

Fixed Orthodontic Treatment of a Patient With Skeletal Class II Malocclusion with Infrazygomatic Anchorage and En-Masse Retraction

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ABSTRACT

Treatment of skeletal Class II malocclusions is difficult anomalies in orthodontics. The treatment of skeletal Class II anomalies varies according to the jaw and the growth period of the anomalies. Adult individuals whose growth is over are treated with fixed orthodontic mechanics or orthognathic surgical approaches. If skeletal class II anomaly is not severe and does not constitute a problem aesthetically, camouflage treatment can be done with fixed orthodontic mechanics. This case report presents the results of orthodontic camouflage treatment and treatment applied to a skeletal Class II malocclusion female patient with chronological age of 18 years and skeletally in the Ru period. The molar relationship of the patient with a slightly convex profile is Angle Class II. In cephalometric examination, skeletal class II problem was detected ($ANB^\circ = 6^\circ$). At the end of the treatment, angle class II relation in the molar region, angle class I relation in the canine region and a smooth soft tissue profile were obtained.

Key Words: Skeletal class 2 malocclusion, En-masse retraction, Infrazygomatic Anchorage

Introduction

Class II division I malocclusions are cases frequently encountered in orthodontic practice. Class II anomalies encountered in 20% of the society may occur together with the protrusive positioning of the maxilla, the retrusive positioning of the mandible or a combination of these two conditions (1) There are 2 possible treatment approaches for adult patients with skeletal Class II malocclusion, whose growth has been completed: (2) camouflage treatment or orthognathic surgery (3). The purpose of dental camouflage treatment is to reposition the maxillary and mandibular dentition teeth by masking skeletal relations and to provide a more acceptable and satisfying profile. (4). Class II camouflage treatment can be done in 3 methods: (5,6) The jaw tip and/or nose reposition, backward tooth movement in the upper jaw, forward tooth movement in the lower jaw, the retraction of protruded maxillary incisors. Backward tooth movement in the upper jaw, forward tooth movement in the lower jaw: This movement is provided with Class II elastics in fixed therapy. However in this method, the forward movement of the lower arch puts the incisors in an unstable position (7).

The retraction of protruded maxillary incisors: This method is applied by extraction of the maxillary premolar teeth, increasing the anchorage and using the extraction space in the incisors retraction without permitting the mesialization of the maxillary posterior teeth (8). Schneider et al. showed that many orthodontists were wrong about anchorage loss in retraction. In both techniques, there was anchorage loss in the posterior region and it was found more advantageous to use ER to close the extraction areas unless crowding is available. It was emphasized that if the anterior segment needs more retraction to change the patient's profile, additional anchorage support can also be increased (9). In the use of extraction space in incisor retraction, mini screws have been the most preferred skeletal anchorage units due to their easy of application, relatively cheap and effectiveness (8).

In the present case, the camouflage treatment was decided instead of surgical treatment, which was rejected by the patient for financial reasons. Miniscrew anchorage, which has been popular in recent years, has been used since maximum anchorage is required to improve facial aesthetics in patients with severe overjet (10). In our treatment planning, skeletal anchorage was considered due to the presence of severe overjet.

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Tablo 1. Changes in cephalometric variables

Variable	Pretreatment	Posttreatment
SNA (°)	80,3	78,6
SNB (°)	74,4	74,5
ANB (°)	6	4,1
Wits (°)	4,3	4,4
SN-GoGN (°)	34,4	34,5
U1/L1 (°)	107	122
U1/SN (°)	122,4	105,4
U1/NA (°/mm)	42 / 10,7	28,4 / 5
L1/NB (°/mm)	29,1 / 2,7	32,8 / 1,7
IMPA (°)	99,1	104,3
S line-Lips (U-L)	-1/ -0,8	-2/-1

The purpose of this case report is to present the results of camouflage treatment with skeletal anchorage supported En-masse retraction technique of a patient with skeletal class II malocclusion whose growth and development has been completed.

Case Report

History and Diagnosis: An 18 years old female patient at Ru period was admitted to Van Yuzuncu Yil Universty, Faculty of Dentistry, Department of Orthodontics with the chief complaint of protrusiv upper anterior teeth. In the radiographic examination, she had skeletal class 2 malocclusion originating from the lower jaw (ANB:6°), patient had third molars (Fig 2). Cephalometric analysis values of the patient are shown in table 1. In the intraoral and extraoral examination was found a Class II molar relation on the both side, a convex profile and incompetent lip. The overjet and overbite were 10,5 mm, 1 mm each. The patient had upper dental midline deviation 1 mm on the left. (Fig 1) Orthodontic treatment goals in this case was to improvement of facial aesthetics, to obtain acceptable profile, to provide functional occlusion.

Treatment Plan: Leveling and alignment of the upper and lower arches, extraction of upper first premolars and placing the OBS mini-screw in the infrazygomatic zone, massively distalization of upper anterior incisors, the closure of the consolidation space and interdigtation of the occlusion with settling elastics.

Treatment Progress: In our patient, where two premolar extractions were planned in the upper jaw, the extraction was not performed at the beginning of the treatment, since crowding was not available. In this way, aesthetic and social anxiety caused by tooth

extraction was prevented in the patient. The maxillary third molars were extracted at the beginning treatment. All the first molars were tubed and 0.022 inch slot Roth brackets (3M Unitek Gemini) were used on all arches. In the levelling and alignment stage 0,014 round nickel titanium (NiTi) archwire was used followed by 0.019 * 0.025 inch NiTi archwires. After the leveling and alignment of the maksilar and mandibular tooth arches were completed with Niti archwires, anguled stainless steel arch wires were passed. The maxillary first premolars were extracted. After extraction, OBS (Ortho Bone Screw) mini-screw was applied to the infrazygomatic crest area with a length of 12 mm and a diameter of 2 mm. CBCT images of mini-screws applied to the infrazygomatic crest area of 2 mm diameter and 12 mm length were taken. Miniscrews are placed in the infrazygomatic area and do not touch the tooth roots. (fig 7) The upper anterior 6 teeth were combined with 0.10 stainless steel wires to become a single block. Maxillary anterior segment retraction was performed with an elastomeric chain by applying 250 g force. Force was applied from the hook of the canine bracket to the OBS mini screw (Fig 3). Class II elastic was used depending on the patient's cooperation. The final stage was done with 0.019 * 0.025 inch stainless steel wires with positive torque. After the releveing phase, the settling phase was completed with vertical component elastics After the finishing arch (0,019*0,025 inç stainless steel) stayed in patient's mouth for 2 months Class I canine closure relation was achieved. Debondig was performed after active orthodontic treatment and essix retainer was applied to the upper and the lower jaws.

Treatment Results: Orthodontic camouflage treatment with tooth extraction was completed in 20 months. On both sides, a class I canine and class II molar relationship, 2 mm overbite and 3 mm overjet



Fig 1. Pretreatment Facial and Intraoral Photographs

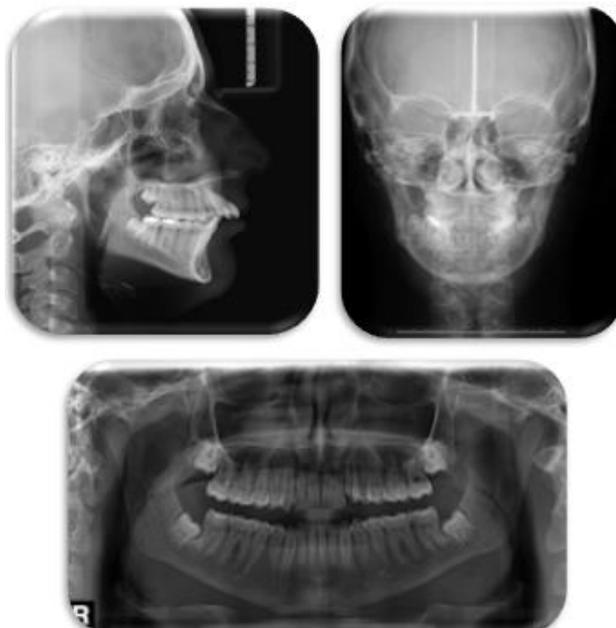


Fig 2. Pretreatment lateral, posteroanterior cephalometric and panoramic radiographs

relation were achieved (Fig 4). The pretreatment and posttreatment cephalometric analysis are shown in Table 1. These changes in the patient's values are due to maksillar anterior teeth retroclination and mandibular anterior teeth protrusion (Fig 5,6) In the final of our treatment the patient had a compatible profile. A noticeable improvement in the appearance of the protrusive upper lip and facial harmonies of the patient was achieved (Fig 4). Along with functional class 1 canine relationship, normal values of overjet and overbite were achieved.

Discussion

In the literature, it has been stated that camouflage therapy is indicated in the patient in cases of mild and moderate sagittal skeletal problems, in which the vertical direction dimensions are not increased, the



Fig 3. Mid-treatment photographs



Fig 4. Posttreatment facial and intraoral photographs

amount of crowding and soft tissue profile appearance are acceptable (11). In this case report where the massively retraction of the maksillar dentition was successfully obtain with the use of skeletal anchorage mechanics, the patient has the conditions mentioned above but since the patient did not want to surgical treatment, skeletal anchorage supported camouflage treatment approach was applied after getting the consent of the patient. In extracted cases how the extraction space can be used for the anterior and posterior teeth depends on many factors such as skeletal structure, growth potential, arch length deviation and the retraction amount of the anterior teeth. In orthodontic treatments, the indication for tooth extraction is not always used due to the increased lack of space. Sometimes there may be conditions such as excessive protrusive incisors or increased overjet that push patients to seek treatment (12). In such cases it is preferred to close the extraction spaces according to the absolute maximum anchorage requirement. The aim of the maximum anchorage is to close the extraction space with incisor retraction without the loss of anchorage in the posterior area. That is why, first premolar, the closest tooth to the anterior area, should be the preferred extraction option. In recent years, titanium screws have been described as the absolute source for orthodontic anchorage and have become widely used in orthodontics.



Fig 5. Posttreatment lateral, posteroanterior cephalometric and panoramic radiographs



Fig 6. Superimposed tracings of the pretreatment (black lines) and posttreatment (red lines) total and local cephalometric radiographs

Park et al. In retraction, they emphasized that the mini screw should be placed towards the apical of the middle triple of the 8-10 mm tooth and the hook towards the 5 - 6 mm gingivale to ensure bodily movement of the maxillary incisor teeth. (10). Considering this risk in our patient, skeletal anchorage support was taken and retraction was started in 0.022 slot bracket with 0.019 * 0.025 inç stainless steel wire and miniscrew was placed in the İnfrazygomatic crest in this direction. Huang et al. have stated that there is no difference in root resorption between two-step retraction and en-masse retraction. The Researchers

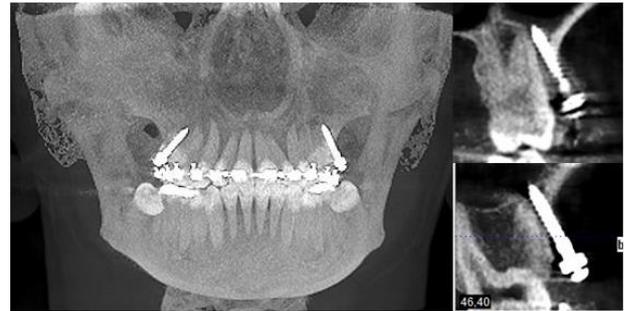


Fig 7. OBS miniscrew CBCT images placed in infrazigomatic crest

have reported that en-masse retraction was more advantageous than the two-step method because it shortened the treatment time (13). However, in cases where there is severe crowding in the anterior incisors, which should be worked with sectioned archs, canines are impacted or the incisors are very protrusive and a tipping movement is desired, it would be better choice to prefer the two step retraction instead of the en-masse retraction.

In cases where there is a class I relationship in the extracted cases; Jarabak, used intraoral elastics in the closure of the extraction space and intermaxillary elastic in the presence of a class II relationship, and took care that the elastic force is not more than 113.6 gr (14).The amount of force recommended in the literature for the en-masse retraction ranges from 150-300 gr. It has been reported that this amount of force is sufficient to cover the space of 0.5 mm - 1 mm (15). The amount of force that can be applied with mini implants is between avarage 200-400 gr. Retraction activation in sliding mechanics is usually made with nitinol spring and conventional springs. Less force is provided with super elastic nitinols. In studies carried out, the fact that friction systems provide faster tooth movement with coil spring than elastic and their superiority in terms of patient cooperation has been stated (16). However, due to the frequent intermittent checks we made in our patient, elastic chain was used and its change was made at intervals. With the OBS mini screw we applied from the infrazygomatic crest area, an elastic chain was applied to create approximately 250 gr force from the distal hook of the canine tooth.

In order to achieve the desired results in orthodontic treatments, the compatibility of skeletal and dental structures with each other is very important. Studies and clinical experiences show that dental structures and perioral muscles should be compatible with each other to ensure the stability of orthodontic treatment. The soft tissue covering the face is important in terms of aesthetics, speech and physiological functions. In many studies evaluated the relationship between mandibular and maxillary incisors and lower and

upper lips has been evaluated. For example Oliver (17), used boys and girls aged 12-15 years in patients with Class II division I malocclusion. He stated that there is a relationship between bone and soft tissue changes especially in boys and girls with thin lips. Bone tissue and soft tissue was found to be connected especially in the thin lip individuals. In another literature, Bailey et al. are stated that the target of treatment should be corrected profile firstly (18). In this case, because of the ideal maxillary incisor inclination, the upper lip is retruded and a compatible profile is provided. As a result, it is seen that there is a retraction of incisors, an increase in nasolabial and labiomental angles, and a noticeable retraction on the lips. Whether it would be changes in skeletal or dental structures, soft tissues manage adapt to the changes in some way (19). Since the OBS mini screw which is placed in the infrazygomatic area is painless during the application and the treatment period, it can be used safely for skeletal anchorage until the end of the treatment without safely patient comfort (20).

The treatment of our patient was started after a comprehensive evaluation of the mini screw type, force vector, tooth, skeletal, soft tissue evaluations, cooperation and growth-development period. In our adult patient with skeletal Class II malocclusion due to moderate mandibular retrusion, the retraction of the maxillary dentition was successfully achieved in a short time and in a controlled manner with the use of OBS mini-screws placed in the infrazygomatic crest region. As a result of orthodontic camouflage treatment, an ideal occlusion, function and harmonious dentofacial aesthetics were obtained.

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