

**SINIF III VE OPEN-BİTE BİR OLGUNUN CERRAHİ TEDAVİSİ
(OLGU SUNUMU)**

**SURGICAL TREATMENT OF A PATIENT WITH A CLASS III AND OPEN BITE:
CASE REPORT**

Dr. Fidan ALAKUŞ SABUNCUOĞLU

Dr. Metin ŞENÇİMEN

Dr. Altan VAROL

Makale Kodu/Article code: 736
Makale Gönderilme tarihi: 10.12.2011
Kabul Tarihi: 08.10.2012

ABSTRACT

ÖZET

Amaç: Olgumuzda çiğneme, dudak yetersizliği ve estetik şikayetleri olan hastanın ortognatik tedavisi sunulmaktadır.

Materyal-Method: Ortognatik cerrahi sonrası öngörü ve cerrahi aşamasındaki planlamanın ve iskeletsel bozukluğun daha iyi saptanması için hastanın sefalometrik analizi, CT si alınıp bilgisayar ortamına aktarıldı. Şiddetli açık kapanış ve sınıf III anomaliden dolayı kabul edilebilir estetik ve fonksiyonel sonuçlar için ortognatik cerrahi kaçınılmaz olduğu görüldü. Cerrahi aşamasında üst çene 4mm öne ve 4mm gömülüp, 3.5 derece saat yönünde rotasyon, alt çenede ise 9mm geriye 5.5 derece saat yönünün tersi yönünde rotasyon yapıldı.

Sonuç: Üst çenenin gömülmesi ile ön yüz yüksekliğinde azalma ve S-Go/N-Me oranında %2 artış sağladı. Açık kapanış ise üst çenenin saat yönünde, alt çeneninde saat yönünün tersi yönünde rotasyon ile düzeltildi. Sınıf I kanin ve molar ilişki, kabul edilebilir overbite, dengeli bir yumuşak doku ilişkisi ve fonksiyon da önemli düzeltilmeler elde edildi.

Anahtar Kelimeler: Açık kapanış, ortognatik cerrahi, sınıf III

Aim: The aim of this case report was to present the orthognathic surgery of a patient whose complaints were difficulty in chewing, lip incompetence and aesthetic problems.

Material-Method: To determine the skeletal deformity and successful surgical planning and accurate prediction of orthognathic surgery outcomes, cephalometric analysis and 3-D CT images of the patient were acquired and the data were transferred to the PC. Due to the severity of the skeletal open bite and Class III malocclusion, orthognathic surgery was inevitable to achieve acceptable results in aesthetic and functional aspects. The maxilla LeFort I advancement (4mm), maxillary impaction (4mm) with clockwise rotation of 3.5 degrees and the mandible was moved 9.0 mm backward with a counter clockwise rotation of 5.5 degrees at surgery.

Results: Intrusion of the maxilla reduced the facial height and S-Go/N-Me ratio showed an increase of 2%. The open bite improved due to clockwise rotation of maxilla and the auto-rotation of the mandible. Class I molar and canine relationship was achieved. The final outcome of the treatment was a substantial improvement in function and aesthetics. The patient's soft tissue profile became more balanced and Class I molar relationship with an acceptable overbite was achieved.

Key-Words: Open-bite, orthognathic surgery, class III.

*Erzurum Mareşal Çakmak Military Hospital, Department of Orthodontics Dentistry, Erzurum, Turkey
**Assoc. Prof., , Ph.D Gulhane Military Medical Academy, Department of Oral and Maxillofacial Surgery
***Assoc. Prof., , Marmara University, Faculty of Dentistry, Dept. of Oral and Maxillofacial Surgery



INTRODUCTION

An anterior open bite is a lack of contact in a vertical direction between the incisal edges of the maxillary and mandibular anterior teeth.¹ Cases of open bite are a rather complex and difficult anomaly.² There are many reasons for the occurrence of open bite, including abnormal growth pattern, finger-sucking, airway obstruction, and tongue posture and function. The morphological indications of open bite include a steep mandibular plane and increased anterior facial height, both of which reflect mainly downward and backward rotation of the mandible and vertical overgrowth of the maxilla.³ In early orthodontic treatment, dentoalveolar open bite can easily be corrected by eliminating local environmental causes such as parafunctional habits. However, adult skeletal open bite cases are more difficult due to complicated problems.⁴⁻⁶ Orthognathic surgery is commonly used for managing these problems. Its effectiveness and stability were well documented and reviewed.

This article reports the treatment of a 20-year-old male patient with an anterior open bite and Class III malocclusion.

CASE HISTORY

Diagnosis: A 20-year-old male patient had an anterior open bite and Class III malocclusion. He complained of aesthetic problems and masticatory disturbances due to the anterior open bite. The medical history was insignificant. The initial postero-anterior radiograph (PA) and lateral cephalometric, panoramic and intra-extraoral photographs were taken (Figure 1a-i).

In the extraoral examination, concave profile with a long anterior facial height, and no facial asymmetry was observed. The lower lip is protruded relatively to the upper lip (Figure.1a-c).

Intraoral examination revealed a Class III malocclusion with an excessive negative overbite (Figure.1d-f). Overjet and overbite were -2.1 mm and -6.0 mm, respectively. The maxillary and mandibular arch forms were U-shaped. The tongue was of average size. The panoramic radiograph showed the presence of the upper and lower third molars (Figure.1g). Periodontal problems and temporomandibular joint disorders were not found. Oral hygiene was generally satisfactory. The maxillary

arch with moderate anterior crowding was observed. The mandibular arch was generally well aligned.

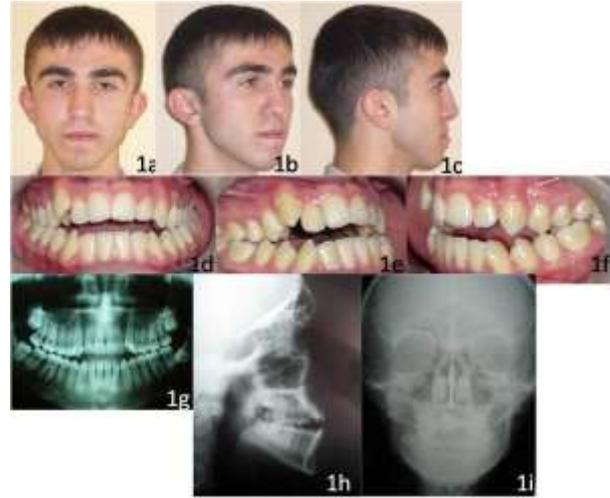


Fig1. Pre-treatment extraoral - intraoral views and radiographs.

To determine the skeletal deformity and successful surgical planning and accurate prediction of orthognathic surgery outcomes, cephalometric analysis and 3-D CT images of the patient were acquired and the data were transferred to the PC. 3D simulation of the skull were produced by using commercial available Mimics software (Materialise, Lueven, Belgium) (Figure.2a-b).

3-D CT images and cephalometric evaluation of the patient revealed a skeletal Class III malocclusion and open bite with an ANB angle of -6° and a SN/Go-Gn angle 42° . The patient had a concave profile and labium superior was 1mm behind the S-line, while labium inferior was 6mm anterior to it. Total anterior facial height (Na-Me) was 141 mm, posterior facial height (S-Go) was 86 mm, and the S-Go / N-Me ratio was 60%, showing a skeletal open-bite inclination (Table I). The upper incisors were proclined, while the lower incisors were retroclined. These abnormal incisor inclinations were probably due to the dentoalveolar compensatory effects arising from severe antero-posterior skeletal Class III relationship.

From these findings, this case was diagnosed as a skeletal open bite with Class III malocclusion. Due to the severity of the skeletal open bite and Class III malocclusion, orthognathic surgery was inevitable to achieve acceptable results in aesthetic and functional aspects.

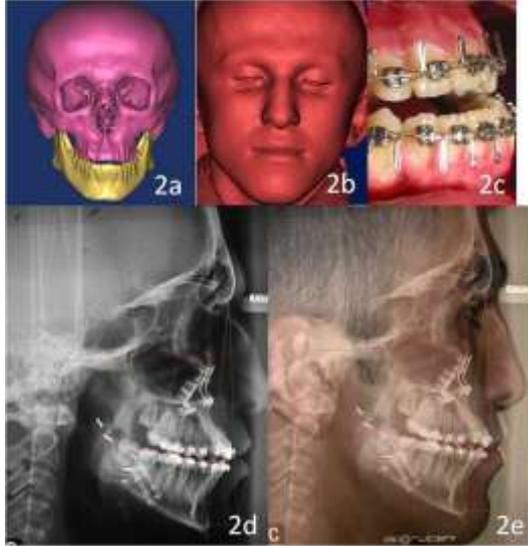


Fig2. The software view of 3 dimensional biomodel, surgical phase and immediate postsurgical cephalometric evaluation.

Table I . Cephalometric analysis of case.

	Preoperative	Immediate post-surgical	Final
SNA	77°	82°	82°
SNB	83°	80°	80°
ANB	-6°	-2°	+2°
SN/Go-Gn	42°	36°	36°
N-Me	141mm	135mm	135mm
N-ANS	59mm	60mm	61mm
ANS-Me	81mm	79mm	79mm
S-Go	86mm	84mm	84mm
S-Go/ N-Me	%60	%62	%62
1/SN	106°	104°	103°
1/Go-Gn	80°	83°	83°
1/I	135°	133°	136°
1/NA	9mm	5mm	5mm
1-NA	27°	25°	24°
1/NB	4mm	3mm	4mm
1-NB	22°	25°	24°

Treatment objectives

1. Creation of space to upper canine teeth and obtain good upper incisor angulation.
2. Elimination of the anterior open bite so that a good incisor overbite and overjet were obtained.
3. Improvement of occlusal function and facial aesthetics.

Orthodontics Treatment

The treatment plan was explained to the patient and began once he gave an informed consent. The treatment began with the fitting of upper and lower pre-adjusted edgewise appliances of 0.018-inch slot. The arches were banded and bonded and the teeth leveled and aligned. The first phase required 7 months to level, align, and coordinate the arches and to reduce the dental compensations by proclining the lower incisors. Following the leveling phase, 0.016 x 0.022 inch arch wires were placed on the upper and lower teeth.

The needed final orthodontics adjustments had been made, full size stabilizing arcwires should be placed and kept for 3 to 4 weeks to become passive before presurgical records were been taken (Figure.2c). The patient's malocclusion and facial appearance was re-examined.

Surgery progress: Since a double jaw surgery was planned for the patient 3 dimensional computerized tomography with 1 mm slices were taken. After performing sanal surgery by a simulation of Mimics software, it was observed that the patient facial profile would come in normal position by maxillary LeFort I advancement (4mm), maxillary impaction (4mm) and mandibular bilateral sagittal split ramus osteotomy (SSRO) (9mm) was performed. Following reduction of the facial height by superior intrusion of the maxilla, mandibular plane angle is also reduced subsequently due to the auto- rotation which helps in reducing facial height discrepancy. The magnitude of intrusion of the posterior portion of the maxilla is usually greater than in its anterior portion. This difference helps to level the palate and maxillary occlusal plane. The superior movement must leave upper anterior teeth exposure of 1 -2 mm below the lower lip line when lips are at rest leading to an acceptable amount of upper teeth showing when the patient talks or smiles.

Following the surgery, settling was accomplished with light round wires and vertical elastic mechanics and cephalometric evaluation was

reexamined (Figure.2d-e). After 24 months of orthodontics treatment, anterior open bite was entirely corrected and a well-balanced face, an acceptable occlusion, a dental Class I relationship were achieved and edgewise appliance was removed. Essix retainers were placed, and the patient was asked to wear them full time for 6 months and at night thereafter (Figure. 3a-l).

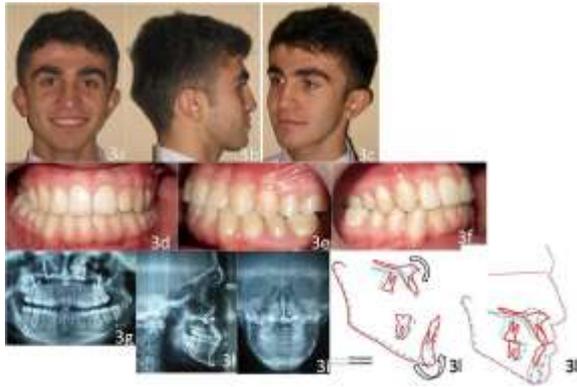


Fig3. Post-treatment extraoral-intraoral views and radiographs, superimposed pre-treatment and post-treatment.

RESULTS

The treatment was concluded 24 months. All three objectives of treatment were achieved. Facial photographs showed that overall facial balance was improved (Figure.3a-c). Acceptable occlusion was achieved and the overbite was improved to 1.2 mm and the overjet to 1.5 mm. The anterior open bite was shut, and the incisors and canines showed a good Class I relationship (Figure 3d-f). Panoramic radiograph showed no root resorption (Figure.3g).

The pre-treatment, immediate pre-surgical and final cephalometric data for the case are summarized in Table I. Significant changes were observed at SNA, SNB, ANB, SN/Go-Gn. Posterior facial height/ anterior facial height ratio showed an increase of %.2. Lower anterior facial height was decreased, and the lips showed less tension in lip closure. Maxillary osteotomies with clockwise rotation and bilateral SSRO with closing rotation of the mandible using rigid fixation is a relatively stable procedure and a viable surgical treatment option for the correction of anterior open bite (Figure.3h-l,Table I).

DISCUSSION

Skeletal open bite is regarded as one of the complicated malocclusions, and its treatment planning depends on the severity of the skeletal discrepancies, which occasionally requires surgical correction.⁷

A successful surgical treatment of skeletal openbite depends on acceptable aesthetic results and harmonious proportions of the face that satisfy the patient on one hand and stability of the moved segments on the other. In order to achieve these goals, it is essential for the surgeon to locate the deformity and establish correct diagnosis.

Selection of an appropriate method of treatment is entirely influenced by correlating the soft tissue discrepancies to the hard tissue discrepancies.⁸ Variations in the soft tissue covering the facial skeleton-like type of the patient's facial profile, size of the nose, thickness and length of the lips and vermilion, naso-labial angle, soft tissue chin, etc. can produce unacceptable aesthetic result if diagnosis and planning are based on dental and skeletal measurements alone. In other words, soft tissue must first be considered before skeletal parts are moved. When this equation is understood well, selection of the appropriate method of surgery comes out satisfactorily.

Every clinician is concerned about the long term stability of treatment outcome. Variable rates of relapse have been reported after surgery.⁹ Relapse has a skeletal and dento-alveolar component and its aetiology is considered to be multifactorial.

The stability of skeletal open bite correction is dependent upon favorable neuromuscular adaptation to maintain the mandible in the new position.⁹ From this viewpoint, a bimaxillary osteotomy or a LeFort I intrusion osteotomy with mandibular autorotation is recommended for correction of skeletal open bites. Meanwhile, the correction of skeletal open bite by SSRO alone is considered to induce considerable relapse due to the clockwise rotation of the mandibular body with lengthening of the suprahyoid muscles.⁹ However, Oliveira and Bloomquist¹⁰ reported on the stability of the bilateral SSRO and rigid internal fixation in the closure of anterior open bite, and indicated that this surgical procedure was a relatively stable for the correction of anterior open bite.

Kokich⁶ et al compared the stability of maxillary surgery open bites treated with Lefort I osteotomy

exhibit significant post-treatment relapse, which was due more to dentoalveolar changes. They also suggest that although dental and skeletal deformity can be corrected, the role of orofacial musculature should also be addressed in orthodontics therapy. If the etiology of the open bite is eliminated during treatment, the stability of open bite correction may increase.^{11,12}

Lello¹³ determined stability in ten patients with anterior open bite, who underwent a Le Fort I osteotomy with bilateral SSRO stabilized with wire fixation, with an average follow up of six-and-a-half years. Two out of eight patients with a Class I or Class II skeletal relationship were considered to have more than 1.5 mm relapse in the horizontal or vertical direction. In all patients relapse occurred, particularly in the mandible, within the first year postoperatively.

The cause of skeletal and dento-alveolar relapse is multifactorial and the interplay between different factors can vary from one patient to another. Overcorrection of the anterior overbite by opening the posterior occlusion, might be advisable when planning a Le Fort I intrusion, and posterior tilting for closure of the anterior open bite. A coordinated surgical-orthodontic approach is essential to achieve optimal aesthetic and functional results^{14,15}.

Orthognathic surgery requires the teeth and jaws to be manipulated in three planes of space to obtain the most aesthetic, stable, and functional result.^{16,17} The planning procedure before maxillomandibular surgery is important to increase the overall success of the operation by performing the modifications virtually prior to the actual operation. Also, for patients seeking for surgical treatment, it would be very beneficial to have a means to predict the post-surgical appearance of their face. An ideal method for describing these facial changes should be able to record facial soft tissue data, be of sufficient accuracy and precision, be able to produce 3D images, and be easily reproducible.¹⁵ The use of 3D image techniques to indicate facial changes that occur as a result of orthognathic surgery may eventually be used to communicate the expected changes to both clinicians and patients.

In the present case, 3D image technique was used in planning treatment. The maxilla LeFort I advancement (4mm), maxillary impaction (4mm) with clockwise rotation of 3.5 degrees and the mandible

was moved 9.0 mm backward with a counter clockwise rotation of 5.5 degrees at surgery. The final outcome of treatment was a substantial improvement in function and aesthetics. The patient's soft - tissue profile became more balanced. As an added benefit, the patient has reported a better self-esteem and a greater degree of pleasure related to her appearance. Long-term follow – up will be required because open bites tend to relapse more than most other types of malocclusion.

REFERENCES

1. Proffit WR, Phillips C, Dann C IV. Who seeks surgical-orthodontic treatment? *Int J Adult Orthodon Orthognath Surg.* 1990; 5:153–160.
2. Sankey WL, Buschang PH, English J, Owen AH. Early treatment of vertical skeletal dysplasia: the hyperdivergent phenotype. *Am J Orthod Dentofacial Orthop.* 2000; 118:317–327.
3. Fields HW, Proffit WR, Nixon WL, Phillips C, Stanek ED. Facial pattern differences in long-faced children and adults. *Am J Orthod Dentofacial Orthop.* 1984; 85:217–223.
4. Miyajima K, Iizuka T. Treatment mechanics in Class III open bite malocclusion with Tip Edge technique. *Am J Orthod Dentofacial Orthop.* 1996; 110:1–7.
5. Proffit WR, Bailey LJ, Phillips C, Turvey TA. Longterm stability of surgical open-bite correction by Le Fort I osteotomy. *Angle Orthod* 2000; 70: 112–117.
6. Liao YF, Chiu YT, Huang CS, Ko EW, Chen YR. Presurgical orthodontics versus no presurgical orthodontics: treatment outcome of surgical-orthodontic correction for skeletal class III open bite. *Plast Reconstr Surg.* 2010 Dec;126(6):2074–83.
7. Al-Ruhaimi K, Nwoku AL, Shaikh HS. Orthognathic surgery: planning and treatment with illustration on six cases. *Saudi Dent J* 1991;2:53-66.
8. Obwegeser HL, Marentette LJ. Profile planning based on alterations in the positions of the bases of the facial thirds. *J Oral Maxillofac Surg* 1986; 4:302-11.
9. Kahnberg KE, Widmark G. Surgical treatment of the open bite deformity. Surgical correction of combined mandibular prognathism and open bite



- by oblique sliding osteotomy of the mandibular rami. Int J Oral Maxillofac Surg. 1988; 17:45-48.
10. Oliveira JA, Bloomquist DS. The stability of the use of bilateral sagittal split osteotomy in the closure of anterior open bite. Int J Adult Orthodon Orthognath Surg. 1997; 12:101-108.
11. Yücel G, Marşan G, Cura N, Hoccoğlu E. Treatment of a patient with a severe Class III and open bite: a case report. World J Orthod. 2009; 10: 57-66.
12. Başçiftçi F.A, Orhan M., Uçkan S., Üşümez S. İskeletsel Sınıf III Olgularda ortodontik-cerrahi yaklaşımlar (iki Vaka Raporu) Türkiye Klinikleri J Dental Sci 2001, (7), 138-144.
13. Lello GE. Skeletal open bite correction by combined Le Fort I osteotomy and bilateral sagittal split of the ramus. J Cranio-Max-Fac Surg 1987; 15:132-6.
14. Ayoub A F et al. Three-dimensional modeling for modern diagnosis and planning in maxillofacial surgery. International Journal of Adult Orthodontics and Orthognathic Surgery 1996,11: 225 – 233.
15. Thomson E R The use of morphanalysis in orthognathic surgery. British Journal of Plastic Surgery 1985,38: 75 – 83.
16. Emshoff R, Scheiderbauer A, Gerhard S, Norer B. Stability after rigid fixation of simultaneous maxillary impaction and mandibular advancement osteotomies. Int J Oral Maxillofac Surg. 2003 Apr;32(2):137-42.
17. Bishara SE, Chu GW Stability after rigid fixation of simultaneous maxillary impaction and mandibular advancement osteotomies. Am J Orthod Dentofacial Orthop. 1992 Oct;102(4):335-41.

Yazışma Adresi

Dr. Fidan ALAKUŞ SABUNCUOĞLU
Erzurum Mareşal Çakmak
Military Hospital,
Department of Orthodontics Dentistry
Erzurum, Turkey
Telf: 0312 3046026
e-mail: fidansabuncuoglu@yahoo.com.tr

