

SURGERY -FIRST APPROACH IN ORTHOGNATHIC SURGERY- A CASE REPORT

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ABSTRACT: The surgery-first approach (SFA) or Surgery-first Orthognathic approach (SFOA) without pre-surgical orthodontic treatment, has become favoured in the treatment of dentomaxillofacial deformities. Conventional orthognathic surgery treatment involves orthodontic interventions both before and after orthognathic surgery, making the total treatment period of 3-4 years and temporary worsening of facial profile. Surgery-first approach involves orthognathic surgery being carried out first, followed by orthodontic treatment to align the teeth and occlusion and it takes the advantage of corticotomy- facilitated orthodontics allowing rapid tooth movement thus reducing treatment duration. The purpose of this article is to present a case of skeletal class III malocclusion treated with surgery-first approach with emphasis on selection of case, treatment protocol, indications, advantages and disadvantages of surgery-first approach.

KEYWORDS: Surgery-first approach, Orthognathic surgery, dentomaxillofacial deformity.

INTRODUCTION

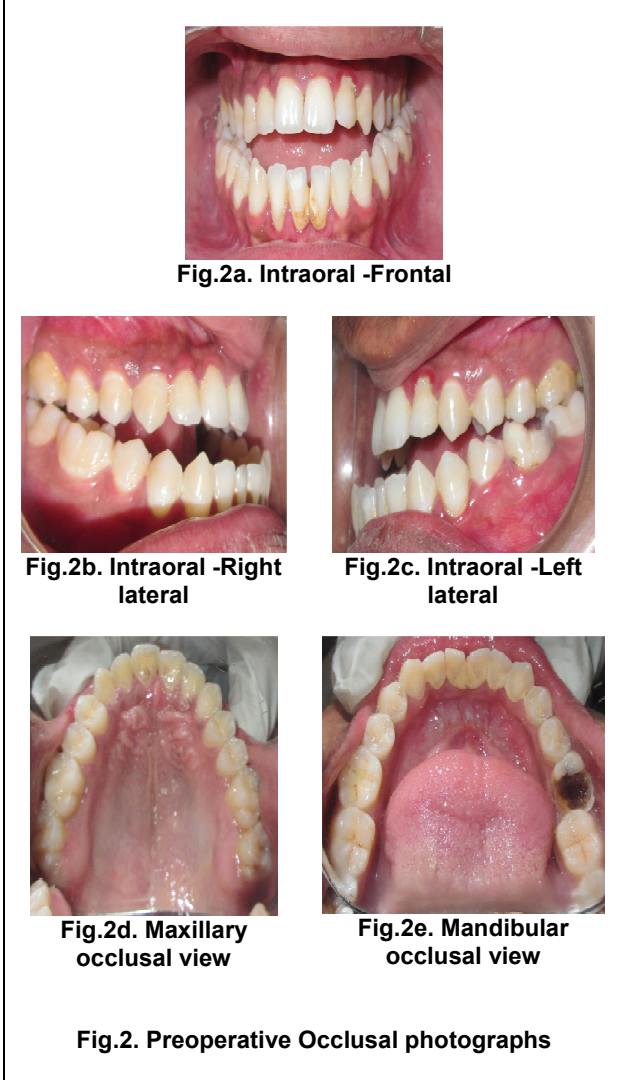
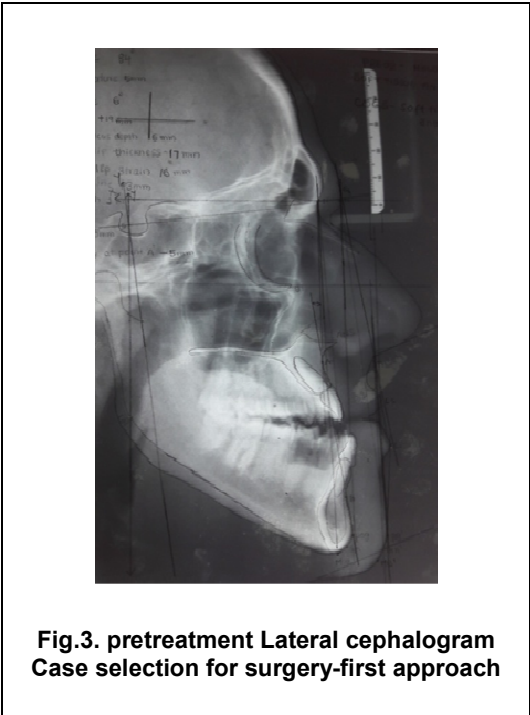
Surgery-first approach is a recent advance in the combined orthodontic-orthognathic treatment for jaw deformities¹. This new concept was proposed by Nagasaka et al. in 2009 for correcting skeletal class III malocclusion². Conventional Orthognathic treatment consists of variable length of preoperative orthodontic preparation, surgery followed by constant period of post-operative orthodontics making a long treatment period of 3-4 years³. The disadvantages of preoperative orthodontic preparation includes dental caries, gingival recession, root resorption, masticatory discomfort, mucosal ulcers, mucocoeles and inconvenience for the patient. In addition, pre-surgical orthodontic decompensation of the occlusal relationships and attainment of normal dental alignment temporarily worsens the patient's facial appearance and also the visual impact of unsightly fixed orthodontic appliances may lead to patient dissatisfaction and lead the patient to terminate the treatment^{4,5}. In order to avoid untoward effects of conventional Orthognathic surgery, surgery-first approach (SFA) or Surgery-first Orthognathic approach (SFOA) has been introduced. Patients with mild to moderate crowding and acceptable arch coordination can undergo orthognathic surgery without preoperative orthodontic treatment. Proper preoperative planning and precise surgery allows direct and rapid postoperative orthodontic procedure. Patients can obtain the desired

facial profile and occlusion in a much shorter period of time.⁶ The purpose of this article is to present a case of skeletal class III malocclusion treated with surgery-first approach.

Case Report

A 24 year old male presented with chief complaint of forwardly placed lower jaw since childhood. Extraoral examination reveals a concave profile, increased lower anterior facial height, anterior facial divergence, normal maxilla, large mandible, positive lip step, shallow mento labial sulcus, incompetent lips, clicking and popping sounds of TMJ while opening and closing the mouth (**Fig 1a,b**). Intraoral examination reveals class III molar and canine relation, anterior open bite, bilateral posterior cross bite, accentuated curve of spee, dental midlines matching, reverse overjet of 7 mm (**Fig.2a,b,c,d,e**). Lateral cephalogram reveals normal maxilla, prognathic mandible, skeletal openbite, acute nasolabial angle(**Fig.3**).

The case is diagnosed as class III skeletal malocclusion with anterior open bite and bilateral posterior cross bite with reverse overjet of 7 mm, along with internal derangement of TMJ.



Surgical treatment plan

From the clinical presentation and lateral cephalogram evaluation, it was apparent that the class III deformity was primarily due to prognathic mandible, in addition patient also presents with internal derangement of TMJ. A surgery-first approach was planned to perform extraoral vertical ramus osteotomy to correct reverse overjet (Fig.4). In addition SFA through vertical ramus osteotomy favours condylotomy effect in which antero-inferior repositioning of the condyle results in an increase in the articular space and an improvement in the articular disc condyle relationship, with a reduction in the load on the glenoid fossa thus immediate correcting of internal derangement of TMJ through Surgery-first approach which has an added advantage to the patient along with retropositioning of lower jaw (Fig 5). Post operative Orthodontics was started after a healing period of two month to correct anterior openbite and mild posterior cross bite (Fig. 6). The overall treatment time was 6 months from start to finish(Fig. 7a,b).

Treatment results: Six months after surgery, post treatment photographic images showed excellent esthetic and occlusal results (Fig.8a,b). Post treatment lateral cephalogram (Fig.9) showed excellent correction of prognathic jaw with adequate soft adaptation.

Discussion

Surgery first approach (SFA) without presurgical orthodontic treatment has become favoured recent treatment modality in combined Orthognathic – Orthodontic treatment. In 2011, Hernandez-Alfaro et al.



Fig.4- Photographs showing the surgical procedure

were the first to report the application of "Surgery-first" in bimaxillary Orthognathic surgery.⁷

The major driving motive for performing Surgery-first approach is the reduced treatment time.⁸ Following Orthognathic surgery, a period of rapid metabolic activity occurs with in the tissues which is known as Regional acceleratory phenomenon (RAP) which begins immediately after surgery and lasts for approximately 3 month post surgery facilitating efficient post operative orthodontic teeth movement.⁹

Regional acceleratory phenomenon was described by Frost HM. Osteotomy causes an increase in cortical bone porosity that results in decreased resistance to tooth movement. During healing process after Orthognathic surgery, there is an increase in blood flow above the presurgical levels which facilitates the healing process and stimulates bone turnover that can potentially speed up orthodontic tooth movement.¹⁰ Bone remodeling in and around the healing tissues facilitates the healing process and orthodontic tooth movement. Alkaline phosphatase (ALP) and C-terminal telopeptide of type I collagen (ICTP) are two bone markers associated in around the corticotomy site. The former is associated with osteoblastic activity while the latter is a byproduct of osteoclastic breakdown of bone. Thus orthognathic surgery triggers 3–4 months of higher osteoclastic activities and metabolic changes within the bone.⁸ Thus Surgery-first approach reduces the treatment time as short as 7 months which has been reported in the literature. Bypassing pre-surgical orthodontics results can be achieved in an overall shortened treatment time up to 1–1.5 years or less.¹¹

In 2007,Sebaoun et al. suggested that rapid tooth movement in the context of corticotomy- facilitated orthodontics was the result of a demineralization-reminerlization process.¹² It appears that selective bone injury results in an overwhelming activating stimulus for both catabolic and anabolic responses in the periodontium. It is possible that the alveolar bone adjacent to the osteotomies performed during orthognathic surgery also undergoes increased bone turnover.¹³ This could account for the more efficient postoperative orthodontic movements and hence contribute to the reduction in total treatment time with the SFA.

Cases with minimal dental discrepancies, in sagittal, vertical, and transverse planes could be assigned for surgery-first approach. Mild proclination or retroclination of teeth in the sagittal plane, no collapsed bite or mild posterior crossbite in the transverse plane, mild curve of Spee with no significant deep bite or open bite in the vertical plane.

Indications

The criteria that are suggested for SFA ¹⁴ are:

- Well-aligned to mild crowding
- Flat to mild Curve of Spee
- Normal to mild proclination/retroclination of incisors
- Minimal transverse discrepancy
- Cases where decompensation is needed, where decompensation is done by positioning the jaw bones
- Mostly for class III malocclusion but also class II.

One patient two problems concept

Surgery-first Orthognathic approach is "one patient two problem concept" wherein skeletal and dental are two separate problems which need to be addressed in one patient. In Surgery-first approach, first the skeletal complexities are corrected by performing surgery and "transitional occlusion" is set-up such that the second problem, which is the dental problem, is taken care off with regular orthodontic treatment utilizing regional acceleratory phenomenon (RAP).

Surgery-first approach: disadvantages ¹⁵

- 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.

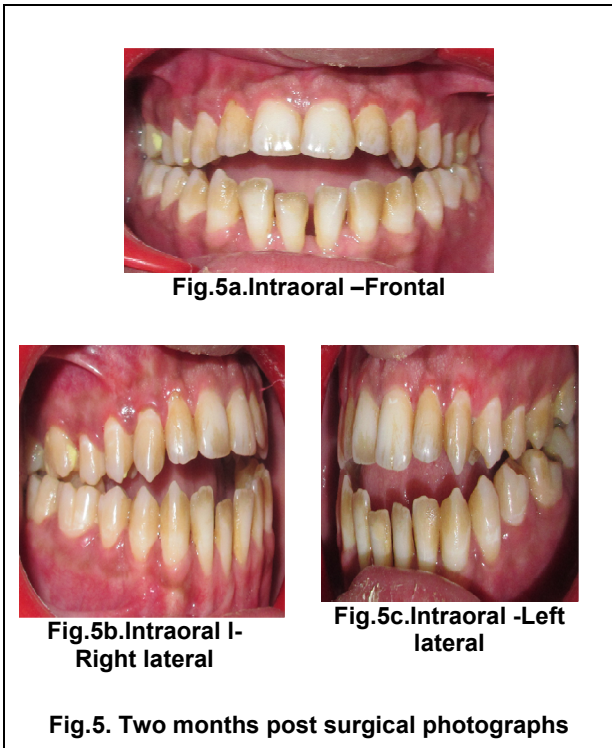
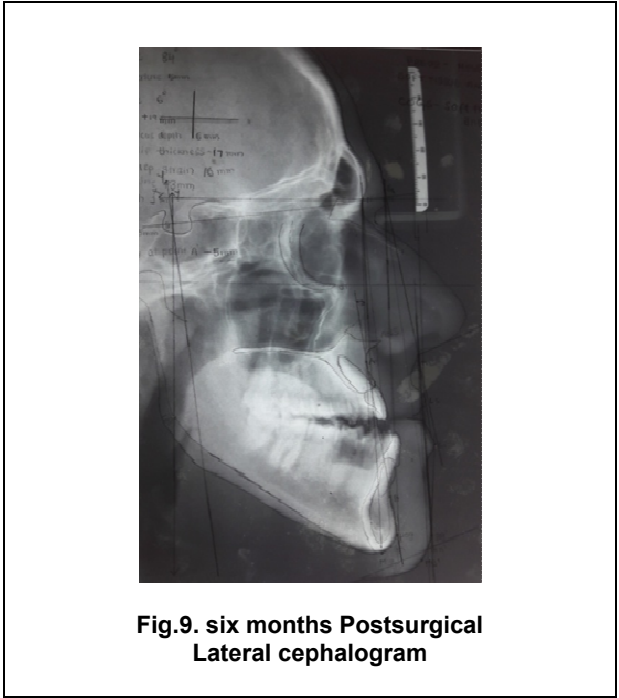




Fig.8. Six months postsurgical- Extraoral photographs



CONCLUSION

Though surgery-first approach has the advantage of shortened total treatment time and early response to a patient's need, there are limitations particularly relating to

Careful case selection, proper diagnosis. The surgeon should exhibit the ability to plan and perform surgery on malaligned, non decompensated dental arches, according to the treatment plan. It is imperative that the orthodontist and surgeon involved in SFA should not only follow the orthognathic surgery principles but also understand the limitations of orthodontic teeth movement. 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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