

# SURGERY FIRST-ORTHOGNATHIC APPROACH- REVIEW ARTICLE

Dr. Padmavati.R<sup>1</sup>, Dr.Mohammed Harris.S<sup>2</sup>, Dr.M.S.Kannan<sup>3</sup>

1. Senior lecturer, Department of orthodontics, Sree Balaji Dental College and hospital, Bharath institute of Higher Education and Research, Chennai.

2. Undergraduate, Sree Balaji Dental College and hospital, Bharath institute of Higher Education and Research, Chennai.

3. Professor and HOD, Department of orthodontics, Sree Balaji Dental College and Hospital, Bharath institute of Higher Education and Research, Chennai.

Undergraduate, Sree Balaji Dental College and hospital, Bharath institute of Higher Education and Research, Chennai.

Mail id: harris.demmahom@gmail.com

## ABSTRACT:

*The correction of skeletal discrepancies requires Orthognathic surgery along with Orthodontic treatment .Surgery first- orthognathic approach (SFOA) was proposed by Nagasaka et al, a new concept in the combination of orthodontic- orthognathic treatment for jaw deformities <sup>[1]</sup>. Before performing Orthodontic treatment early correction of soft tissue and skeletal problems may be easier for the tooth movement. Nowadays, most of the orthodontic centers in the world prefer surgery first followed by orthodontic treatment. The regional acceleratory phenomenon (RAP) is a tissue reaction to a noxious stimulus that increases the healing capacities of the affected tissues. RAP is a key factor that shows a notable reduction in treatment duration during SFOA. KEYWORDS: Surgery first, orthognathic surgery, Jaw deformities, regional acceleratory phenomenon (RAP).*

## INTRODUCTION:

The term 'Orthognathic surgery' was first coined by Hullihen<sup>[2]</sup>. The surgery-first Orthognathic approach is done to obtain the best position of the jaw in the individual before the Orthodontic treatment. The increase in demand for flawless and fast esthetics has led to a rise in the use of the surgical approach. But there seems to be postoperative occlusal instability and relapse<sup>[3]</sup>. Postoperative problems due to unstable occlusion result in masticatory dysfunction. A standard protocol known as a three-stage approach (pre-operative orthodontics, surgery, and post-operative orthodontics) has been set up<sup>[4]</sup>. In the conventional approach, preoperative orthodontics will take upto 15 to 24 months and an additional 7 to 12 months for postoperative orthodontics. Orthognathic surgery has evolved quickly particularly in the past 10 years. Nowadays, most patients prefer SFOA over the conventional approach, to seek a quick transformation with the least possible treatment time. The disadvantage of orthognathic surgery includes a prolonged treatment phase, temporary worsening of facial appearance, dental caries, gingival recession, root resorption<sup>[5]</sup>.

## SURGICAL TECHNIQUE:

1. Mandibular surgery
2. Maxillary surgery
3. Dentoalveolar surgery
4. Distract osteogenesis
5. Adjunctive facial procedure, rhinoplasty, lip procedure, chin modification.

**GOALS OF ORTHODONTIC SURGERY:**

1. Esthetics
2. Stability
3. Minimizing treatment time
4. Fixing structural deformities
5. Functional occlusion
6. Speech

**INDICATIONS AND CONTRAINDICATIONS:**

The SFOA was introduced to shorten the treatment time and improve patient care. Most commonly mandibular prognathism is indicated for SFOA because Class III with open bite usually has mild crowding and less dental compensation. It is indicated in a patient with mild anterior crowding, flat curve of spee, slight proclination/retroclination of incisors, minimal transverse discrepancies, facial asymmetries, cleft lip, or palate. The SFOA is contraindicated in severe crowding, severe proclination of upper and lower anteriors<sup>[6]</sup>, arch incoordination, severe vertical/transverse discrepancies. Patients with the temporomandibular disorder or periodontal issues are not recommended for SFOA. The drawback of SFOA with intraoral vertical ramus osteotomy is 4 weeks of intermaxillary fixation; it will delay the initiation of postoperative orthodontic treatment.

**SURGERY- FIRST ORTHOGNATHICS:**

In conventional orthodontics, the alignment of the teeth is achieved by pre-operative orthodontic treatment, whereas the surgery-first approach provides normal jaw relations before the orthodontic treatment. The objective of SFOA is dental alignment, arch coordination, occlusal settling. The advantages of SFOA are short treatment time; provide esthetics, and function, and psychological benefits. Orthodontic tooth movement after surgery can speed up due to increased blood flow and bone turnover during the healing process is called a regional acceleratory phenomenon. The most important concern for performing surgery first orthodontics has been reduced treatment time<sup>[7]</sup>. Orthodontic treatment time decreases by using alveolar osteotomy procedures<sup>[8]</sup>. Rigid fixation of the bony segments was the key factor for SFOA. Pre-operative procedures include timing of bonding in SFOA, stabilizing/initial archwires, splints, laboratory procedures. The titanium miniplates are used to anchor orthodontic forces for three-dimensional movements in non-growing patients. The decrease in treatment time is due to an increase in cortical bone porosity that results in decreased resistance to tooth movement. Post-operatively, surgical splint, and intermaxillary fixation should be removed for the tooth movement. The treatment is expected to be completed within 1 year<sup>[9]</sup>. The crevicular fluids increased during fracture healing in SFOA cases. Computer-aided surgical simulation utilizing three-dimensional images obtained from multi-slice computed tomography/cone-beam computer tomography has been successfully performed to plan craniofacial surgery<sup>[10]</sup>. The relapse rate in SFOA is good when compared to the conventional surgical approach; it shows that a patient without presurgical orthodontics is more likely to develop unstable occlusion which leads to relapse. Post-operatively after the surgery, wearing and adjusting the surgical splint is important for occlusal stability.

**REGIONAL ACCELERATORY PHENOMENON (RAP):**

It was introduced by Frost<sup>[11]</sup> in 1983, he claimed that injury will accelerate the regional healing process and this acceleration is called as Regional acceleratory phenomenon. RAP is one of the reasons to shorten the treatment time due to an increase in osteoclastic and metabolic activities during the surgery. The cellular activities accelerate the RAP as an 'SOS' phenomenon of the body to respond to the new perturbation. It increases the rate of orthodontic movement, remodeling, and transient osteopenia<sup>[12]</sup>. RAP is typically seen in hard tissue sometimes in soft tissue also. RAP is characterized by the production of woven bone at the tissue level with a typical

unorganized pattern. Serum alkaline phosphatase and c-terminal telopeptide type 1 collagen are two bone markers which are increased during the orthognathic surgery<sup>[13]</sup>. The RAP occurs due to mechanical perturbation which induces micro damage at tissue level during tooth movement. The RAP shows peak activity in 1-2 months after surgery and lasts until 6-24 months postoperatively<sup>[14]</sup>. The former is associated with osteoblastic activity while the latter is a by-product of the osteoclastic breakdown of bone. There will be high osteoblastic activities and metabolic changes in the dentoalveolar component after 3-4 months of surgery.

### PROTOCOL VARIATIONS:

The treatment of choice may be similar but different protocols are generally used for the treatment<sup>[15]</sup>. Usually, brackets and wires are placed before the surgery to prevent tooth movement. After surgery, the surgical splints are used 1-4 weeks postoperatively.

### CONCLUSION:

SFOA has the advantage of reduced treatment time and patient response to the treatment and care should be taken during the case selection, diagnosis, predictions, and simulating correction. However, the limitations of this approach should be considered. Coordination between surgeons and orthodontists plays a vital component in the success of the treatment.

### REFERENCE:

1. Nagasaka H, Sugawara J, Kawamura H, Nanda R. "Surgery first" skeletal Class III correction using the Skeletal Anchorage System. *J Clin Orthod*. 2009;43:97-105
2. Hullihen S, Aziz S. The origin of orthognathic surgery. *J Oral Maxillofac Surg*. 2004;62:1303-7.
3. Bell WH, Creekmore TD (1973) Surgical-orthodontic correction of mandibular prognathism. *Am J Orthod* 63:256-270
4. Proffit WR, Miguel JA (1995) The duration and sequencing of surgical orthodontic treatment. *Int J Adult Orthodon Orthognath Surg* 10:35-42
5. Luther F, Morris DO, Hart C. Orthodontic preparation for orthognathic surgery: How long does it take and why. A retrospective study? *Br J Oral Maxillofac Surg*. 2003;41:401-6
6. Huang CS, Chen YR (2015) Orthodontic principles and guidelines for the surgery-first approach to orthognathic surgery. *Int J Oral Maxillofac Surg* 44: 1457-146
7. Yu CC, Chen PH, Liou EJ, Huang CS, Chen YR. A Surgery-first approach in surgical-orthodontic treatment of mandibular prognathism - A case report. *Chang Gung Med J*. 2010;33:699-705
8. Wilcko WM, Wilcko T, Bouquot JE, Ferguson DJ. Rapid orthodontics with alveolar reshaping: Two case reports of decrowding. *Int J Periodontics Restorative Dent*. 2001;21:9-19
9. Nagasaka H, Sugawara J, Kawamura H, Nanda R. surgery first skeletal class III correction using the skeletal anchorage system. *J Clin Orthod* 2009: 58 (2): 97-105
10. Hsu S, Singhal D, Xia J, Gateno J, Lin CH, Huang CS, et al. Planning the surgery-first approach in surgical-orthodontic treatment with a computer aided surgical simulation (CASS) planning protocol. *J Taiwan Assoc Orthod*. 2012;24:24-37.
11. Frost HM (1983) The regional acceleratory phenomenon: a review. *Henry Ford Hospital medical journal* 31: 3-9
12. Verna C (2016) Regional acceleratory phenomenon. *Front Oral Biol* 18: 28-35.
13. Liou EJ, Chen PH, Wang YC, Yu CC, Huang CS, Chen YR. Surgery-first accelerated orthognathic surgery: Postoperative rapid orthodontic tooth movement. *J Oral Maxillofac Surg*. 2011;69:781-5
14. Yaffe A, Fine N, Binderman I (1994) Regional accelerated phenomenon in the mandible following mucoperiosteal flap surgery. *J Periodontol* 65:79-83
15. Choi JW, Bradley JP (2017) Surgery first orthognathic approach without presurgical orthodontic treatment: questions and answers. *J Craniofac Surg* 28: 1330-1333