



COMBINED ORTHODONTICS AND SURGICAL APPROACH IN TREATING CLASS III MALOCCLUSION WITH ANTERIOR OPEN BITE IN ADULTS

Dental Science

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ABSTRACT

The present case report describes the treatment protocol for Class III malocclusion with 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. Patient had significant anteroposterior as well as transverse discrepancies, with a concave profile, and strained lip closure. On intra-oral examination the patient had an open bite extending from first molar on one side to the first molar on the other. The treatment objectives were to correct the skeletal open bite, occlusion as well as facial aesthetics. Orthodontic mini implants were used to facilitate intrusion of first molars to a certain extent. The surgical procedures included a bilateral sagittal split osteotomy which was performed in order to allow counter-clockwise rotation of the mandible and anterior projection of the chin, accompanying the maxillary occlusal plane.

KEYWORDS

Orthodontics and Orthogn

BACKGROUND

Skeletal anterior open bite with Class III malocclusion in adults is one of the most difficult malocclusions to treat. Surgical intervening becomes mandatory 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 skeletal anterior open bite is 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 a single 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. The results can be dramatic for the patient as there will be a quantum jump in his/her aesthetics.

CASE PRESENTATION

A 24-year-old male patient reported with a chief complaint of inability to masticate food properly. The patient had no relevant family or medical history. He was highly positive for the treatment. The patient had an Angle Class III malocclusion with an open bite of 8 mm 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° and an upright mandibular central incisor-mandibular plane angle (IMPA) of 76.5° . According to the soft tissue analysis, the lower facial height was slightly long. Furthermore, the patient had a wide, broad, and flat tongue, an open bite, mandibular prognathism and falling in the category of Angle's Class III malocclusion. Chronic posturing of the tongue between the teeth at rest was noticed during his clinical examination.

Extra oral examination revealed that the patient was dolicocephalic, (long & narrow head type) leptoprosopic (long facial type). He had a concave profile, with protrusion of chin and competent lips (figure 1).

FIG 1 : PRE TREATMENT EXTRA ORAL PHOTOGRAPHS



Problem list: Patient presented with a prognathic mandible and increased lower anterior facial height. An anterior open bite of 8mm with skeletal class III malocclusion and compromised aesthetics. Functionally the patient struggled to masticate food as the only teeth in occlusal contact were the second molars (figure 2).

FIG 2 : PRE TREATMENT INTRA ORAL PHOTOGRAPHS



Treatment objective: To correct anterior open bite and achieve Class I skeletal jaw bases and to achieve aesthetically 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 an improved quality of oral health.

TREATMENT If relevant

Treatment plan:

- A Combination therapy of fixed orthodontics to harmonise the dentition over the jaw bases - dental decompensation was carried out first.
- Non-extraction fixed orthodontic treatment with MBT 0.022 SLOT prescription.
- To correct the inclinations of upper and lower anterior teeth- dental decompensation.
- To upright the lower first molars in the left and the second molar in the right.
- To intrude the upper first and second molars using mini-implants (Company- Dentos).
- To correct the reverse overjet and anterior open bite.
- Surgical plan: Bilateral sagittal split osteotomy setback and superior replacement of mandible to correct the anterior open bite and class 3 malocclusion.
- Prosthetic replacement of missing mandibular molar.

Treatment progress:

The pre adjusted edgewise appliance plan included 0.022x0.028 inch MBT prescription. The arch wire sequence 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. Micro Implants (Company- Dentos, dimensions 1.5mmX 10mm) were placed above between the roots of

the maxillary first and second molars and elastics were given to intrude the upper posterior teeth (figure 3). 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. The maxillo-mandibular relationship was recorded using a facebow transfer and mock surgery was done on Hanau semi adjustable articulator with condylar guidance adjusted at 30. Mock surgery was done by 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. 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

FIG 3 : MID TREATMENT INTRA ORAL PHOTOGRAPHS



OUTCOME AND FOLLOW-UP

At the end of treatment, functional occlusion, normal overjet, and overbite, adequate intercuspation, with angles Class I molar relationship on right side, Class I canine relationship, Class I incisor relationship, normal lateral and protrusive excursions were achieved. Mandibular prognathism was eliminated and facial aesthetics were considerably improved (figure 4 & 5).

The pre-treatment midline deviation of the mandibular dentition to the right was corrected fully with post- surgical 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 2nd molar to the 2nd premolar of the third quadrant to maintain the space until the tooth was replaced.

Critical Appraisal: Although most of the problems were addressed in treating this case, there was a mild cross -bite in relation to the second molars bilaterally. This could have been prevented by expansion done in the maxillary second molar region.

FIG 4 : POST TREATMENT INTRA ORAL PHOTOGRAPHS



Fig 5: Post treatment Extra oral photos



DISCUSSION

Include a very brief review of similar published cases

Anterior open bite can be due to lack of eruption of anterior teeth but most often the skeletal open bite 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 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 dental expansion was carried out by

removable orthodontic appliance as an adjunct to presurgical orthodontics. Also, in rapid maxillary expansion because of 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 open bite was reduced by mandible autorotating in the closing direction and aided by intrusion of the 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) are performed instead of two-jaw surgery in patients with skeletal Class III and open bite, the surgical invasion is reduced. However, there have been few reports of such a therapy[9-11]. Mandibular distraction osteogenesis is also carried out in some cases instead of bilateral sagittal split osteotomy for mandibular advancement[12-13].

It is said that orthodontists talk in millimetres and angles whereas the oral surgeon thinks in centimetres. Hence, periodic assessment of the patient through the treatment progress by both teams would ensure that the case falls on track. Attaining the pre-surgical goals with rigid arch wires in place and surgery in preparation.

LEARNING POINTS/TAKE HOME MESSAGES 3-5 bullet points

- Treating skeletal open bite malocclusions requires the combined efforts of an orthodontist and an Oral Surgeon
- The combined surgical-orthodontic treatment of this case led to a significant facial, dental, and functional improvement in this case of skeletal open bite malocclusion.
- Use of micro implants to aid in the intrusion of the maxillary molars and eventually correct the open bite proved advantageous .

Facially, vertical balance and harmony were obtained and this is perhaps the most important goal achieved, because it was the patient's chief concern.

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