

Correction of Anterior Open Bite and Facial Profile by Orthognathic Surgery– A Case Report

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Abstract:

This case report describes the treatment of a severe anterior open bite, Class III malocclusion with a history of digit sucking. An 18 years-old male presented with a significant anteroposterior and vertical discrepancy of face. The patient's face was concave with procumbent lips. He had an anterior open bite of 11 mm, a reverse overjet of 8 mm, and a transverse maxillary deficiency on right side. The orthognathic surgery was elected as an option of treatment to correct the anterior open bite with improvement of facial profile.

Keywords: Anterior open bite, Transverse maxillary deficiency, Vertical excess, Orthognathic surgery.

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Introduction:

An anterior open bite is a lack of contact in a vertical direction between the incisal edges of the maxillary and mandibular anterior teeth¹. Numerous theories of open-bite etiology have been proposed, including unfavorable growth patterns, heredity, digital habits, and tongue function². Among the treatments used are habit-breaking appliances, bite blocks, high-pull headgear therapy, vertical-pull chin cups, vertical elastics, multiloop edgewise archwire therapy, and surgical correction³⁻⁶.

History and Etiology:

Patient Rubel, an 18years old male attended to the Orthodontic department of the BSMMU with the complaints of anterior open bite associated with

chewing problem. His medical and dental history was noncontributory. He had a history of digit sucking and swollen palatine tonsils. The enlarged tonsils were believed to have caused mouth breathing and compensatory anterior tongue posturing to achieve an adequate airway.

He was suggested to do the OPG, lateral cephalogram, frontal cephalogram, and model construction for diagnostic purpose. In clinical examination it was revealed that he had Class III malocclusion with an 11 mm anterior open bite, 8-mm reverse overjet, and slight midline deviation. [Figure-2(e-j)] A space analysis indicated 2 mm of crowding in the maxillary arch and 1 mm of crowding in the mandibular arch. Furthermore, a concave profile because of a maxillary



Fig.-1: Patient's profile: frontal view pre-operative (a) & post- operative (b); right lateral view pre-operative (c), & post- operative (d)

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Fig.-2: Intra-oral photograph shows occlusion of the patient: frontal view- preoperative (e) and post-operative (f); left lateral view- preoperative (g) and post-operative (h); right lateral view –preoperative (i) and post-operative (j).

deficiency & mandibular prognathism was noted. He also demonstrated an acute nasolabial angle, an increased lower facial height, and strained circumoral musculature on lip closure. He had developed macroglossia which causing tongue thrush.

Cephalometric analysis[Figure-3(l)] showed a skeletal Class III relationship (ANB 1°) with maxillary retroclination (SNA 79°), an increased steepness to her mandibular plane (FMA 29°), and protrusive incisors (interincisal angle, 104° ; maxillary incisor to NA angle, 36° ; maxillary incisor to NA

distance, 11 mm; mandibular incisor to NB angle, 40° ; mandibular incisor to NB distance, 14 mm). These findings [Table-I] were consistent with the diagnosis of a skeletal Class III malocclusion with a severe anterior open bite secondary to a sucking habit.

Table-I

Summary of Cephalometric Analysis.

Cephalometric points	Standard	Pre treatment	Post treatment
SNA($^{\circ}$)	82°	80°	82°
SNB($^{\circ}$)	80°	78°	80°
ANB($^{\circ}$)	2°	2°	2°
FMA($^{\circ}$)	22°	47°	33°
1/NA($^{\circ}$)	22°	37°	34°
1-NA(mm)	4mm	11mm	11mm
1/NB($^{\circ}$)	25°	41°	27°
1-NB (mm)	4mm	14mm	8mm
1/1($^{\circ}$)	131°	102°	119°



(k)



(l)



(m)



(n)

Fig.-3: Patient's cephalometric radiograph: preoperative (k) & post-operative (m); cephalometric tracing: preoperative (l) & post-operative (n).

Treatment Objectives:

The objectives of treatment were to eliminate the anterior open bite and attain an acceptable occlusion while improving facial esthetics.

On the basis of the skeletal discrepancies, a pre-surgical orthodontic treatment was discussed, but the parents deemed it too long procedure and selected an immediate treatment option without the need to wait for many years until the end of an orthodontic treatment then a surgical procedure. Thus, a surgical plan was devised to eliminate the open bite and there by, the patient's chief complaint. For surgical correction of the skeletal discrepancies the patient was referred to the oral and maxillofacial department of BSMMU and decided to work out bilaterally.

Treatment plane:

A two-phase treatment was considered. In the early intervention, to improve the facial profile Le Fort I Osteotomy in maxilla and Bilateral Saggital Splite Ramus Osteotomy in mandible followed by surgical correction of macroglossia were prescribed. To improve the minor occulusal irregularities, in the second phase of treatment, the occlusion was corrected by orthodontic treatment. The patient was discussed about the complexity of this plan and about the need for perfect compliance with surgical procedure.

Treatment Progress:**Surgical technique**

Mock surgery was done on models to asses the position of the jaws after surgery. An occlusal splint was fabricated on these models [Figure-4(o)].



Fig.-4: Occlusal splint fabricated on articulating patient's dental cast (o).

Under general anesthesia, Le Fort I Osteotomy was done by traditional approach to reduce the vertical high of the maxilla by removing a triangular bone fragment that's base (10 mm) located on retromolar region & apex (1 mm) located to the ANS, from both side of the maxilla which made of possible to reduce the vertical height and advancement of maxilla⁷⁻⁸.



Fig.-5: Diagram illustrated the location of wedge shaped bone fragment that will be removed from maxilla.

Bilateral Saggital Splite Ramus Osteotomy was done by traditional approach⁹ to reposition the mandible at relatively proper position which made of possible to correct the prognathism of the mandible with the occlusion of maxilla by moving the mandible upwards and backwards.



(q)



(r)



(s)

Fig.-6: Per operative photograph: Le Fort I Osteotomy (q), Bilateral Saggital Splite Ramus Osteotomy (r), Traditional surgical approach by a rhomboid pattern from the dorsum of the tongue(s)

The tongue was reduced by traditional surgical approach by a rhomboid pattern from the dorsum to prevent the post operative tongue thrush and post surgical relapse. Peri-operatively, the miniplate osteosynthesis was done to stabilize the osteomobilized fragments of maxilla and mandible.

Post surgical orthodontic settling

The postsurgical orthodontic treatment will be commenced after six month of surgery. Both arches will be coordinated and remaining space and rotation of teeth will be corrected. Patient will give upper and lower retainers.



(t)



(u)

Fig.-7: Patients panoramic radiographic pre-treatment (t) and post-treatment (u)

Results:

Considering the skeletal pattern and the surgical approach that was chosen, excellent facial and occlusal results were achieved [Fig-1(b), (d)] despite lack of pre-surgical orthodontic treatment. At the completion of treatment, the lips were slightly less protrusive with improved lip competence.

As there, so far only the orthognathic surgery was performed, so skeletal cephalometric points were corrected; the remaining dental cephalometric points will be corrected by post surgical orthodontic treatment [Table-I].

Discussion:

The first report of surgical repositioning of the mandible was written by VP Blair in 1907¹⁰ Since then, the surgical correction dentofacial deformities has developed into not only a well defined science but also a fascinating art form.

The development of surgical repositioning of the mandible includes ingenious work by surgeons¹¹⁻¹³ described body osteotomy procedures. Procedures to reposition the mandible using various ramus oestotomies were described. In 1955 Obwegeser and Trauner described a surgical procedure involving a saggittal splite osteotomoies through the ramus of the mandible.

After Le Fort described the natural planes of fracture of the midface in 1901, maxillary surgery developed through the work of Wassmud, Auxhauser, Obwegeser, willmar and others. It was not however until Bell⁷ and his coworkers excellent research in mid 1970 on the biologic basic of hemodynamic and the vesicular supply of maxilla during after maxillary downen fracture surgery that the Le Fort I oestotomy developed in to the refined science and art that it is today.

Maxillary abnormalities contribute too many facial deformities that should be recognized and treated successfully by adhering to basic biologic and technical principles. Numerous techniques for Le Fort I maxillary osteotomy have been described and reflect a strong tendency to operators preference.

The patient displayed typical characteristics of achondroplasia like midfacial deficiency, concave profile and retrognathic maxilla. The additional significant features were the Class III molar relation, upper and lower anterior proclination, anterior open bite, prognathic mandible, maxillary and mandibular vertical excess with macroglossia.

Considering above clinical and radiological findings, the treatment plan should be included pre- orthognathic correction followed by bimaxillary orthognathic surgery which is a combination of Le Fort I Osteotomy in maxilla, and Bilateral Saggital Splite Ramus Osteotomy in mandible followed by surgical correction of macroglossia. The residual occlusal irregularities will be corrected by post surgical orthodontic treatment.

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