Management of Skeletal Class II Malocclusion by Surgery-First Approach– A Short Term Clinical Experience

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Abstract

Orthognathic surgery has undergone considerable evolution during the past years. Traditional orthognathic surgery is a rarely adopted procedure in recent time, as patients prefer hastened orthodontic treatment. Recent advances in the application of mini-screws and presurgical simulational orthodontic management skills on dental model shows that it is possible to perform a surgery-first orthognathic approach without pre-surgical orthodontic treatment. Class III skeletal malocclusions are most frequently treated by surgery first approach since, the facial correction corrected initially contributes to positive attitude in patients. On the contrary Class II skeletal malocclusions are rarely treated by surgery first approach since the patient profile worsens initially and dentoalveolar compensation complicates the planning. This paper highlights the advantages and disadvantages of advocating surgery first approach in skeletal class II patients.

Keywords: Surgery First Approach; Orthognathic Surgery; SFOA; Skeletal Malocclusion

Introduction

Surgery-first approach (SFA) has been a paradigm shift in the field of orthognathic surgery. Majority of the published cases that have been managed by this approach are of skeletal class III. The traditional orthognathic approach requires presurgical orthodontic treatment for an average period of 17 months [1], followed by surgery and postsurgical orthodontic treatment for approximately 6 - 12 months. Therefore, the total treatment duration for the conventional orthognathic approach lasts approximately from 18 - 36 months [2-4]. Traditional orthognathic surgery is a rarely adopted procedure in recent time, as patients prefer hastened orthodontic treatment. Although presurgical orthodontic treatment has been approved as an inevitable process for stable orthognathic correction before surgery, recent advances in the application of mini-screws and presurgical simulational orthodontic management skills on dental model shows that it is possible to perform surgery-first orthognathic approach without pre-surgical orthodontic treatment [5].

The SFOA is indicated in patients with: well aligned to mildly crowded anterior teeth, normal to mild proclined/retroclined incisor inclination, flat to mild curve of spee, minimal transverse discrepancies, pronounced soft tissue imbalance in skeletal class III patients, severe skeletal class II deformities in which minimal decompensation is a requisite [6]. This approach is also advantageous in patients...
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who desire immediate esthetic result along with improvement in function. In these patients the immediate post-surgical occlusion must exhibit at least three stable occlusal stops with positive overbite of six anterior teeth and existing arch coordination. The advantages of SFOA includes immediate change in the facial profile. Advocating surgery first eliminates the unsightly pre-surgical profile and allows the chief complaint of the patient to be addressed at the beginning of treatment. Patient cooperation is optimum during post-surgical orthodontic treatment hence, reduces overall treatment period and post-op orthodontic treatment can be progressed rapidly [6]. The main factor which is responsible for rapid tooth movement is the regional acceleratory phenomenon (RAP) [7]. They believed that normalizing the soft tissue drape, places the dentoalveolar segments and teeth into better positions after surgery [8].

Surgery first approach uses osteotomy to solve both skeletal problems and dental compensation so that the orthodontic treatment becomes less complex. With these advantages, SFOA is regarded as an ideal and valuable alternative over conventional surgical procedure. SFOA is contraindicated in patients who require definite decompensation, severe crowding, arch-incoordination, severe vertical or transverse discrepancy, patients with high expectations of treatment outcomes in terms of dental esthetics and stable occlusions, severe proclination of upper and lower anteriors [6].

This paper highlights the advantages and disadvantages of SFOA performed in skeletal Class II malocclusion through two case reports.

**Case Reports**

Class II skeletal malocclusion with mandibular retrognathism is treated by mandibular advancement surgeries associated with or without genioplasty.

Owing to the dentoalveolar compensations, it is often difficult to predict the surgical outcome, hence conventional orthognathic approach is preferred in most of the situations.

Compensations are evidently perceived in transverse, anteroposterior and vertical planes of space. Anterior crowding along with the other discrepancies attribute to the complexity of the skeletal malocclusion.

The therapeutic extractions conventionally followed are upper second premolars and lower first premolars for decompensating skeletal class II malocclusions. In patients whom crowding is absent non-extraction treatment strategy is often adopted. The transverse decompensation is managed by dentoalveolar expansions using arch wire or by fixed adjunctive expansion appliances.

The patients who underwent surgery first approach are divided into two clinical categories:

- **Category (1)** - In whom therapeutic extraction was performed for decompensation
- **Category (2)** - In whom decompensation did not require extraction strategy.

In category (1) the patients presented a convex profile, obtuse nasolabial angle with low mandibular plane angle and skeletal class II malocclusion due to retrognathic mandible and orthognathic maxilla. Intra oral examination revealed dentoalveolar class I malocclusion with mild proclination in maxillary incisors, proclined and crowded lower incisors (Figure 1 and 2).

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Figure 1: Pretreatment extraoral and intraoral records of patient in category (1) who underwent therapeutic extraction.

Figure 2: Pretreatment cephalogram of patient in category (1) showing mandibular deficiency.
The patient who was subjected to Surgery first approach the appliance was strapped up segmentally avoiding the upper second premolars and lower first premolars. The respective premolars were extracted during the surgery and mandibular advancement with advancement genioplasty was performed. Orthodontic treatment comprising of aligning, levelling, space closure and settling was completed after the surgery (Figure 3).

Figure 3: Mandibular advancement with advancement genioplasty performed in surgery first approach with on-table extraction of upper second premolars and lower first premolars.

The patient’s profile were successfully corrected and occlusion was settled in stable Class I canine and molar relation (Figure 4).

Figure 4: Post-treatment extraoral and intraoral records treated with extraction in surgical first approach.

In category (2) the patients presented a convex profile with skeletal class II owing to retrognathic mandible with good soft tissue chin prominence, low mandibular plane angle and dento-alveolar class II. Intra oral examination revealed upper and lower arch proclination, with deep bite and upper anterior spacing (Figure 5 and 6).

**Figure 5:** Pretreatment extraoral and intraoral records of patient in category (2) who were treated by non-extraction approach.

**Figure 6:** Pretreatment cephalogram of patients in category (2) showing mandibular deficiency.
The patient was strapped up with orthodontic appliance passively and surgery (SFOA) comprising of mandibular advancement was carried out within the first month of commencement of the treatment. The maxillary arch presented with transverse dento-alveolar constriction which was corrected using Quad helix appliance post surgically for good arch co-ordination (Figure 7).

Figure 7: Mandibular advancement was performed in surgery first approach with non-extraction treatment approach.

The profile was corrected in both patients with good improvement in lower facial height and stable occlusion (Figure 8).

Figure 8: Post-treatment extraoral and intraoral records treated with non-extraction approach in surgical first approach.

Discussion

Critical appraisal of the class II skeletal malocclusion treated by conventional surgical approach and surgery first approach

Advantages of Surgical first approach in class II skeletal malocclusion:

1. In surgery first approach maximum skeletal advancement is possible since disocclusion of teeth during surgery offers no restriction in the skeletal movement. Orthodontic tooth movement is easier and more physiologically favourable after surgical elimination of the skeletal disharmony because the direction of tooth movement for decompensation is not against the soft tissue pressure, whereas the opposite is true in presurgical orthodontic movement [8]. In conventional approach the upper anterior teeth tend to lose torque during space closure which acts as a limiting factor in advancing the mandible to the full predicted extent. Thus, deficiency in profile correction is often compensated by the accentuated genioplasty procedure.

2. Optimum profile correction is possible since maximum skeletal movement is achievable when surgery first approach is advocated.

3. Maximum bite opening is possible in surgery first approach since the deep curve of spee remain uncorrected which makes tripoding occlusion achievable. Whereas in conventional approach the curve of spee may be reduced on aligning the lower arch by continuous mechanics.

4. Treatment time is shorter with surgery first approach compared to conventional approach. The regional acceleratory phenomenon aids in hastening the postsurgical orthodontic aligning, levelling and space closure.

Disadvantages of Surgical first approach in class II skeletal malocclusion:

1. Facial profile worsens immediately after surgery. The skeletal movement along with dental compensations would result in a worsened profile which subsequently improves after the compensations are relieved during the active postsurgical orthodontic therapy.

2. Owing to the disocclusion and tripoding during the surgery, the posteriors are in maximum open bite situation. Maxillary molars have high chances of rotation and anchor loss. Hence, implants are mandatory in the upper arch for further alignment and space closure.

3. Transverse decompensation have to addressed after surgery with the help of adjunctive expansion appliances for hastening the process to compensate the effect of class II elastics and settling elastics acting buccal to the centre of resistance, on a resilient wire which will compromise the expansion of the upper arch.

Conclusion

The future of orthognathic surgery is geared toward minimizing the overall treatment time without compromising the final results. Class III skeletal malocclusions are most frequently treated by surgery first approach since, the facial correction corrected initially contributes to positive attitude in patients. On the contrary Class II skeletal malocclusions are rarely treated by surgery first approach since the patient profile worsens initially and dento-alveolar compensation complicates the planning. The experience of advocating surgery first approach in skeletal Class II malocclusions in our center, this approach was found to be advantageous in numerous ways like shortened treatment time, optimum skeletal correction. The key factor being dentoalveolar component does not dictate the extent of skeletal correction and the utilization of the regional acceleratory phenomenon aids in faster orthodontic movement.

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