

ANTERIOR OPEN-BITE TREATMENT BY MEANS OF ZYGOMATIC MINIPLATES: A CASE REPORT*

Ön Açık Kapanışın Zigomatik Miniplaklar Kullanılarak Tedavisi: Bir Olgu Bildirisi

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ABSTRACT

This case report presents the treatment of a patient with skeletal CI II malocclusion and anterior open-bite who was treated with zygomatic miniplates through the intrusion of maxillary posterior teeth. A 16-year-old female patient with a chief complaint of anterior open-bite had a symmetric face, incompetent lips, convex profile, retrusive lower lip and chin. Intraoral examination showed that the buccal segments were in Class II relationship, and there was anterior open-bite (overbite -6.5 mm). The cephalometric analysis showed Class II skeletal relationship with increased lower facial height. The treatment plan included intrusion of the maxillary posterior teeth using zygomatic miniplates followed by fixed orthodontic treatment. At the end of treatment Class I canine and molar relationships were achieved, anterior open-bite was corrected and normal smile line was obtained. Skeletal anchorage using zygomatic miniplates is an effective method for open-bite treatment through the intrusion of maxillary posterior teeth.

Keywords: Class II malocclusion; anterior open-bite; zygomatic miniplate; skeletal anchorage; smile line

ÖZ

Bu olgu bildirisinde iskeletsel Sınıf II maloklüzyonu ve ön açık kapanışı olan bir hastanın zigomatik miniplaklar kullanılarak tedavi edilme süreci anlatılmaktadır. Üst arka dişler miniplaklar kullanılarak intrüze edilmiştir. Ön dişleri arasındaki açık kapanıştan şikayetçi olan 16 yaşındaki kadın hasta simetrik bir yüze, yetersiz dudak kapanışına, belirgin olmayan çene ucuna, retrüviz alt dudak projeksiyonuna ve konveks bir profile sahipti. Ağız içi muayenesinde Sınıf II dişsel ilişki, ön açık kapanış (overbite -6.5 mm) görüldü. Sefalometri analizi, iskeletsel Sınıf II ilişki ve artmış alt yüz yüksekliğinin olduğunu gösterdi. Tedavi planı maksiller posterior dişlerin zigomatik miniplaklar kullanılarak intrüze edilmesi olarak belirlendi. İntrüzyon aygıtının çıkartılmasını takiben alt ve üst dişler seviyelendi. Tedavi sonunda Sınıf I dişsel ilişki elde edildi, ön açık kapanış düzeltildi, normal gülme hattı temin edildi. Arka dişlerin intrüzyonu yoluyla ön açık kapanışın tedavi edilmesini sağlayan zigomatik miniplaklar, açık kapanışın tedavisinde kullanılabilecek efektif bir yöntemdir.

Anahtar kelimeler: Sınıf II maloklüzyon; ön açık kapanış; zigomatik miniplak; iskeletsel ankrj; gülme hattı



Introduction

The treatment of anterior open-bite is challenging and difficult in orthodontics. Main morphologic characteristics of this malocclusion are; increased lower facial height and steep mandibular plane resulting from the over-erupted maxillary posterior dentition (1-4). Surgical treatment involves maxillary impaction with or without mandibular ramus osteotomy to decrease the lower anterior facial height (5). In order to eliminate the risks and costs of the surgery, alternative clinical procedures to intrude the maxillary posterior teeth were investigated. Recent studies have used zygomatic miniplates to obtain effective posterior intrusion (6-9). This case report presents the treatment of a patient with skeletal and dental CI II malocclusion and anterior open-bite who was treated with zygomatic miniplates through the intrusion of maxillary posterior teeth.

Case Report

Diagnosis

The 16-year-old female patient's chief complaint was anterior open-bite. She had a symmetric face, incompetent lips, nonconsonant smile arch, low smile line, convex profile, and retrusive lower lip and chin (Figure 1). The intraoral examination showed that she had good oral hygiene, and the periodontal tissues were healthy. Buccal segments were in Class II relationship. She had anterior open bite (overbite -6.5 mm), increased overjet (6.3 mm), and constricted maxilla. The upper and lower dental midlines were coincident with the facial midline. Arch length discrepancies in the upper and lower arches were -2.5 mm and -2.1 mm, respectively. According to the pretreatment lateral cephalometric analysis she had Class II skeletal relationship, increased lower facial height, and proclined upper and lower incisors (Figure 2A; Table 1). The pretreatment panoramic radiograph revealed that upper and lower third molars were present (Figure 2B).

Treatment objectives

The treatment objectives for this patient were to improve facial and dental aesthetics, close anterior open-bite, correct dental and skeletal relationship, relieve maxillary constriction, and achieve ideal overbite and overjet.



Figure 1. Pretreatment extraoral and intraoral photographs

Treatment alternatives

Two treatment options were proposed to the patient and her family: double jaw orthognathic surgery with maxillary posterior impaction and the intrusion of maxillary posterior teeth using miniplate anchorage. The patient and the family were informed about 2 possible options and they refused orthognathic surgery. As a result, the second alternative was chosen. The treatment plan included intrusion of the maxillary posterior teeth using zygomatic miniplates followed by fixed orthodontic treatment.

Treatment progress

The patient was monitored at 4-week intervals. Posterior dentoalveolar intrusion was achieved in 6 months. After the intrusion, rapid maxillary expansion was performed. Hyrax expander was activated twice daily for two weeks. When enough expansion was achieved, the appliance was removed, and a transpalatal arch and orthodontic brackets (0.018-inch slot, preadjusted Roth edgewise appliances) were placed on the maxillary and mandibular teeth. During the orthodontic therapy, intrusion of posterior teeth was maintained with wire ligation between the miniplates and the molar tubes. When the satisfactory interdigitating was achieved (Figure 3C), fixed appliances were removed. Upper and lower canine-to-canine fixed lingual retainers were placed for retention (Figure 4) and patient was referred for the removal of miniplates.

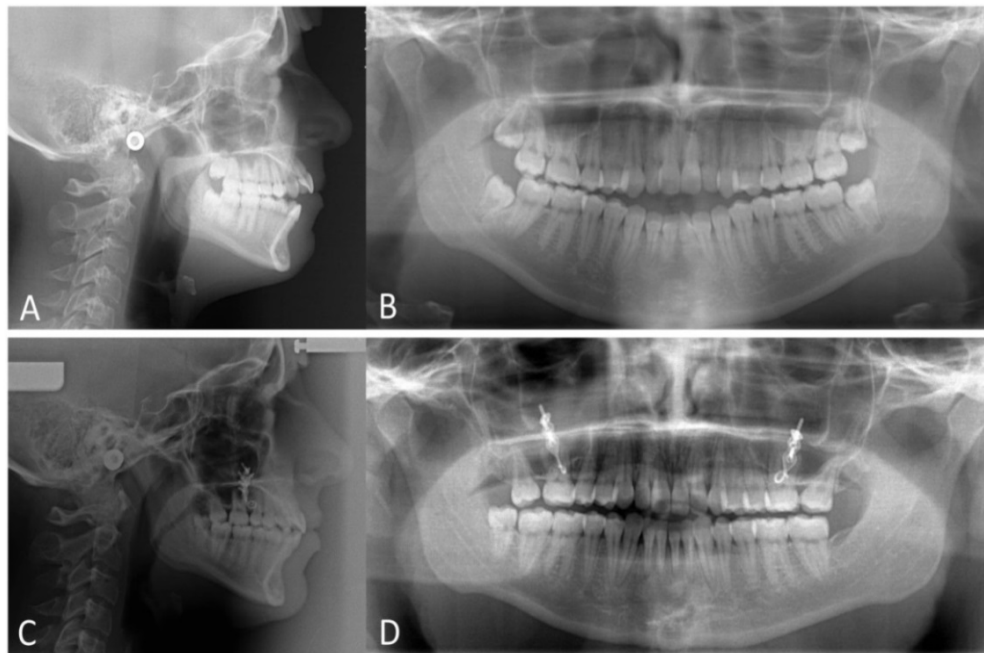


Figure 2. (A) pretreatment lateral cephalometric radiograph; (B) pretreatment panoramic radiograph; (C) posttreatment lateral cephalometric radiograph; (D) posttreatment panoramic radiograph.

Results

The active treatment time was 20 months. At the end of treatment, the profile, vertical and sagittal relationship were improved and the anterior open bite was corrected (Figure 4). Class I molar and canine relationship with normal overbite and overjet were achieved. Maxillary constriction was relieved. The posttreatment extraoral

photographs displayed a pleasing smile. The posttreatment lateral cephalometric analysis and superimpositions showed skeletal changes, decrease in the lower facial height and 2.5 mm molar intrusion (Figures 2C, Figure 5; Table 1). The mandibular plane showed counterclockwise autorotation. In the posttreatment panoramic radiograph, no sign of apical resorption was seen and maxillary third molars erupted and successfully replaced the second molars (Figure 2D).

Table 1. Summary of cephalometric measurements.

Measurement	Pretreatment	Posttreatment
ANSM _e /Nme (%)	58.6	56.5
GoMe-SN (°)	33	30
FMA (°)	24	21
SNA (°)	87	87
SNB (°)	81	84
ANB (°)	6	3
Overjet (mm)	6.3	1.9
Overbite (mm)	-6.5	0.7
I-SN (°)	115	108
IMPA (°)	99	102
U6 to palatal plane (mm)	24.5	22
U1 to palatal plane (mm)	26.5	28.3
L6 to mandibular plane (mm)	34.1	34
L1 to mandibular plane (mm)	39.2	41



Figure 3. (A) pretreatment; (B) initiation of intrusion; (C), achievement of satisfactory interdigitation.

Discussion

Anterior open bite is characterized mostly by the over-eruption of maxillary posterior teeth (3, 4). Therefore, intrusion of over-erupted teeth to correct open bite is an effective treatment method. Skeletal anchorage allows the clinicians to correct some of the dentofacial deformities (10) and skeletal miniplate anchorage has been recommended for the intrusion of over-erupted teeth (11, 12). This case report reveals that maxillary posterior teeth intrusion and open bite correction were achieved effectively with zygomatic miniplate anchorage. The intraoral appliance used for this patient was made of a hyrax expansion screw with acrylic blocks that surrounded the crowns of the posterior teeth to obtain segmental intrusion without tipping the teeth buccally. For intrusion of the molars Park *et al.* (13) applied 200 – 300 g force, Yao *et al.* (14) applied 150 – 200 g force to each molar. Erverdi *et al.* (7), Sugawara and Nishimura (15) and Akan *et al.* (10) applied 400 g intrusive force on each maxillary posterior segment blocked with acrylic. For this patient 400 g intrusive force was used on each posterior segment. Expansion of the maxillary arch was required; therefore, rapid maxillary expansion was performed following the intrusion. Although it was not possible to know pure intrusion amount following the removal of the Hyrax appliance, according to the final lateral cephalometric film and cephalometric values molar intrusion was 2.5 mm and we think that Hyrax expansion screw changed its vertical place due to this intrusion (Figures 2A, 2C and Table 1). However; this new position did not affect the expansion mechanics, because the initial position

of the expansion screw relative to the center of the resistance of the maxillary first molars is important for the orthodontic and orthopedic responses (16). Hyrax expansion screw changed its vertical position equally with the amount of posterior dentition intrusion and Hyrax expansion screw's position did not change relative to the center of the resistance of the molars, therefore intrusion did not affect expansion mechanics. Before the treatment, upper second molars were extracted to facilitate intrusion of maxillary posterior teeth. The mesiodistal size of upper third molars was suitable to replace the second molars. It was reported that upper third molars erupt and satisfactorily replace second molars following extraction for orthodontic purposes (17). For this patient, upper third molars erupted and favorably replaced the second molars.



Figure 4. Posttreatment extraoral and intraoral photographs.

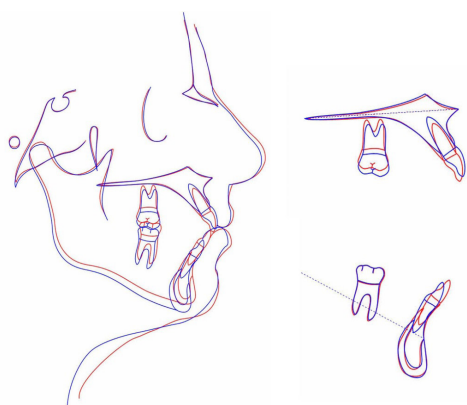


Figure 5. Cephalometric superimposition. Blue color indicates pretreatment, red color indicates posttreatment.

Conclusion

Skeletal anchorage using zygomatic miniplates is an effective and successful method for anterior open-bite treatment through the intrusion of maxillary posterior teeth.

Source of funding

None declared

Conflict of interest

None declared

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