

Exploring the Surgery First Approach in Orthognathic Surgery: A Comprehensive Review

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Abstract:- The Surgery First Approach (SFA) in orthognathic surgery has garnered increasing attention for its potential to streamline treatment processes and enhance patient outcomes. This literature review explores the fundamental concepts underlying the SFA, elucidates established protocols, examines variations in implementation across different clinical scenarios, and discusses emerging trends shaping its contemporary practice. Through comprehensive analysis of recent literature, this review aims to provide insights into the evolving landscape of SFA, its applications, challenges, and future directions in orthognathic surgery.

Keywords:- SFA, Orthognathic Surgery, Aesthetics.

I. INTRODUCTION

Surgical orthodontics combines orthodontic and oral surgery techniques to correct complex jaw and dental issues, aiming for improved function and aesthetics.^{1,2} The term orthognathic surgery was 1st coined by Hullihen² in 1849.

Presurgical orthodontic treatment aims to position teeth over basal bones, level and align teeth, relieve crowding, coordinate dental arch forms, and manage root divergence near surgical sites.⁴

In 1988, **Behrman and Behrman**⁵ introduced “Surgery first orthognathic approach”. The hypothesis suggests that after surgery, normalized soft tissues such as lips, cheeks, and tongue settle teeth into improved positions. This settling may aid remaining orthodontic tooth movement and potentially shorten the total orthodontic treatment duration.

Surgery First Approach (SFA) offers early facial profile improvement, establishes proper maxillomandibular relationships pre-orthodontics, and shortens treatment duration. Effective for Class III malocclusion, it immediately improves upper airway constriction, fostering high patient satisfaction and cooperation during postoperative orthodontics, enhancing its acceptance in surgical and orthodontic communities.⁶

II. INDICATIONS OF SURGERY FIRST ORTHOGNATHIC APPROACH

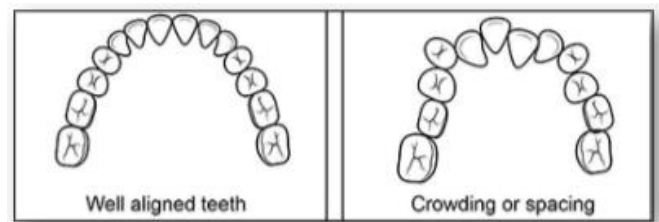


Fig 1. Minimum Anterior crowding

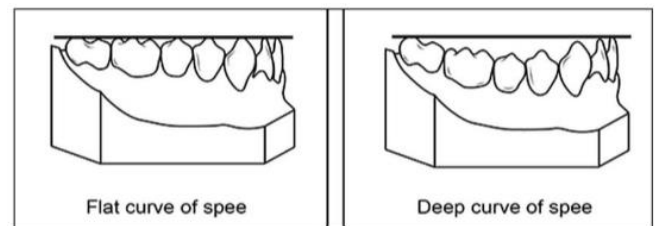


Fig 2. Curve of Spee: Flat

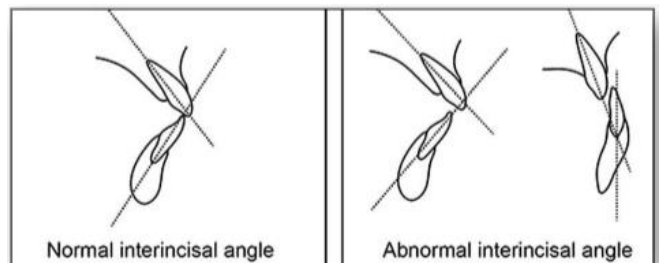


Fig. 3 Interincisal angle: Normal

Orthognathic surgery is suitable for patients with mild facial asymmetry, pronounced soft tissue imbalance in skeletal Class III cases, severe skeletal Class II deformities, bimaxillary protrusion, and those desiring immediate esthetic and functional improvements. Candidates should have at least three stable occlusal stops with a positive overbite of six anterior teeth and existing arch coordination, and be of appropriate age for surgery.

III. CONTRAINDICATIONS OF SURGERY FIRST ORTHOGNATHIC APPROACH

Patients with temporomandibular joint, facial asymmetry or periodontal issues may not be candidates for the surgery-first approach. Mild temporomandibular disorder cases may allow for consideration of the surgery-first approach with intraoral vertical ramus osteotomy.^{8,9}

➤ *Benefits*

- One advantage of the Surgery First Approach (SFA) is the shorter total treatment time. This is attributed to the regional accelerated phenomenon (RAP), which increases osteoclastic and metabolic activities due to surgery. Selective bone injury during orthognathic surgery activates anabolic and catabolic responses in the adjacent periodontium, enhancing bone reorganization. RAP typically begins a few days after surgery, peaks at 1–2 months, and subsides over 6 months to more than 24 months. Teeth tend to move in the direction of decompensation following surgery, as reported by Choi and Bradley. Orthodontic treatment time varies based on case complexity, ranging from 4 months to 6–12 months, with tooth extraction being a key factor influencing treatment duration. Patients with pre-existing temporomandibular joint dysfunction may experience significant improvement in signs and symptoms after SFA.⁹⁻¹⁵

IV. LIMITATIONS

Predicting the final occlusion is challenging and time-consuming, relying heavily on the clinician's experience and skill to achieve satisfactory results. Simulation of postsurgical occlusion is also time-consuming, involving delicate and complicated short-term orthodontic procedures that require accurate and experienced decisions. Complicated bending of surgical arch wires is necessary, with no opportunity for preoperative third molar extraction. Extended intermaxillary bony fixation periods may be required.¹⁶

Table No. 1 Treatment Protocol in SFOA¹⁷

Sr. No	Sequence of Procedure	Steps involved
I.	Diagnostic Evaluation	a. Comprehensive clinical assessment by an orthodontic-surgical team b. Utilization of CBCT and intraoral scans c. Creation of an augmented virtual skull model via file fusion
II.	Pre-operative Planning	a. 3D virtual orthodontic setup for dental movements b. Planning skeletal adjustments in 3D c. CAD-CAM fabrication of an intermediate splint d. Conventional fabrication of the final splint
III.	Preoperative Orthodontic Preparation	a. Bracket bonding one week pre-surgery b. Soft arch placement a day before surgery c. Application of splints in Surgery First Orthognathic Approach (SFOA) d. Completion of necessary laboratory procedures

IV.	Surgery	a. Insertion of 4-8 2.0-mm miniscrews b. Minimally invasive orthognathic procedures c. Systematic buccal interdental corticotomies using a piezoelectric microsaw d. Optional bone augmentation with hydroxyapatite blocks for gaps >3 mm e. Fixation of the end splint to the maxilla in maxillary segmental surgery
V.	Postoperative Orthodontics	a. Commencement of orthodontic adjustments two weeks post-surgery b. Archwire changes scheduled every 2-3 weeks

➤ *Systemic Acceleratory Phenomenon (SAP)*

SAP leads to the release of osteogenic growth peptide (OGP) which stimulates proliferation of alkaline phosphatase activity that ultimately accelerates bone repair process.^{18,19,20}

➤ *Stability and relapse in surgery first orthognathic approach*

Skeletal relapse remains a potential concern despite implementing skeletal stabilization and proximal segment control. The duration of prolonged skeletal stabilization varies individually. Upon releasing fixation, a two-day observation period is recommended before initiating interarch elastic therapy. If incipient skeletal relapse is detected, evident as malocclusion, reinstating skeletal stabilization for two additional weeks is advised, with repeated cycles as necessary. Introducing interarch elastic therapy at this stage is cautioned against, as it may lead to dental compensations, particularly extrusion of teeth, prone to relapse, especially in non-growing individuals.²¹

V. CONCLUSION

SFOA is efficient but limited to specific cases. Patient selection is crucial. Passive wire bending is cumbersome, and occlusal stability relies solely on the surgical splint. Effective case selection, thorough planning, and communication between the orthodontist and surgeon mitigate these challenges

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