

# Surgery-First Approach: A Boon for Periodontally Compromised Patients - A Case Report

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## Abstract

**The Rationale:** The surgery-first approach (SFA) has revolutionized orthognathic surgery in recent years and in trend because it addresses the dentofacial abnormalities first, making the patient compliant and outcome more predictable. **Patient Concerns:** A 22-year-old female was concerned about her forwardly placed teeth. **Diagnosis:** She had a compromised periodontium with a skeletal Class II malocclusion and dental malocclusion. **Treatment:** A SFA plan was executed with the extraction of all first premolars followed by postsurgical orthodontic treatment. **Outcomes:** Optimal functional and dentofacial esthetics were achieved by 11 months. **Take-away Lessons:** Research has attributed several advantages of SFA over the conventional triphasic approach, which has proven to be beneficial in periodontally compromised individuals as it intends to relieve any traumatic occlusion primarily by stabilizing tissue integrity. It is most favorable in patients seeking a quick transformation with the least possible duration.

**Keywords:** Mandibular osteotomy, maxillary osteotomy, orthognathic surgery, periodontitis, surgery-first approach

## INTRODUCTION

The concept of the surgery first approach (SFA) was introduced to reduce shortcomings of the conventional procedure.<sup>[1]</sup> It supported the principle that normalizing surrounding soft tissues set the teeth into a better position after the surgery coupled with the concept of regional acceleratory phenomenon (RAP) where enhanced metabolic activity within healing tissues becomes an advantage when treating periodontally compromised patients.

The following case report illustrates a severe skeletal Class II malocclusion with compromised periodontium successfully managed by SFA and its anticipatory benefits on improving the dentofacial esthetics and obtaining functional rehabilitation.

## CASE REPORT

### Patient concern

A 22-year-old female sought treatment in the orthodontics department with a complaint of forwardly placed upper front teeth [Table 1].

## Diagnostic assessment

The patient had incompetent lips with an excessive show of incisors at rest (8 mm), which increased (10 mm) on smiling with unequal gingival height in the maxillary anterior region and a nonconsonant smile arc.

On intraoral examination, the patient exhibited Class I molar relationship and end-on canine relationship bilaterally, with a deep bite, deep curve of Spee, increased overjet of 10 mm, spacing in the maxillary anterior region, and crowding in the mandibular anterior region.

A periodontist performed a thorough periodontal examination. Gingival recession was seen in 31 and multiple

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periodontal pockets. The clinical attachment loss was 7 mm in 31 owing to traumatic deep bite (3 mm recession + 4 mm pocket depth). Palatal impingement was noted. Grade 1 mobility was present in 31, 32, 41, and 42. The plaque index revealed a score of 2.4 indicating poor oral hygiene and the gingival index score was 2.1 which substantiated severe gingivitis.

Pretreatment orthopantomogram indicated the horizontal bone loss extending up to the middle third of the roots in the entire maxillary arch and mandibular anterior [Figure 1].

### Therapeutic intervention

The patient presented a skeletal Class II malocclusion with severe proclination of maxillary and mandibular teeth.



**Figure 1:** Pretreatment records and surgical treatment objective

**Table 1: Timeline**

| Date               | Treatment progress   |
|--------------------|--|
| July 24, 2018      | Pretreatment records taken   |
| July 25, 2018      | Periodontal assessment by periodontist, followed by oral prophylaxis                   |
| July 26, 2018      | Evaluation by oral maxillofacial surgeon and fitness approval from a general physician |
| August 2, 2018     | Presurgical strap up with 0.016" NiTi arch wire in the maxillary arch                  |
| August 3, 2018     | STO preparation, face bow transfer, and mock surgery                                   |
| September 5, 2018  | Extraction of all first premolars and orthognathic surgery was performed               |
| September 17, 2018 | Mandibular arch strap up with 0.016" NiTi arch wire                                    |
| October 20, 2018   | 0.016×0.022" NiTi in maxillary and mandibular arch                                     |
| November 14, 2018  | 0.017×0.025" NiTi in maxillary and mandibular arch                                     |
| December 15, 2018  | 0.019×0.025" NiTi in maxillary and mandibular arch                                     |
| January 17, 2019   | 0.019×0.025" SS in maxillary and mandibular arch                                       |
| February 11, 2019  | Retraction with 0.018" SS with intermaxillary hook                                     |
| April 29, 2019     | Settling on 0.014" SS  |
| June 15, 2019      | Debonding and retainer delivered   |

NiTi=Nickel-titanium; STO=Surgical treatment objective; SS=Stainless steel

The cephalometric evaluation revealed a very thin cortical boundary concerning the upper and lower incisors [Table 2]. Orthodontic retraction in these situations will cause tipping of roots beyond the cortical bone, leading to resorption.<sup>[2]</sup> Surgical retraction was suggested as an option to reduce the treatment time and further deterioration of the periodontal condition. Since occlusal trauma had to be addressed initially, SFA offered the ideal solution.<sup>[3]</sup>

SFA involved extraction of the all first premolars with intrusion and setback with anterior maxillary osteotomy (AMO) and mandibular anterior subapical osteotomy. This will be followed by postsurgical orthodontics of leveling and aligning, space closure, and settling. The occlusion would be finished in Class I molar, premolar, and canine relationship with coincident dental and facial midlines and a stabilized periodontium.

To begin with, chronic periodontitis was addressed by nonsurgical therapy. Virtual treatment planning was carried



**Figure 2:** Surgical phase illustrating anterior maxillary osteotomy and mandibular anterior subapical osteotomy

out using FACAD® (Ilexis AB, Sweden) that generated a surgical treatment objective [Figure 1]. The case progressed by presurgical bonding with 0.022" × 0.028" MBT preadjusted edgewise prescription appliance in the maxillary arch segmentally, which would permit alignment of the anterior simultaneously during the postsurgical healing phase.

Extraction of first premolars in all four quadrants was done during the surgery. An incision for AMO by Cupar method was placed along the maxillary vestibular region from 14 to 24 regions. Excess bone was removed as planned for the 6 mm setback and 4 mm impaction of the maxillary anterior segment. Mandibular anterior subapical osteotomy of 5 mm was done along with the extraction of 34 and 44 [Figure 2].

Once sufficient healing was achieved, bonding of the mandibular arch was implemented. Leveling and aligning were completed in both arches.

The retraction was initiated with elastics for space closure and to bring about controlled tipping of the maxillary incisors. Retention protocol with maxillary Begg's wrap around and mandibular lingual bonded retainer was advocated [Figure 3].

The patient was advised to wear the maxillary retainer full time for 8 months to allow reorganization of the supracrestal gingival fibers, followed by part-time wear for another 4 months. Despite the patient being subjected to a meticulous oral hygiene program at regular intervals, the patient did not maintain her hygiene



**Figure 3:** Orthodontic phase: Complete strap up of arches and retraction mechanics



**Figure 4:** Posttreatment records and superimposition of pre- and post-treatment cephalograms

and developed white spot lesions (WSLs). Mechanical plaque control and Fluor Protector varnish were professionally applied every 4 months for long-term caries prevention.

### Follow-up and outcomes

Treatment was completed in 11 months. ACP-CPP tooth mousse was prescribed to the patient to promote postorthodontic remineralization.

A harmonious facial profile and stable dental occlusion were obtained without worsening the periodontal status. The patient had a pleasing smile and Class I molar and canine relationship with normal overbite and overjet. Posttreatment orthopantomogram shows a good improvement of the periodontium. Superimposition of the pre-and post-treatment lateral cephalograms revealed the quantum of impaction and setback of the anterior segments achieved and associated dental and soft-tissue adaptations [Figure 4 and Table 2].

The patient is being monitored every 6 months for the past 1 year and has a stable occlusion and dentofacial esthetics. Gingiva was found to be healthy with no further progression of WSL.

### DISCUSSION

AMO was indicated as it addresses localized anterior maxillary protrusion in patients with adequate posterior occlusion.

Moreover, it is proven that AMO has lesser relapse tendencies and the advantage of preserving the palatal vascular supply and attached gingiva of osteotomized segments.<sup>[4]</sup> Mandibular subapical osteotomy was directed to correct the deep curve of Spee, relieve TFO, and the proclined anterior.

After orthognathic surgery, there is an increase in the blood flow above the presurgical levels which facilitates healing and stimulates bone turnover which speeds up orthodontic tooth movement.<sup>[5]</sup> Thus, SFA not only bypassed the presurgical orthodontics stage but also increased cellular activity taking place after surgery (RAP), resulting in shortened treatment time.<sup>[6,7]</sup>

Permanent retention is often part of the treatment plan for such patients.<sup>[8,9]</sup> In the present case scenario, the posterior occlusion is undisturbed and stable. The complications of AMO and subapical procedure may arise owing to transient malocclusion postoperatively, hypersensitivity of the teeth, root damage at the osteotomized site, uncontrolled hemorrhage, nerve injury, necrosis of soft tissues, skeletal relapse. Nevertheless, these complications remain sporadic episodes and can be mitigated when performed by proficient surgeons.<sup>[10]</sup>

A future alternate perspective would be accelerated orthodontics through either wilckodontics, vibrational technology, photobiomodulation with aligner treatment which has

**Table 2: Comparison of pre-and post-treatment cephalometric variables**

| Variables                                     | Pretreatment | Posttreatment |
|---|--------------|---------------|
| SNA (°)                                       | 87           | 82            |
| SNB (°)                                       | 80           | 78            |
| SND (°)                                       | 77           | 78            |
| ANB (°)                                       | 7            | 4             |
| U1 to NA (mm)                                 | 8            | 5             |
| U1 to NA (°)                                  | 35           | 25            |
| L1 to B (mm)                                  | 10           | 7             |
| L1 to B (°)                                   | 35           | 32            |
| IMPA (°)                                      | 106          | 100           |
| Inter-incisal angle (°)                       | 100          | 126           |
| FMA (°)                                       | 25           | 26            |
| Body length (Go-Me)                           | 66           | 67            |
| N A Pg (°)                                    | 11           | 2             |
| Mandibular plane to HP (°)                    | 22           | 23            |
| Max pos (mm)                                  | 4            | 0             |
| Mand pos (mm)                                 | -1           | -6            |
| N Pg (mm)                                     | -4           | -4            |
| ANS-PNS (mm)                                  | 51           | 51            |
| N-ANS (mm)                                    | 45           | 43            |
| N-PNS (mm)                                    | 47           | 48            |
| Lower anterior facial height (Ans-Gn/HP) (mm) | 57           | 58            |
| 1 to NF (mm)                                  | 33           | 29            |
| 1 to MP (mm)                                  | 43           | 39            |
| 6 to NF (mm)                                  | 19           | 20            |
| 6 to MP (mm)                                  | 29           | 27            |
| Nasolabial angle (°)                          | 88           | 98            |
| Lower lip to E plane (mm)                     | 3            | 0             |

been proven to be beneficial in periodontally compromised patients. However, in complex scenarios, the treatment duration is expected to prolong by 2 years, making the patient compliance and prognosis of the periodontal status highly questionable.<sup>[11,12]</sup>

### Patient perspective

Initially, the patient was psychosocially distressed due to her facial appearance. Postsurgically, she reported immediate gratification; her quality of life and confidence were greatly improved because of restored esthetics.

### Critical appraisal

Choosing conventional orthognathic surgery would result in a compromised outcome by worsening existing periodontal status. A holistic SFA would address both function and esthetics with remarkable improvement in facial appearance, shorter duration, and the periodontal stress would be drastically reduced.

The periodontal condition proved to be a challenge in achieving occlusal stability. The short, thin upper lip further affected the smile esthetics. An effort was also taken to offer all possible retention protocols to overcome the relapse tendency.

## CONCLUSION

This case report demonstrated that SFA (surgery driven) can be successfully applied in correcting skeletal malocclusion of a severe periodontally compromised patient. Furthermore, patient self-confidence improved because of appreciable facial esthetic changes seen during the initial stage itself.

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### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

Dr. Ananthanarayan P, who is one of the section editors of the journal, was not involved in the editorial process of this article.

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