

## Combined orthodontics and surgical approach to class III malocclusion with anterior open bite in adults

Sanjana Narendran<sup>1</sup>, Ferin Fathima<sup>1</sup>, Jyothikiran Hurkadle<sup>2</sup>, Raghunath N<sup>3</sup>

From <sup>1</sup>Postgraduate Student, <sup>2</sup>Associate Professor, <sup>3</sup>Professor and Head of the Department, Department of Orthodontics and Dentofacial Orthopaedics, JSS Dental College and Hospital, Bannimantap, Mysuru, Karnataka, India.

**Correspondence to:** Dr. Sanjana Narendran, 69/B, Shanti Marga, Siddartha Layout, Mysuru, Karnataka - 570011, India. E-mail: gattavadi@gmail.com.

Received - 01 May 2019

Initial Review - 21 May 2019

Accepted - 31 May 2019

### ABSTRACT

Skeletal anterior open bite with Class III malocclusion in adults is one of the most difficult malocclusions to treat. Surgical intervening is a must, along with orthodontics in such complex cases. The most effective treatment option in adult patients with Class III malocclusion and the skeletal anterior open bite is surgical repositioning of the maxilla or both jaws. The present case report describes the treatment protocol for Class III malocclusion with an anterior open bite in adult, a novel orthodontic- surgical approach. A 24-year old male patient with a Class III malocclusion, anterior open bite (skeletal), poor facial aesthetics, mandibular and chin protrusion. The objective was to achieve ideal overjet and overbite, to achieve class 1 incisor, canine and molar relation. To correct anterior open bite and achieve Class I skeletal jaw bases and to achieve esthetically pleasing profile and functionally stable occlusion. Therefore, by correction of the dental and skeletal jaw relationship, we hoped to improve the patient's self- esteem, confidence and improved oral health quality of life.

**Keywords:** Anterior open bite, Class III malocclusion, Surgical-orthodontic treatment.

**S**keletal anterior open bite with Class III malocclusion in adults is one of the most difficult malocclusions to treat. Surgical intervening is a must, along with orthodontics in such complex cases. Most subjects with Class III malocclusions have combinations of skeletal and dentoalveolar components [1]. The factors contributing to the anomaly are complex. The most effective treatment option in adult patients with Class III malocclusion and the skeletal anterior open bite is a surgical repositioning of the maxilla or both jaws. With the advent of rigid internal fixation, improved stability in mandibular surgical procedures has been documented [2]. This procedure has a reduced risk of negative soft-tissue effects and the added benefit of simultaneous vertical anterior open-bite correction and anteroposterior correction with 1 mandibular procedure [3]. Treatment of the class III malocclusion often involves dentoalveolar decompensation or combined Orthognathic approach to achieve normal occlusion and soft tissue harmony.

### CASE REPORT

A 24-year-old male patient was referred to the department of orthodontics and dentofacial orthopedics with the chief complaint of inability to chew, since last several years. The patient had no relevant family or medical history and he had a positive outlook for the treatment. The patient presented with prognathic mandible and increased lower anterior facial height. The patient had an

Angle Class III malocclusion with an excessive open bite of 8 mm, anterior open bite of 6mm, and a constricted maxillary dental arch. The lateral cephalometric analysis indicated a skeletal Class III jaw relationship with mandibular protrusion and an ANB angle of -2°, and SNB angle of 84°, a mandibular plane angle of 37.5°, a large gonial angle of 140.0u, and an upright mandibular central incisor-mandibular plane angle (IMPA) of 76.5u. According to the soft tissue analysis, the lower facial height was slightly long, with a middle third height /lower third height (G-Sn/Sn-soft tissue mentum [MeS]) ratio of 0.9. Furthermore, the patient had a wide, broad, and flat tongue; an open bite; mandibular prognathism; Class III malocclusion; chronic posturing of the tongue between the teeth at rest; disproportionately excessive mandibular growth; an increased gonial angle. The cephalometric analysis confirmed the clinical findings. The intra oral examination of the patient was dolicocephalic, leptoprosopic. He had a concave profile, with protrusion of chin and competent lips.

The Treatment plan was as follows: 1- Pre-treatment prophylaxis; 2- Combination therapy; 3- Non-extraction fixed orthodontic treatment with MBT 0.022 SLOT prescription; 4- To correct the inclinations of upper and lower anterior teeth; 5- To upright the lower first molars in the left and the second molar in the right; 6- To intrude the upper first and second molars using mini-implants; 6- To correct the reverse overjet and anterior open bite. A surgery was planned for bilateral sagittal split osteotomy setback and superior replacement of mandible to correct the anterior

Table 1 – Cephalometric analysis – pre and post treatment

	Pre-treatment	Post-treatment
<b>SKELETAL :</b>		
S N A angle	69	70
S N B angle	74	75
A N B angle	-5	-5
N ⊥ to Pt A (mm)	-15	12
N ⊥ to Pog (mm)	-17mm	-6
GoGn to SN (angle)	87	
Angle of inclination	87	89
Lower anterior Face height (mm)	72	68
Effective maxillary length (mm)	83	85
Effective mandibular length (mm)	122	125
Y – axis angle	67	63
Facial axis angle	4	
Sum of posterior angles	396	
<b>Dental</b>		
Upper Incisor to NA (angle)	51	42
Upper Incisor to NA (mm)	15	10
Upper Incisor to SN (angle)	120	115
Lower Incisor to NB (angle)	25	18
Lower Incisor to NB (mm)	6	2
Lower Incisor to A-Pog line (mm)	5	2
Lower Incisor to Mandibular plane (angle)	96	39

open bite and class 3 malocclusion. This will achieve a long term stability followed by replacing the missing mandibular molar.

The pre-adjusted edgewise appliance plan included 0.022x0.028 inch MBT prescription. The arch wire sequence was proceeded as follows: 0.016 inch NiTi, followed by 0.018 SS, 0.019 x 0.025 inch NiTi, and 0.019x 0.025 SS wires. Reverse Orthodontics was done to decompensate the inclination of upper and lower incisors and to upright the incisors on their basal bone. The reverse overjet obtained before surgery was -6 mm; facebow transfer and mock surgery was done on Hanau semi-adjustable articulator with condylar guidance adjusted at 30. Mock surgery was done by the mandibular setback and an acrylic splints were prepared for the surgery.

Bilateral sagittal split ramus osteotomy was done to correct the mandibular prognathism and anterior open bite. Mandible was set back by 6 mm to coordinate the upper and lower arch. A 2mm of overcorrection was planned to overcome the minor relapse occurring post-surgery. Surgery was performed and rigid internal fixation was used. Post-surgical notations included rather a normal ecchymosis and some transient paresthesia of the chin and lower lip. Post-surgical orthodontics was resumed two months later which was followed by placing 0.016 SS in the upper and lower arch, to correct the minor midline shift. Occlusal settling was done by cutting the wire distal to the canine and placement of settling elastics. The total duration of the treatment was 23 months.

At the end of treatment, functional occlusion, normal overjet, and overbite, adequate intercuspation, with angles Class I molar relationship on the right side, Class I canine relationship, Class I incisor relationship, normal lateral and protrusive excursions, was achieved. Mandibular prognathism was eliminated and facial aesthetics was considerably improved.

The pre-treatment midline deviation of the mandibular dentition to the right was corrected fully with post-surgical



Figure 1: Pretreatment photographs



Figure 2: Mini-implants for intrusion of upper molars

orthodontics. All the functional movements of the mandible were without limitations and without symptoms. The patient decided to opt for a prosthetic implant to replace the missing lower left first molar at a later date. Therefore, a rigid wire of 1mm stainless steel was bonded on the buccal surfaces of the 2<sup>nd</sup> molar to the 2<sup>nd</sup> premolar of the third quadrant to maintain the space until the tooth was replaced.

**DISCUSSION**

An anterior open bite can be due to lack of eruption of anterior teeth but most often is caused by rotation of the jaws or excessive eruption of posterior teeth. On cephalometric analysis, the major indicators of a skeletal relationship that predispose an individual to open bite (the ‘skeletal open bite’ pattern) are a short mandibular ramus and downward rotation of the posterior maxilla. Both tend to produce a downward-backward rotation of the mandible that increases anterior face height and separates the anterior teeth.

Once excessive vertical development has occurred, orthognathic surgery is the only way to correct the jaw rotations and reduce anterior face height. Surgical repositioning of the mandible was written by VP Blair in 1907. In 1955 Obwegeser and Trauner described a surgical procedure involving sagittal split osteotomy through the ramus of mandible [4]. Similar cases of open bite with a severe vertical dysplasia have also been treated by surgically assisted rapid palatal expansion. It was not warranted in this case as the dental expansion was carried out by a removable orthodontic appliance as an adjunct to presurgical orthodontics. Also, in rapid maxillary expansion (because of the downward and forward movement of the maxilla) there is autorotation of mandible in a downward and backward direction thereby increasing the vertical dysplasia [5, 6]. However, it increases the mandibular plane angle hence was not recommended [7].The residual occlusal irregularities will be corrected by post-surgical orthodontic treatment. In this case, the mandible was autorotated in the closing direction, and the open bite was reduced by the intrusion of the

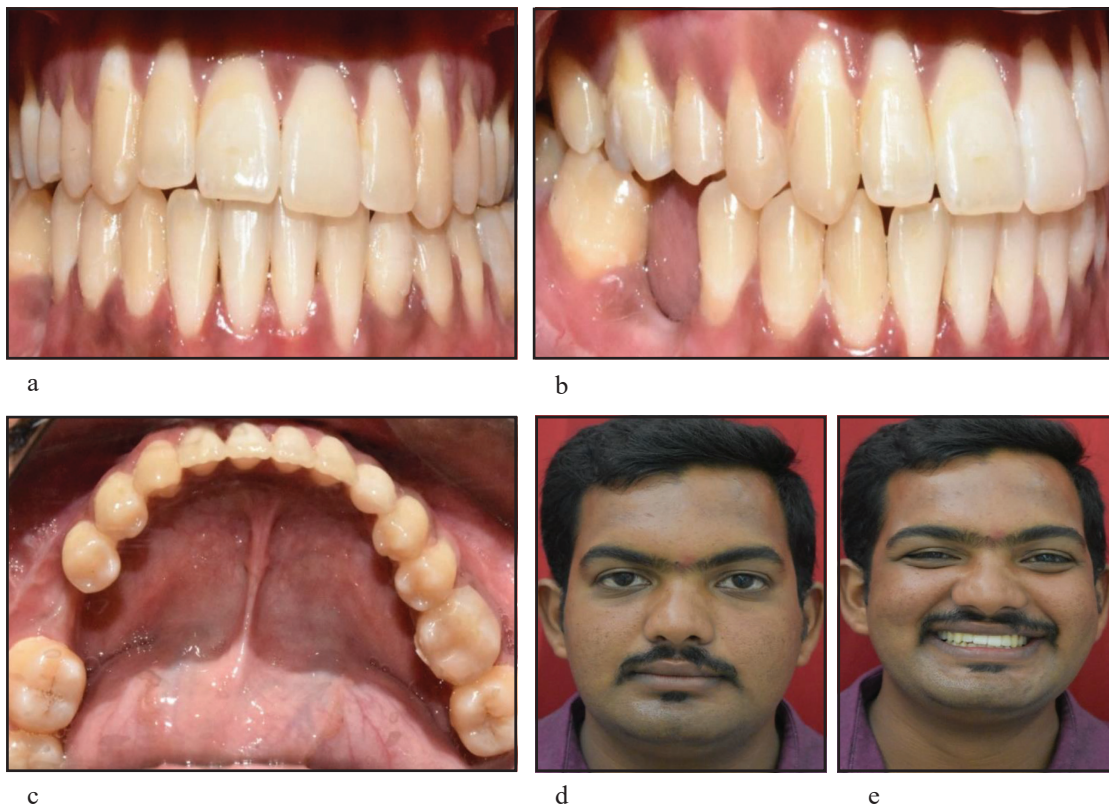


Figure 3: Post treatment photographs-extraoral and intraoral

molars using titanium screws during the presurgical orthodontic treatment phase [8] If intrusion of the molars with titanium screws and bilateral sagittal split osteotomy (BSSO) is performed instead of two-jaw surgery in patients with skeletal Class III and an open bite, the surgical invasion is reduced. However, there have been few reports of such therapy [9, 10, 11]. Mandibular distraction osteogenesis is also carried out in some cases instead of bilateral sagittal split osteotomy for mandibular advancement [12]. It is said that orthodontists talk in millimeters and angles whereas the oral surgeon thinks in centimeters. Hence, periodic assessment of the patient through the treatment progress by both teams would ensure that the case falls on the track. Attaining the pre-surgical goals with rigid arch wires in place and preparation of surgical splint are steps that need careful detailing [13].

## CONCLUSION

The combined surgical-orthodontic treatment of this case led to a significant facial, dental, and functional improvement. The dental relationship achieved was good. Facially, vertical balance and harmony were obtained and this is perhaps the most important goal achieved because it was the patient's chief concern.

## REFERENCES

1. Proffit WR, Fields HW, Ackerman JL, Bailey LT, Tulloch JFC. Contemporary Orthodontics. 3rd ed. St Louis, MO: Mosby-Year Book Inc; 2000. [13]
2. Thomas PM, Tucker MR, Prewitt JR, Proffit WR. Early skeletal and dental changes following mandibular advancement and rigid internal fixation. *Int J Adult OrthodOrthogSurg* 1986;1: 171-8.

3. Caskey RT, Turpin DL, Bloomquist DS. Stability of mandibular lengthening using bicortical screw fixation. *Am J OrthodDentofacialOrthop* 1989;96:320-6.
4. Blair VP. Report of case of double resection for correction of protrusion of mandible. *Dent Cosmos* 1906;48:817-20.
5. Oliveira JA, Bloomquist DS. The stability of the use of bilateral sagittal split osteotomy in the closure of anterior open bite. *Int J Adult OrthodOrthogSurg* 1997; 12:101-8.
6. Joondeph DR, Bloomquist DS. Open-bite closure with mandibular osteotomy. *Am J OrthodDentofacialOrthop* 2004;126:296-8.
7. Conley RS, Legan HL. Correction of severe vertical maxillary excess with anterior open bite and transverse maxillary deficiency. *Angle Orthod* 2002;72:265-74
8. Togawaa R, Iinob S, Miyawaki S. Skeletal class III and open bite treated with bilateral sagittal split osteotomy and molar intrusion using titanium screws. *Angle Orthod*2010;80:1176-84
9. Oliveira JA, Bloomquist DS. The stability of the use of bilateral sagittal split osteotomy in the closure of anterior open bite. *Int J Adult OrthodOrthogSurg*1997;12:101-8.
10. Joondeph DR, Bloomquist DS. Open-bite closure with mandibular osteotomy. *Am J OrthodDentofacialOrthop* 2004;126:296-8.
11. Sugawara J, Baik UB, Umemori M, Takahashi I, Nagasaka H, Kawamura H, Mitani H. Treatment and posttreatment dentoalveolar changes following intrusion of mandibular molars with application of a skeletal anchorage system (SAS) for open bite correction. *Int J Adult OrthodonOrthognath Surg.* 2002; 17:243-253.
12. Singera SL, Southall PJ, Rosenberg I, et al. Mandibular distraction osteogenesis and maxillary osteotomy in a class II division I patient with chronic juvenile arthritis. *Angle Orthod*2006;76:341-8.
13. Proffit WR, Phillips C, Dann C IV. Who seeks surgical-orthodontic treatment? *Int J Adult OrthodonOrthognathSurg*1990; 5:153-60.

*Funding: None; Conflict of Interest: None Stated.*

**How to cite this article:** Narendran S, Fathima F, Hurkadle J, Raghunath N. Combined orthodontics and surgical approach to class III malocclusion with anterior open bite in adults. *Indian J Case Reports.* 2019;5(3):283-286.

Doi: 10.32677/IJCR.2019.v05.i03.030