to the cephalocaudal gradient of growth.

The features of dental Class III include anterior crossbite, reverse overjet and canines and molars in Class III relationship. The diagnosis is important due to the different treatment approaches. In general, a dental Class III can be treated with orthodontics alone.

There are three main treatment options for skeletal class III malocclusion: growth modification, dentoalveolar compensation (orthodontic camouflage), and orthognathic surgery.⁴ Growth modification should be commenced before the pubertal growth spurt. After this spurt, only the latter two options are possible. Decision to reposition the mandible posteriorly or the maxilla anteriorly in the treatment of class III malocclusions depends upon multiple clinical, cephalometric, and biomedical considerations. In each case the decision must be made on the basis of frontal and profile treatment objectives, occlusion, and the needs of the patient. In many instances, depending upon the magnitude of the disharmony, the treatment plan will be based upon the clinical judgment and experience of the surgeon and orthodontist. Surgery for class III patients is both predictable and stable, in proportion to how much maxilla or mandible has been moved.^{5,6}

CASE REPORT

A 27-year-old male patient reported to the Department of Orthodontics, Dr. R Ahmed Dental

College and hospital, Kolkata with the chief complaint of forwardly placed lower front teeth, inability to chew properly and impaired speech that has led to low self esteem levels in him.

Clinical frontal examination revealed a grossly symmetrical face with leptoprosopic facial form. The profile assessment revealed concave profile with anterior facial divergence, orthognathic maxilla, and prognathic mandible with protrusive lower lip and high mandibular plane angle.

Figure 1 shows extraoral pretreatment

photographs whereas Figure 2A shows intraoral photographs. Intraoral examination revealed good periodontal health with symmetrical arches, and mild crowding in the lower arch. Class III molar and canine relation on both the sides and an anterior openbite and mild posterior crossbite on the right side.

Temporomandibular joint examination did not reveal any discrepancy between centric relation and centric occlusion and patient did not complain of pain or clicking in the joint.



Figure 1: Pre-treatment extra-oral photograph



Figure 2A: Pre-treatment intra-oral photograph

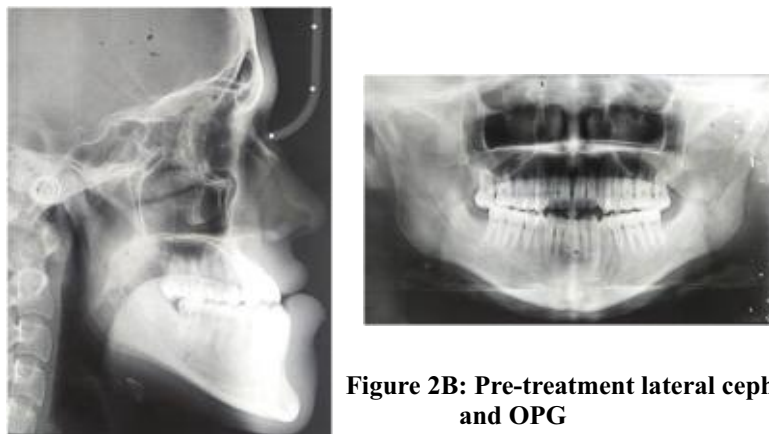


Figure 2B: Pre-treatment lateral cephalogram and OPG



Figure 3: Pre-surgical extraoral photographs



Figure 4: Pre-surgical intraoral photographs



Figure 5: Post-surgical extra-oral photograph



Figure 6: Post-surgical intra-oral photograph

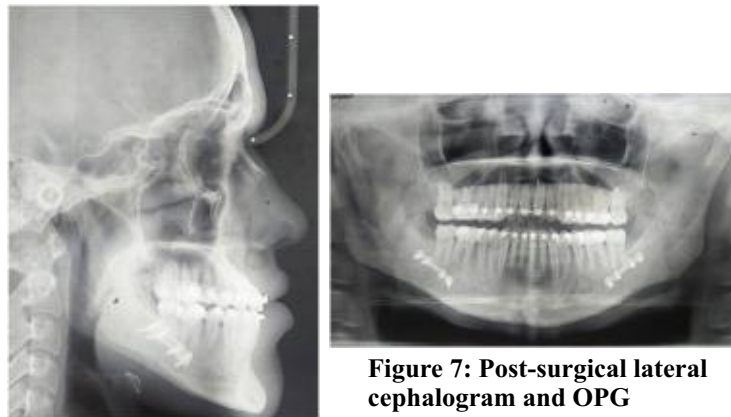


Figure 7: Post-surgical lateral cephalogram and OPG



Figure 8: Pre-surgical and post-surgical lateral cephalogram and Superimposition

Cephalometric examination revealed orthognathic maxilla, prognathic mandible, with vertical growth pattern and proclined maxillary incisors and retroclined mandibular incisors. Mild vertical deficiency was evident. Soft tissue examination on lateral cephalogram revealed concave profile, increased nasal prominence, normal nasolabial angle, increased upper lip thickness, and protrusive lower lip. A panoramic radiograph showed that all teeth were present including the third molars Figure 2B.

DIAGNOSIS

The case was diagnosed as Angle's class III malocclusion with class III skeletal jaw base as indicated by the ANB angle with an anterior open bite.

TREATMENT OBJECTIVES

The objectives of the treatment were:

1. Attain a pleasing profile by reducing the prominence of lower jaw

Values	Pre- treatment	Post-treatment
ANB	-6°	-1°
SNA	83°	83°
SNB	89°	84°
MP-FH	33°	30°
Gonial angle	135°	132°
U1 to NA	27°	28°
IMPA	81°	85°
Go-Pog	86mm	80mm
Ar-Go	51mm	51mm
N-ANS	47mm	47mm
ANS-Me	69mm	65mm
Upper lip to E line	-3mm	-3mm
Lower lip to E line	+4mm	-1mm

Table 1: Cephalometric values

2. Alignment of both the arches with proper angulations of all the teeth
3. Correct the anterior crossbite and the openbite
4. Achieve an acceptable occlusion

TREATMENT OPTIONS

1. Orthodontic camouflage by extraction of lower first premolars on both sides followed by space closure. This option was ruled out as the lower anteriors were already severely retroclined.
2. Use of class III elastics to correct the dental malrelation. This option was also ruled out as the dental discrepancy was way too much to be corrected by elastics.
3. Orthodontic decompensation followed by orthognathic surgery. The most acceptable option considering all the adjoining factors.

TREATMENT PLAN

The treatment plan for this patient was pre-surgical orthodontic decompensation of the dental malocclusion followed by surgical mandibular setback by BSSO procedure. Finally, post-surgical orthodontics to be done to achieve a stable occlusion.

TREATMENT PROGRESS

Treatment was started in pre-adjusted edgewise mechanics (MBT prescription) in 0.022" slot with initial 0.014" round NiTi wire followed by 0.016" round NiTi. Initial crowding was relieved. This was followed by placement of expanded upper 0.017" × 0.025" SS wire for correction of posterior crossbite. The openbite also got reduced a little due to flattening

of the lower arch. Finally, 0.019" × 0.025" SS wire was placed for a period of 1 month before the surgery date. The negative overjet during this decompensation period increased from 3mm to 5mm. The total orthodontic decompensation took about 7 months (Figure 3 & 4).

Immediate presurgical planning included an elaborate prediction tracing followed by mock surgery of the patient's cast mounted on a semi-adjustable articulator. It was decided to set back the mandible by 6mm bilaterally. For that Bilateral saggital split osteotomy was planned. After mock surgery was done, an acrylic surgical splint was fabricated on the newly determined occlusal position and the fit was checked inside the patient's mouth on each arch, one at a time. Finally, the patient was referred to the department of Oral and Maxillofacial Surgery for BSSO surgery.

After surgery, the patient was referred back to the department of orthodontics and dentofacial orthopedics for post-surgical orthodontics after initial stability of the surgical site was achieved. The splint was removed and 0.014" round SS wire was placed and settling elastics were started for proper intercuspation. Class I canine and class I molar relationship was established. Time taken to achieve an acceptable intercuspation was about 6 months.

RESULTS

Cephalometric evaluation showed (Table 1), (Figure 8) anti-clockwise rotation of the mandible indicated by gonial angle that reduced from 135° to 132° and mandibular plane angle that reduced from 33° to 30°. SNB also reduced from 89° to 84° which resulted in the decrease in the lower lip prominence from +4mm to -1mm in relation to E line. The lower facial height also decreased from 69mm to 65mm. the lower incisors got uprighted from an IMPA of 81° to 85°.

Positive overjet and overbite was achieved. Angle's class I molar and canine relation were established. The profile became straight from concave (Figure 5-7).

DISCUSSION

For skeletal class III cases who have already completed their growth phase and show significant dental compensation to mask the skeletal discrepancy, surgical treatment approach is a very viable treatment option and in fact in some cases, the only option to achieve optimal facial esthetics with a stable dental and skeletal relationship.⁷ Bilateral sagittal split osteotomy (BSSO) is a very commonly carried out surgical procedure for correction of such skeletal discrepancy.⁸ But the compensated dentition in both the arches try to unsuccessfully mask the skeletal discrepancy and thereby reduce the capacity of surgical correction that can be achieved otherwise. Hence it is very important to bring the dentition in both the arches to their near original axial inclination before the surgical correction can be attempted.⁹ This is achieved by pre-surgical orthodontics. In this case, similar orthodontic decompensation was achieved by initial round NiTi wire followed by rectangular SS wire.

Relapse after such surgery is not an uncommon finding in many cases. This can be due to several reasons such as condylar sag during the surgical procedure, patient cooperation with splint usage, incomplete orthodontic decompensation among others. Keeping this in mind, it is always better to do some overcorrection during the planning of the surgical treatment i.e. during the mock surgery procedure.¹⁰ Also the patient should be asked to wear the splint after surgery till the surgeon feels the initial stability of the surgical site has been achieved. Finally, proper orthodontic settling during the post-surgical orthodontic phase also minimizes this problem.

CONCLUSION

A carefully planned presurgical orthodontic phase with skillfully done surgery and adequate detailing during postsurgical phase, keeping patients expectations in mind are the key factors that dictate the results of a successful orthognathic treatment.

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