



## **A Review on Surgery First Approach in Orthodontics**

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### **ABSTRACT**

*The approach of performing SF (surgery first) has turned out to be a replacement standard in orthodontic surgery. Using this method, generally teeth of the patients are in the original positions and no treatment has been provided before the patient undergoing orthognathic surgery. This approach uses surgical operation to unravel most of the dental and skeletal issues. Surgery-First is mostly used for individuals who want an instantaneous facial result, with short duration of dental treatment, or for treatment of the sleepapnea. The psychosocial impact of an orthodontic deformity's unattractive look is typically the most significant indicator of the necessity for surgical treatment. The standard method for treating these defects up until now has been to start with orthodontics first approach. According to the traditional method, presurgical orthodontic treatment must be completed before the orthognathic surgery. The modern therapeutic archetype for dentofacial deformity care is SFA. It has demonstrated to have good effects and increased acceptance thanks to its immediate and quick bone modification.*

*Keywords: surgery first approach, decompensation, orthognathic surgery, facial symmetry.*

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### **INTRODUCTION**

Patients with dentofacial deformities are treated with orthodontic surgical treatment [1]. Restoration of occlusion bite is the primary basis of orthodontic treatment with the focus on facial profile of the patient. Surgery First Approach (SFA) is a orthognathic approach that includes postsurgical treatment and orthognathic surgery, without the presurgical dental orthodontic treatment [2,3]. Pre-operative orthodontics, surgery, post-operative a three-stage approach has been planned and it is usually a standard protocol[4]. The various purposes of pre-surgical planning are:

1. Decompensation of the dentition with which teeth are positioned on basal bone irrespective of its association with opposite jaw.
2. Levelling and alignment of teeth and correction of crowding if persists.
3. Coordination of both the jaws.
4. Diverging roots adjacent to surgical regions where osteotomies were scheduled.

Pre-surgical treatment exposes the exact skeletal inconsistency pre-surgery and assists in determining exact amount of decompensation of the dentition that limits complete alteration of skeletal deformity.

With Surgical First approach, the treatment duration is significantly decreased, because the productivity of post-operative orthodontic treatment is increased owing to the Regional acceleratory phenomenon and systematic acceleratory phenomenon[5].

### **ORTHOGNATHIC SURGERY**

In 2002, first paper was published on Surgery first approach. The new concept of SFA was first forwarded in this article using the phrase- Functional Orthognathic surgery. This idea was established on laboratory method, in which orthognathic surgery was performed initially after that orthodontic treatment was performed without doing any pre-operative orthodontic treatment. As per the patient's perception, orthodontic treatment which was performed pre-surgically could further deteriorate the facial aesthetics as it would increase patient's discomfort and some other functional problems. All these factors may limit the dental compensation.

On the other side, in surgery first approach, the dental decompensation is in similar direction as per the new adjacent skeletal structures including the muscle and dental changes. That can be one key reason of

performing SFA with reduced treatment time. Intraoral vertical ramus osteotomy and Sagittal ramus osteotomy were the two surgery methods used after induction of primary lower jaw surgery in 1907[6]. In Sagittal ramus osteotomy, there is intermaxillary fixation for short duration with stability of distal segment. It requires fixation using plates and screws that requires another surgery. In case of displacement of the proximal segment there will be chances of relapse, sagging and problem of temporomandibular joint. The proximal segment provides a pivotal role in post-operative revival of jaw function and post-operative stability. Patient normally undertakes active physiotherapy in bone soothing period, and during this course, remodelling occurs at contact site of bony fragment along with surrounding structures. Intraoral vertical ramus osteotomy has advantages over SSRO in respect to physiological location of condyles post-surgery[7]. The history of SFA in orthognathic surgery during various years along with their result is depicted in table number 1.

Table 1 Summary of studies using surgery-first approach in orthognathic surgery

S.No.	Malocclusion	Surgical method	Conclusion
1.	Mandibular prognathism	Vertical Ramus Oblique osteotomy	Without pre-orthodontic treatment stable results achieved
2.	Mandibular prognathism	Vertical Ramus Oblique osteotomy	Minimum orthodontic treatment before surgery proposal
3.	Anterior open bite	Le Fort I(LF) & Genioplasty(GN)	SFA is better as compared to first orthodontic treatment
4.	Dentofacial Deformity	Bilateral Sagittal Split Osteotomy & Maxillary osteotomy	First surgery to be performed
5.	Skeletal Class III	Bilateral Sagittal Split Osteotomy	Treatment time is reduced
6.	Skeletal Class II	Bilateral Sagittal Split Osteotomy	Using SFA method efficiency of treatment is increased.
7.	Mandibular prognathism	LF+BSSO+GN	Reduced total treatment duration
8.	Skeletal Class III	LF+BSSO	Accurate prediction of post-surgical treatment time.
9.	Skeletal Class III	LF+BSSO	After the surgery transitional occlusion is created
10.	Skeletal Class III	LF+BSSO	Accurate diagnosis and detailed planning required for SFA

### Benefits with surgery first approach [8]:

1. Direction of post-surgical orthodontics same as natural compensation.
2. Likelihood of less treatment duration.
3. No serious unpleasant appearance while pre-surgical orthodontic period.
4. Minimum disruption in social life of an individual
5. Facial aesthetics improves early
6. Sleep disorders corrects early.

### Indications

- (i) Well alignment to minimal crowding.
- (ii) Curve of speed (flat/ mild)
- (iii) Proclination of reocclusion of the upper incisors should be either normal or mild.
- (iv) Mild discrepancy in transverse direction.
- (v) Cases in which decompensation is required.

### Contraindications

- (i) Severe crowding in maxillary incisor region
- (ii) Critically compensated, flared maxillary incisors
- (iii) Excessively extruded maxillary second molars
- (iv) Disharmony between maxillary and mandibular inter-canine width
- (v) Postoperative crossbite in anterior region
- (vi) Asymmetric dental compensation in transverse position

### Presurgical preparation

Pre-surgical preparation could be carried in numerous ways in respect to postsurgical-orthodontic treatment:

1. Positioning of surgical without including arch wire.
2. Positioning of anchor screws.
3. Placement of rectangular or round orthodontic wire.

4. Placement of rectangular, passive arch wires which are attached with the help of surgical hooks.

### **SFA FOR FACIAL ASYMMETRY**

There is a certain amount of facial irregularity in patients having class II and III dentofacial deformity. They need orthognathic surgery for correction. Facial asymmetry is also displayed in patients with SFA. If more vertical aspects are present in the asymmetrical aspect of mandible, the surgical occlusion can be easily established for Surgery First Approach. Thus, the transverse compensation is almost similar in the left and right lateral region in these patients, also the displacement of maxillary denture midline and mandibular denture midline is minimal, so the maximum asymmetry is revealed in skeleton [9]. Thus the maximum improvement should be modified by surgical procedure, and the scale of postoperative movement after surgery can be minimised.

### **SFA in Class II Surgeries**

The SFA is performed in class II cases, if it is attained via setup of the dental models post-operative orthodontic movement [10]. The SFA is performed very carefully in patients having Class II malocclusions and the following circumstances:

1. If the condylar position is unstable.
2. Cross bite in anterior region after SFA.

### **Surgical stabilization and initiation of orthodontic treatment**

Kim et al. assessed the post-operative stability of SFA with the help of IVRO. The bony segment is not affixed during IVRO. The intermaxillary fixation is maintained for two weeks. For rehabilitation of lower jaw Class II elastics were also used. Post-surgery the orthodontic treatment was started after two months [11-12].

### **Postoperative management**

Post-operative surgical splint is kept in place for two to six weeks, many studies have showed that postoperative occlusion depends upon surgical splint. It is highly unstable occlusion, and can promote to malocclusion quickly [13-15]. The presence of unfavourable occlusal contacts after surgery can induce unexpected mandibular positions. It may affect the long-term outcome of surgery. Postsurgical splints are to be stable and presence of any occlusal interference are removed by changing the splint [16].

Limitation of the SFA: is related to occlusion during surgery.

- i. This method can't use the occlusion of patient as per surgical movement.
- ii. With no assistance of three-dimensional digital imaging and mock-up surgery, difficult cases cannot be treated by SFA.
- iii. As occlusion after surgery is mostly unstable within the surgery-first approach, surgical wafer ought to be maintained for guiding the mandibular movement after surgery.
- iv. If there is a requirement for the implementation of presurgical arch wire, no movement of tooth shouldn't occur pre-operatively [17-18].
- v. Patients with diarthrosis/TMJ problem or periodontal issues might not be the candidates for the SFA.

In case of mild disorder of temporomandibular joint, the SFA with intra-oral vertical bone surgical operation is also thought-about. The disadvantage of the SFA with intra-oral vertical bone surgical operation is four weeks of inter-maxillary fixation because the peak activity of regional accelerated phenomenon is 1-2 months post-operatively, four weeks of inter-maxillary fixation can postpone the start of operative treatment. The alteration of retrognathic mandibular with narrow palate, deep bite isn't attainable without the pre-operative treatment. Most of the patients which aren't suggested for the surgery-first approach need difficult post-operative treatment [19-21].

### **Stability of SFA**

Various studies which were evaluated to find parameters for unpredictability in SFA specified that deeper curve of spee, over jet, greater mandibular set back and over jet can be causes of failure of Surgical-First Approach. After the follow up of 6 months it was concluded that occlusal instability because of premature contact may result in relapse during after surgery bone healing [22].

### **CONCLUSION**

Surgical First Approach has proven satisfactory results with direct bony changes with improvement in facial aesthetics. It has also increased dependability among operators and patients. Correct diagnosis and selection of cases can be done by orthodontist and oral surgeon so that the slightest mistake can be very hard to correct.

**REFERENCES**

1. Huang CS, Chen YR. (2015). Orthodontic principles and guidelines for the surgery-first approach to orthognathic surgery. *Int J Oral Maxillofac Surg.* 44(12):1457-1462.
2. Choi JW, Lee JY. (2021). *The Surgery-First Orthognathic Approach: With discussion of occlusal plane-altering orthognathic surgery.* Springer Nature Publications.
3. Choi JW, Bradley JP. (2017). Surgery first orthognathic approach without presurgical orthodontic treatment: questions and answers. *J Craniofac Surg.* ;28(5):1330-1335.
4. Choi DS, Garagiola U, Kim SG. (2019). Current status of the surgery-first approach (part I): concepts and orthodontic protocols. *PlastReconstr Surg.* 41(1):1-8.
5. Moose SM. (1964). Surgical correction of mandibular prognathism by intraoral subcondylar osteotomy. *J Oral Surg.* 22:197-200.
6. Lee YC, Sohn HB, Kim SK, Bae OY, Lee JH. (2015). A novel method for the management of proximal segment using computer assisted simulation surgery: correct condyle head positioning and better proximal segment placement. *Maxillofac Plast Reconstr Surg.* 37:21-26.
7. Ahmadvand A, Alavi S, Mehraban SH. (2021). An overview of surgery-first orthognathic approach: History, indications and limitations, protocols, and dentoskeletal stability. *Dent Research J.* 18:10-19
8. Leung MY, Leung YY. (2018). Three-dimensional evaluation of mandibular asymmetry: a new classification and three-dimensional cephalometric analysis. *Int J Oral Maxillofac Surg.* 47(8):1043-1051.
9. Cintra O, Grybauskas S, Vogel CJ, Latkauskiene D, Gama NA Jr. (2018). Digital platform for planning facial asymmetry orthodontic-surgical treatment preparation. *Dental Press J Orthod.* 23(3):80-93.
10. Esteves LS, Castro V, Prado R, de Moraes e Silva CÁ, do Prado CJ, TrindadeNeto AI. (2014). Assessment of skeletal stability after counterclockwise rotation of the maxillomandibular complex in patients with long-face pattern subjected to orthognathic surgery. *J Craniofac Surg.* 25(2):432-436.
11. Kim JY, Jung HD, Kim SY, Park HS, Jung YS. (2014). Postoperative stability for surgery-first approach using intraoral vertical ramus osteotomy: 12-month follow-up. *Br J Oral Maxillofac Surg.* 52:539-544.
12. Jung S, Choi Y, Park JH, Jung YS, Baik HS. (2020). Positional changes in the mandibular proximal segment after intraoral vertical ramus osteotomy: Surgery-first approach versus conventional approach. *Korean J Orthod.* 50(5):324-335.
13. Choi DS, Garagiola U, Kim SG. (2019). Current status of the surgery-first approach (part I): concepts and orthodontic protocols. *PlastReconstr Surg.* 41(1):1-8.
14. Kwon TG, Han MD. (2019). Current status of surgery first approach (part II): precautions and complications. *PlastReconstr Surg.* 41(1):1-10.
15. Proffit WR, Miguel JA. (1995). The duration and sequencing of surgical orthodontic treatment. *Int J Adult OrthodonOrthognath Surg.* 10:35-42.
16. Hernández-Alfaro F, Guijarro-Martínez R, Molina-Coral A et al. (2011). Surgery first in bimaxillary orthognathic surgery. *J Oral MaxillofacSurg.* ;69:201-207.
17. Liou EJ, Chen PH, Wang YC et al (2011). Surgery-first accelerated orthognathic surgery: orthodontic guidelines and setup for model surgery. *J Oral Maxillofac Surg.* 69:771-780.
18. Hwang H et al (2017). Surgery-first approach in correcting skeletal Class III malocclusion with mandibular asymmetry. *Am J Orthod Dentofac Orthop.* 152:255-267.
19. Park KR, Kim SY, Park HS, Jung YS. (2013). Surgery-first approach on patients with temporomandibular joint disease by intraoral vertical ramus osteotomy. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 116:429-436.
20. Huang CS, Hsu SS, Chen YR. (2014). Systematic review of the surgery-first approach in orthognathic surgery. *Biom J.* 37:184-190.
21. Kim CS, Lee SC, Kyung HM, Park HS, Kwon TG. (2014). Stability of mandibular setback surgery with and without presurgical orthodontics. *J Oral Maxillofac Surg.* 72:779-787.
22. Ko EW, Hsu SS, Hsieh HY, Wang YC, Huang CS, Chen YR. (2011). Comparison of progressive cephalometric changes and postsurgical stability of skeletal Class III correction with and without presurgical orthodontic treatment. *J Oral Maxillofac Surg.* 69:1469-1477.

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