



Research Article

OUR EXPERIENCE WITH BIMAXILLARY/ BI JAW ORTHOGNATHIC SURGERIES - CASE SERIES

Dr. Sunil Vasudev, Dr. Niranjani raja, Dr. Sahana M S and Dr. Gowrishankar

Dapm RV Dental College

ARTICLE INFO

Article History:

Received 15th February, 2023

Received in revised form 28th February, 2024

Accepted 18th March, 2024

Published online 28th March, 2024

Key words:

Orthognathic surgery, jaw advancements, jaw surgery, angle class, malocclusion

ABSTRACT

Patients with skeletal class III jaw bases present with multitude of functional difficulties which affect them on a day-to-day basis and pose a greater, if not equal, concern to both the patient and the clinician than just the aesthetic drawbacks associated with such skeletal deformities. Orthognathic surgeries post initial orthodontic decompensation is a standard line of treatment followed in such patients. Here we discuss three such cases where patients with class III skeletal jaw bases were treated with bimaxillary orthognathic surgeries performed using patient specific acrylic splints to improve the patient's respiratory and speech functions as well as to achieve the desired orthognathic profile.

Copyright© The author(s) 2024. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Bimaxillary surgery is a common component of orthognathic surgery when dealing with severe skeletal malocclusion. Relocation of the maxilla is a key step in achieving an ideal outcome in two-jaw surgery. However, selecting the best approach for moving the maxilla to the planned position accurately remains a difficult task [1].

The differential diagnosis of Class III malocclusion plays an important role in the success of treatment results, and the therapeutic possibilities of such trait mainly depend on the developmental age of patient and nature of malocclusion. Non-growing patients with Class III malocclusion may present with various combinations of dentoalveolar and skeletal problems, and mild cases can often be treated with orthodontic camouflage while severe skeletal discrepancies require orthognathic surgery along with orthodontic appliance therapy. However, in cases with borderline characteristics, it becomes difficult for the clinician to determine whether or not the patient is suitable for surgery. Kerr et al., developed some cephalometric yardsticks and reported that surgery should be performed for patients with an ANB angle of $<-4^\circ$, a maxillary/mandibular (M/M) ratio of 0.84, and mandibular incisor inclination $<83^\circ$. Stellzig-Eisenhauer et al. in their discriminant analysis showed that Wits appraisal is most decisive in distinguishing the borderline case, and average Wits for camouflage treatment was -4.6 ± 1.7 mm and for surgical treatment was -12.1 ± 4.3 mm. Rabie et al. suggested that Holdaway angle can be a reliable guide, and an angle $>12^\circ$ can be successfully camouflaged.

The main objective of surgical orthodontic treatment is to reposition the jaws to achieve an esthetic profile with good occlusion and masticatory function. The type of orthognathic surgery to be performed depends on the culprit jaw and the severity of the sagittal discrepancy. Bimaxillary surgeries are performed when the sagittal discrepancy cannot be corrected by single-jaw surgery or when there are anatomic limitations. General limits for the surgical maxillary advancement are 6–8 mm and that of mandibular setback is 4–6 mm.

Johnston et al. reported that bimaxillary surgery is more frequently used procedure (75% cases) and has 3.4 times the odds of fully correcting the ANB angulations than single-jaw surgery [2].

CASE REPORT 1

Diagnosis and treatment plan

A 19 year old female patient presented to the department of Oral and Maxillofacial surgery, RV Dental college, Bangalore with a chief complaint of forwardly placed lower jaw. The patient had no associated medical history. Clinical assessment revealed an apparently bilaterally symmetrical face, dolichofacial pattern, concave profile with anterior divergence, prognathic lower jaw, and incompetent lips with protrusive lower lip. Intra oral examination revealed retroclined upper incisors and proclined lower incisors. The maxilla presented with a yaw to the left by 3mm. Class III malocclusion with end on molar relation bilaterally was noted. The overall overjet and overbite was 4mm each (Figure 1). The mouth opening along with the tongue movements were satisfactory. Patient had no difficulty in speech or swallowing. Candidature

for orthognathic surgery was confirmed post investigations and preparation of pre fabricated surgical splints.

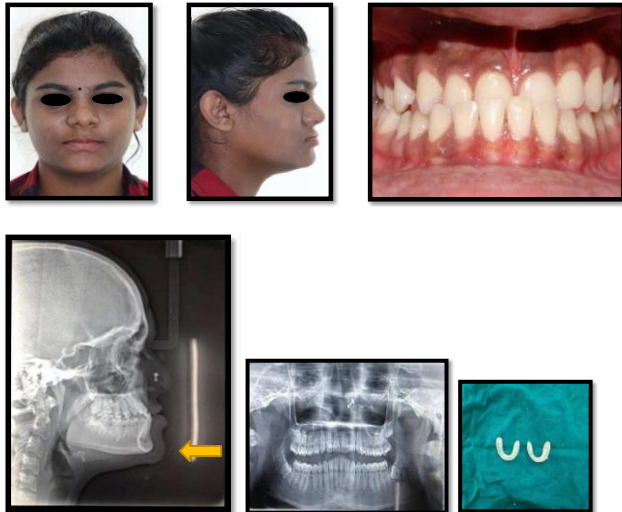


Fig. 1 Pre operative records

Surgical Procedure

General anaesthesia was achieved by left nasal intubation. Painting and draping was done following standard aseptic protocols. Local anaesthesia with vasoconstrictor was administered to the proposed surgical site.

Maxillary vestibular incision was given and full thickness mucoperiosteal flap was raised to expose the pyriform aperture. Le Fort I osteotomy cuts were performed and the pterygomaxillary disjuncture was achieved.

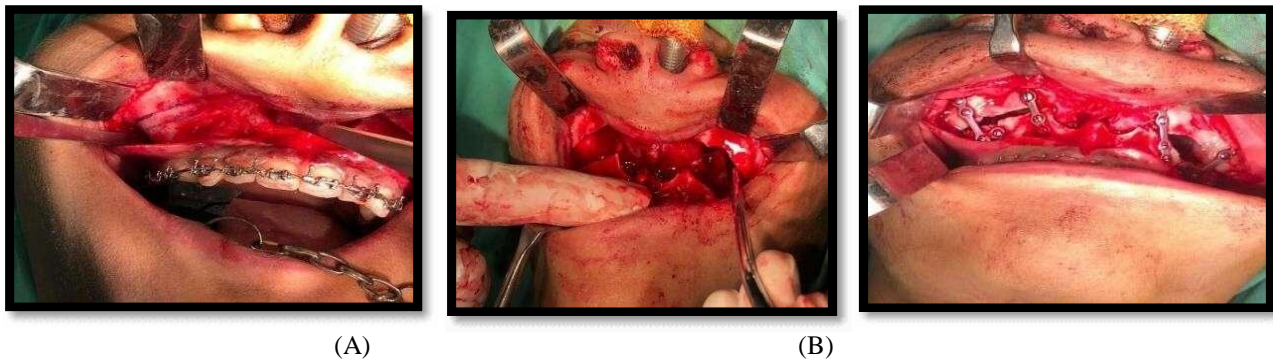


Fig. 2 (A): Maxillary vestibular incision placed, mucoperiosteal flap raised up to the base of the pyriform aperture, Le Fort I osteotomy cuts marked and placed, and pterygomaxillary disjuncture achieved
(B) : Osteotomised maxillary segment advanced by 5mm with the help of pre-fabricated guiding splints and fixed in position using titanium miniplates and screws

Guided by pre-fabricated splints, the maxilla was advanced by 5mm with a downward rotation and then semi-rigid fixation was done using titanium miniplates bilaterally. 1.5mm 'L' shaped plates were placed each on the right and left side, anteriorly in the thick bone at the pyriform areas. Two 1.5mm 4-holed with gap plates were placed, each on the right and left side at the zygomatico-maxillary buttress region. All the plates were secured in place using one 1.5x4 mm screw and thirteen 1.5x6 mm screws (Figure 2). Bilaterally, incisions were placed from the distal end of last mandibular molars, extending upwards on the anterior border of ramus to expose the sigmoid notch. Bilaterally, sagittal split osteotomy cuts were placed as per the protocol and the osteotomized bone segments were mobilized to achieve mandibular set back by 3 mm as guided by the pre-fabricated splints. The re-positioned mandibular

osteotomized segments were then fixed in place using one 2 mm 4 holed with gap and one 2 mm 6 holed continuous plate which were secured using two 2x6 mm screws and eight 2x8 mm screws (Figure 3).



Surgical site was then irrigated with Betadine and saline solution and closure was achieved using 3-0 Vicryl. Extraorally pressure packs were placed and the patient was extubated and shifted to recovery uneventfully.

The desired occlusion was achieved using the pre fabricated surgical splints (Figure 4). The post operative profile showed significant changes (Figure 5).



Fig. 4 Desired occlusion achieved with the help of splints post osteotomy cuts



Fig. 5 (1) Immediate post operative profile



Fig. 5 (2) Post-op 1 month review profile and occlusion pictures

CASE REPORT 2

A 23 year old male patient presented to the Department of Oral and Maxillofacial Surgery, RV Dental college with a chief complaint of pain in bilateral TMJ with speech problems. Patient is diagnosed with skeletal Class III jaw base, vertical growth pattern, mutilated molar relation bilaterally, Class III canine relation bilaterally, reverse overjet of 3 mm, open bite of 4mm, proclined and forwardly placed upper incisors, retroclined and backwardly placed lower incisors (Figure 6). Patient has a concave profile, and is endomorphic and euryprosopic. Patient also presented with a positive lip step and anterior facial divergence. Candidature for orthognathic surgery was confirmed post investigations and preparation of pre fabricated surgical splints.

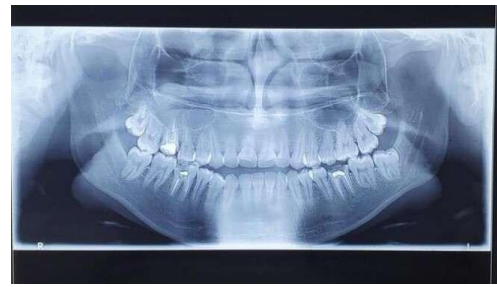


Fig. 6 Pre operative records

SURGICAL PROCEDURE

General anaesthesia was achieved by left nasal intubation. Painting and draping was done following standard aseptic protocols. Local anaesthesia with vasoconstrictor was administered to the proposed surgical site.

Maxillary vestibular incision was given and full thickness mucoperiosteal flap was raised to expose the pyriform aperture. Le Fort I osteotomy cuts were performed and the pterygomaxillary disjunction was achieved.

Guided by pre-fabricated splints, the maxilla was advanced by 5mm with a downward rotation of about 4mm to correct the pitch and was then fixed in place bilaterally using two 1.5mm 'L' shaped plates on each side, at the anterior pyriform region and posteriorly at zygomatico- maxillary buttress, which were all secured in place using eight 1.5x8 mm screw and eight 1.5x6mm screws (Figure 7).

Bilaterally, incisions were placed from the distal end of last mandibular molars, extending upwards on the anterior border of ramus to expose the sigmoid notch. Bilaterally, sagittal split osteotomy cuts were placed as per the protocol and the osteotomized bone segments were mobilized to achieve mandibular set back by 3 mm as guided by the pre-fabricated splints. The re-positioned mandibular osteotomized segments were then fixed in place using one 2 mm 4 holed with gap and one 2 mm 6 holed continuous plate which were secured using two 2x6 mm screws and eight 2x8 mm screws (Figure 8).

Surgical site was then irrigated with Betadine and saline solution and closure was achieved using 3-0 Vicryl. Extraorally pressure packs were placed and the patient was extubated and shifted to recovery uneventfully.

The desired occlusion was achieved using the pre fabricated surgical splints. The post operative profile showed significant

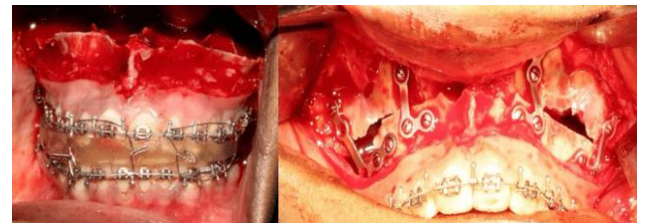


Fig.7 Maxillary vestibular incision placed, mucoperiosteal flap raised up to the base of the pyriform aperture, Le Fort I osteotomy cuts marked and placed, and pterygomaxillary disjunction achieved. Maxillary segment advanced by 5mm and fixed in position using titanium miniplates and screws

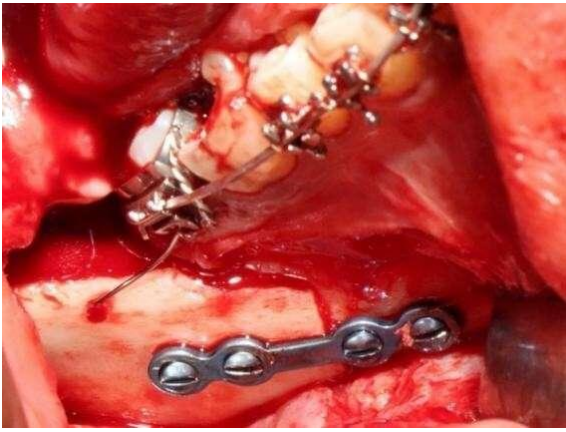


Fig. 8 BSSO osteotomy cuts placed bilaterally, mandibular setback by 3 mm achieved with guiding splints and fixed in place



Fig. 10 Pre operative records

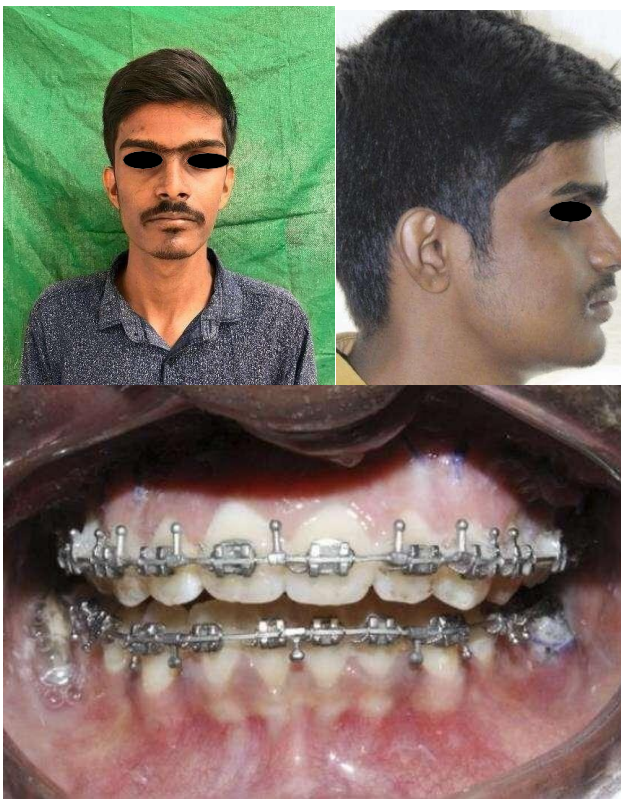


Fig. 9 Post operative records

CASE REPORT 3

A year old female patient presented to the Department of Oral and Maxillofacial Surgery, RV Dental College, with a chief complaint of forwardly placed lower jaw and backwardly placed upper jaw. Patient was diagnosed with a retrognathic maxilla, prognathic mandible with an anterior open bite and posterior scissor bite. Patient has a concave profile and is endomorphic and euryprosopic. Patient also presented with a positive lip step and anterior facial divergence (Figure 10). Candidature for orthognathic surgery was confirmed post investigations and preparation of pre fabricated surgical splints.

SURIGICAL PROCEDURE

General anaesthesia was achieved by left nasal intubation. Painting and draping was done following standard aseptic protocols. Local anaesthesia with vasoconstrictor was administered to the proposed surgical site.

Maxillary vestibular incision was given and full thickness mucoperiosteal flap was raised to expose the pyriform aperture. Le Fort I osteotomy cuts were performed and the pterygomaxillary disjuncture was achieved.

Guided by pre-fabricated splints, the maxilla was advanced by 5mm with a downward rotation of about 4mm to correct the pitch and was then fixed in place bilaterally using two 1.5mm 'L' shaped plates each on the right and left side at the pyriform buttress and zygomatico- maxillary buttress, which were all secured in place using eight 1.5x8 mm screw and eight 1.5x6 mm screws (Figure 11).

Bilaterally, incisions were placed from the distal end of last mandibular molars, extending upwards on the anterior border of ramus to expose the sigmoid notch. Bilaterally, sagittal split osteotomy cuts were placed as per the protocol and the osteotomized bone segments were mobilized to achieve mandibular set back by 3 mm as guided by the pre-fabricated splints. The re-positioned mandibular osteotomized segments were then fixed in place using one 2 mm 4 holed with gap and one 2 mm 6 holed continuous plate which were secured using two 2x6 mm screws and eight 2x8 mm screws (Figure 12).

Surgical site was then irrigated with Betadine and saline solution and closure was achieved using 3-0 Vicryl. Extraorally pressure packs were placed and the patient was extubated and shifted to recovery uneventfully.

The desired occlusion was achieved using the pre fabricated surgical splints. The post operative profile showed significant changes (Figure 13).

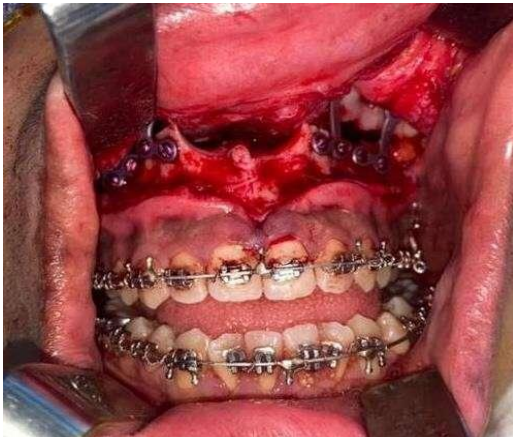


Fig. 11 Maxillary vestibular incision placed, mucoperiosteal flap raised up to the base of the pyriform aperture, Le Fort I osteotomy cuts marked and placed, and pterygomaxillary disjunction achieved. Maxillary segment advanced by 5mm and fixed in position using titanium miniplates and screws

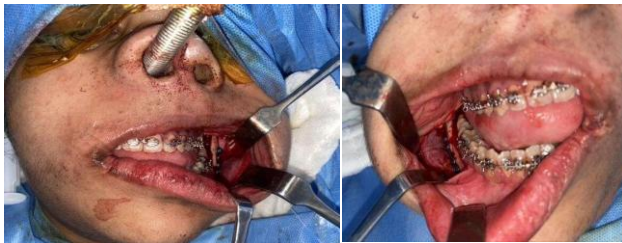


Fig. 12 BSSO osteotomy cuts placed bilaterally, mandibular setback by 3 mm achieved with guiding splints and fixed in place

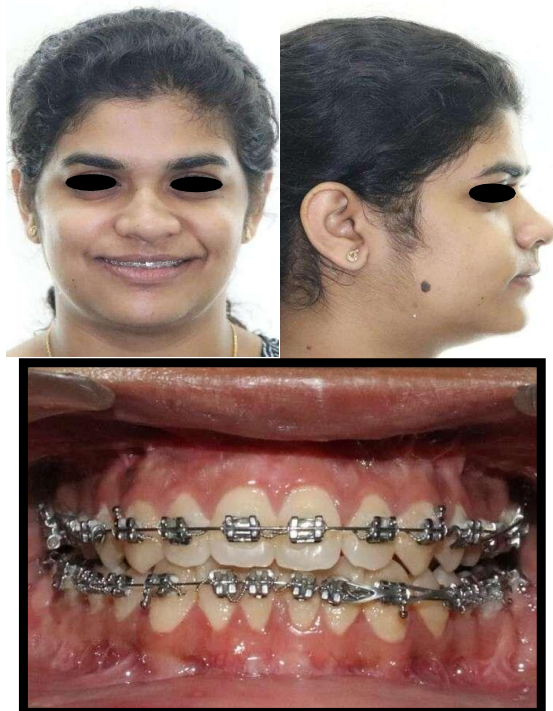


Fig. 13 Post operative records.

DISCUSSION

Orthodontic treatment aims to achieve an adequate occlusion thus ensuring satisfactory and healthy functioning of the

stomatognathic system's physiological routine, an optimal facial, oral, and dental aesthetics, resulting in a long-term stability. Skeletal Class III malocclusion is usually easy to recognize and frequently leads to conspicuous impairment of facial aesthetics and depending on the severity may cause gross reduction in masticatory performance. Although isolated surgery of the mandible for prognathic lower jaw has long been the most commonly applied procedure for Class III correction, recently bimaxillary surgery is becoming more common. [2]

General limits for the surgical maxillary advancement are 6–8 mm and that of mandibular setback is 4–6 mm. Bimaxillary surgery is more frequently used procedure (75% cases) and has 3.4 times the odds of fully correcting the ANB angulations than single-jaw surgery. [2]

The decision to operate on the mandible as the first jaw in a bimaxillary orthognathic procedure dates back to the 1970s. [4]

The orthognathic surgeries commonly used to correct skeletal class III malocclusions are the maxillary advancement, mandibular setback procedures and genioplasty. The maxillary advancement, through LeFort I osteotomy, not only resets the occlusion but also leads to the anterior movement of the soft palate resulting in an increase in volume of the PAS (Posterior Airway Space), especially of the nasopharynx. [5]

In the present case series, all the three patients were treated with bimaxillary surgeries to correct malocclusion, improve facial aesthetics and ventilation mechanism. The average advancement of maxilla and mandibular setback being 4-5 mm and 3-4mm respectively. Post- operatively IMF was maintained with elastics which were regularly changed for a period of 3- 4 weeks, throughout which post-op orthodontic treatment was continued. The elastics were functional in guiding the patient's musculofascial complex along the newly positioned skeletal system and helping the patient in adapting to this new occlusion.

Post-operative 12 months review revealed stable occlusion and skeletal jaw relations along with improved functions and desirable aesthetics in all the three patients.

References

1. Chen H, Bi R, Hu Z, Chen J, Jiang N, Wu G, Li Y, Luo E, Zhu S. Comparison of three different types of splints and templates for maxilla repositioning in bimaxillary orthognathic surgery: a randomized controlled trial. *International Journal of Oral and Maxillofacial Surgery*. 2021 May 1;50(5):635-42.
2. Haryani J, Nagar A, Mehrotra D, Ranabhatt R. Management of severe skeletal Class III malocclusion with bimaxillary orthognathic surgery. *Contemporary Clinical Dentistry*. 2016 Oct;7(4):574.
3. Kim YJ, Lee Y, Chun YS, Kang N, Kim SJ, Kim M. Condylar positional changes up to 12 months after bimaxillary surgery for skeletal class III malocclusions. *Journal of Oral and Maxillofacial Surgery*. 2014 Jan 1; 72(1):145-56.
4. Borba AM, Borges AH, Cé PS, Venturi BA, Naclério-Homem MG, Miloro M. Mandible-

- first sequence in bimaxillary orthognathic surgery: a systematic review. *International journal of oral and maxillofacial surgery*. 2016 Apr 1;45(4):472-5.
5. Santagata M, Tozzi U, Lamart E, Tartaro G. Effect of orthognathic surgery on the posterior airway space in patients affected by skeletal class III malocclusion. *Journal of maxillofacial and oral surgery*. 2015 Sep; 14:682-6.
6. Foltán R, Hoffmannová J, Donev F, Vlk M, Šedý J, Kufa R, Bulik O. The impact of Le Fort I advancement and bilateral sagittal split osteotomy setback on ventilation during sleep. *International journal of oral and maxillofacial surgery*. 2009 Oct 1; 38(10):1036- 40.

How to cite this article:

Sunil Vasudev., Niranjani raja., Sahana M S and Gowrishankar. (2024). Our experience with bimaxillary/ bi jaw orthognathic surgeries - Case Series. *International Journal of Current Advanced Research*. 13(03), pp.2953-2958.
