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REVIEW ARTICLE

SURGERY FIRST APPROACH: A REVIEW

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ABSTRACT

The concept of "surgery-first and orthodontics second" is called "SFOA" (Surgery-First Orthognathic-Approach) or "SFA" (Surgery-First approach). Surgery first approach is an alternative methodology to conventional orthognathic surgery ("Orthodontics– Orthognathic surgery– Orthodontics") which performs directly an orthognathic surgery, without the previous orthodontic preparation, followed by a post-surgical orthodontic treatment. Surgery-first approach treats facial esthetics first and then occlusion, whereas the conventional approach treats occlusion first and then facial esthetics. The surgery-first approach uses osteotomy to solve both skeletal problems and dental compensation, and a "transitional" occlusion is set up postoperatively

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INTRODUCTION

The term Orthognathic surgery was 1st coined by Hullihen in 1849. (Poulton and Ware, 1959) Numerous surgical techniques have been used for the dissection of the mandibular body or ascending ramus to correct mandibular prognathism. Trauner and Obwegeser introduced sagittal splitting Ramus osteotomy, which marked the beginning of the modern era of Orthognathic surgery. This intraoral approach could move the mandible in three dimensions according to a designated surgical plan, keeping the condyle in the glenoid fossa, and, most importantly, maintaining sufficient bone contact area to allow primary bone healing after Orthognathic surgery. After introducing osteotomy in the mandible, Obwegeser was also the first to develop LeFort I osteotomy to move the maxilla in all three dimensions, reporting a large series of maxillary osteotomy cases in 1969. (Trauner and Obwegeser, 1957; Obwegeser, 1969) Pre-surgical orthodontic preparation was uncommon for patients requiring orthognathic surgery until the 1960's. This process is time consuming. In addition, there is worsening of facial profile, masticatory discomfort during presurgical orthodontic treatment, and psychosocial problems associated with delay in responding to the patient's complaint and also because of the long term orthodontic preparation, there may be complications such as dental caries, gingival recession, gingival hyperplasia and root resorption. To overcome the disadvantages and inconveniences of presurgical orthodontics, surgery first orthognathic approach has been introduced by Behrman and Behrman in 1988. (Behrman and Behrman, 1988) soft tissues (lips, cheeks and tongue) settles the teeth into better positions after surgery, thereby facilitating remaining orthodontic tooth movement rapidly and reducing the total orthodontic treatment period. This concept of "surgery-first and orthodontics second" is called "SFOA" (Surgery-First Orthognathic-Approach) or "SFA" (Surgery-First approach). Surgery first approach is an alternative methodology to conventional orthognathic surgery ("Orthodontics– Orthognathic surgery– Orthodontics") which performs directly an orthognathic surgery, without the previous orthodontic preparation, followed by a post-surgical orthodontic treatment. surgery-first approach treats facial esthetics first and then occlusion, whereas the conventional approach treats occlusion first and then facial esthetics. The surgery-first approach uses osteotomy to solve both skeletal problems and dental compensation, and a "transitional" occlusion is set up postoperatively.

Indications

- Well aligned to mildly crowed 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 decompensation is not required,

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- Patients who want immediate esthetic result or
- Who want to improve both function and esthetic, patients with facial asymmetries,
- Cleft lip and palate patients.

Contraindicated

- Patient 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.

Advantages

- Immediate change in the facial profile,
- Having surgery first eliminates the unsightly pre-surgical profile and allows the chief complaint of the patient to be addressed at the beginning of treatment,
- Improved cooperation of the patient during orthodontic treatment,
- Reduces overall treatment period and post-op orthodontic treatment can be progressed rapidly.

Disadvantages

- Predicting the final occlusion is the hardest challenge with SFA due to multiple dental interferences
- Cases requiring extractions are especially very difficult to plan when performing surgery-first
- Any minor surgical error can compromise the final occlusion
- The planning process is very time consuming in contrast to the total treatment time
- The increase in the number and complexity of osteotomy procedures poses a greater risk to the patient.

Regional Acceleratory Phenomenon

The main factor which is responsible for rapid tooth movement is the regional acceleratory phenomenon (RAP). The regional acceleratory phenomenon (RAP) was well described by Harold Frost in 1989. After an osteotomy, bone remodeling around the healing tissue facilitates the healing process. Alkaline phosphatase (ALP) and C-terminal telopeptide of type I collagen (ICTP) are two bone markers which have been studied using 22 patients of SFA. The former is associated with osteoblastic activity while the latter is a by-product of osteoclastic breakdown of bone. The results of such study show that orthognathic surgery triggers 3–4 months of higher osteoclastic activities and metabolic changes in the dentoalveolus. (Frost, 1989)

Treatment Planning

- The molar relationship can be utilized as a starting point to come up with a temporary occlusion
- The inclination of upper incisors is important in determining the need for possible extractions. If the upper incisor to occlusal plane angulation is <53-55°, extraction must be considered.
- The midlines must be coincident or close to it after surgery, and proper buccal overjet must be established bilaterally.
- Most challenging and time consuming step is the prediction of the final occlusion based on the current position of teeth. The term intended transitional malocclusion is used to describe the occlusion that is used to fabricate the surgical splint and surgeon's guide during surgery. At least a three-point contact must be established between the upper and lower models when deciding ITM. In cases where such temporary occlusion cannot be established, it is advisable to initiate some orthodontic movement in order to relieve some of the interferences.

Stability

Various studies done to compare stability of SFA with a conventional technique and found no significant difference. (Choi et al., 2010; Baek et al., 2010) Comparison for transverse changes has also been made, and no significant difference is found with and without presurgical orthodontics. (Wang et al., 2010) The surgeon should be capable of performing designated osteotomy and intermaxillary fixation with occlusion bite plate on malaligned dental arches and providing the stability after skeletal reposition.

Conclusion

Surgery first approach has multiple advantages like shortened treatment time, increased patient acceptance, and the utilization of the regional acceleratory phenomenon. There are limitations particularly relating to careful case selection, adequate diagnosis, prediction and simulating correction with the model setup is required. Experience of surgeon and orthodontist are important factors in applying the appropriate treatment method taking account of patient's need and goals.

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