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Clinical case

Bimaxillary Dentoalveolar Protrusion Treated through Dentition Distalization with Mini-Screws. Case Report

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ABSTRACT

Introduction: Maxillary and mandibular dentition distalization using orthodontic mini-screws has been described in the literature as a treatment for bimaxillary dentoalveolar protrusion. **Objective:** To show the management, treatment, and results of a moderate dentoalveolar biprotrusion patient by maxillary and mandibular distalization with mini-screws. **Case presentation:** Orthodontic treatment was performed with passive self-ligating braces and distalization with mini-screws placed on the infrazygomatic crest and mandibular shelf on both sides. Maxillary and

mandibular incisors were lingually inclined. Overbite and crowding correction were observed. There was a retrusion of the upper and lower lip. **Conclusion:** Distalization with mini-screws for moderate dentoalveolar biprotrusion is an adequate treatment alternative avoiding premolar extraction, and obtaining favorable, functional, and aesthetic results.

Keywords: Bimaxillary dentoalveolar protrusion, distalization, mini-screw, dentition distalization

INTRODUCTION

Dentoalveolar bi-protrusion is a malocclusion in which the main characteristic is the protrusion and proclination of the anterior teeth in the maxilla and mandible[1]. Consequently, the lips are protrusive and the facial profile is convex. Facial manifestations may be present to a greater or lesser degree depending on the severity of the bi-protrusion and the soft tissue characteristics of the patient[2,3]. Some cases present molar and canine Class I with good oral function, making esthetics the main reason for patients to seek orthodontic treatment[2]. The main objective of treatment of this malocclusion is to reduce proclination and protrusion of the incisors, consequently improving lip protrusion[4].

One of the treatment alternatives to correct this type of malocclusion includes the extraction of the upper and lower first bicuspids with retraction of the anterior segments[5]. Another treatment alternative is the total distalization of the teeth of the maxillary and mandibular arch with mini-implants placed in the infrazygomatic ridge and/or mandibular shelf as anchorage. This option is favorable for esthetic changes in the soft tissues, as well as in the dental and skeletal position[6,7]. Therefore, this article aims to show the management, treatment, and results of a patient with moderate dentoalveolar bi-protrusion by distalization of the upper and lower arches with mini-implants, in which posterior intrusion and retroclination of incisors was observed associated with the retraction biomechanics employed.

CLINICAL CASE PRESENTATION

A 21-year-old male patient presented to the Orthodontics Specialty Clinic of the Escuela Nacional de Estudios Superiores, León campus, UNAM. The reason for consultation was that his upper teeth were "*very inclined towards the front*". After analyzing the clinical history and taking photographic records (Figure 1), imaging (Figure 2) and study models (Figure 3), a diagnosis was made: Skeletal class I, mesofacial, with neutral growth, presence of all erupted teeth, bilateral molar class I, right canine class II and left canine class I, with mild upper and lower crowding, protrusion and proclination of upper and lower incisors, multiple rotations; straight facial profile with lower procheilia and slightly negative labial step. No alterations or pathologies in the function of the stomatognathic system were found. The treatment objectives were to eliminate the upper and lower crowding, correct proclination and protrusion of the upper and lower incisors, distalize the upper and lower arches with the intrusion of the posterior segment and retroclination of the anterior segment, preserve molar class I, achieve bilateral canine class I, and retract the lower lip.

Figure 1. Initial extraoral and intraoral photographs

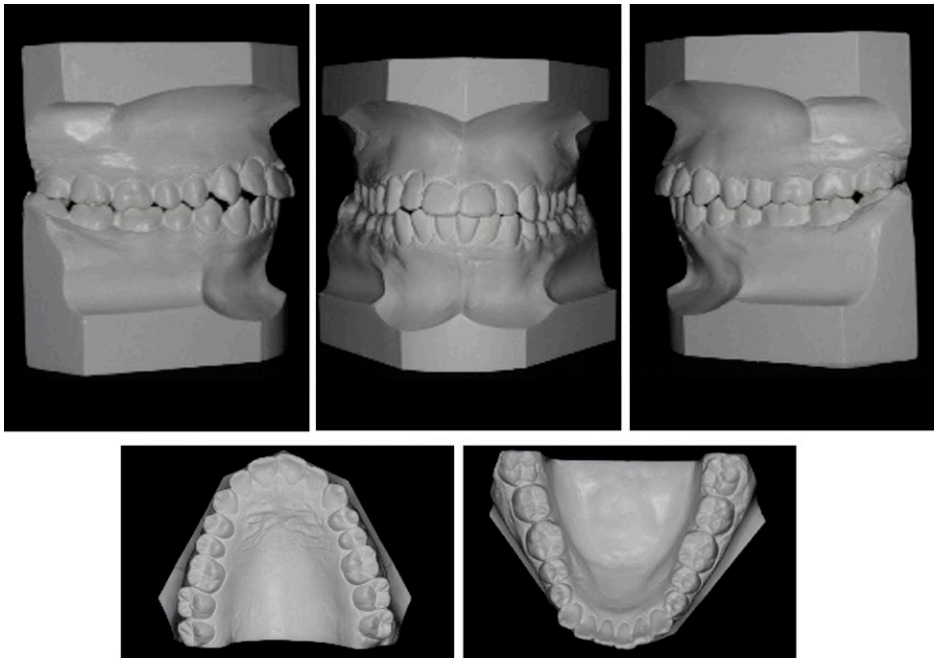

Figure 2. Initial study models

Passive self-ligating brackets with 0.022" slot (Easy-K) were placed and directly bonded tubes on the upper and lower first and second molars. Under local anesthesia, mini-implants were placed in the infrazygomatic crest and the mandibular shelf on both sides, and immediate loading of the implants was performed with a short elastic chain that went from the cuspid bracket of each quadrant to its corresponding implant with a force of 50 grams. Once the appliance was installed, the patient was referred for extraction of teeth 18, 28, 38, and 48.

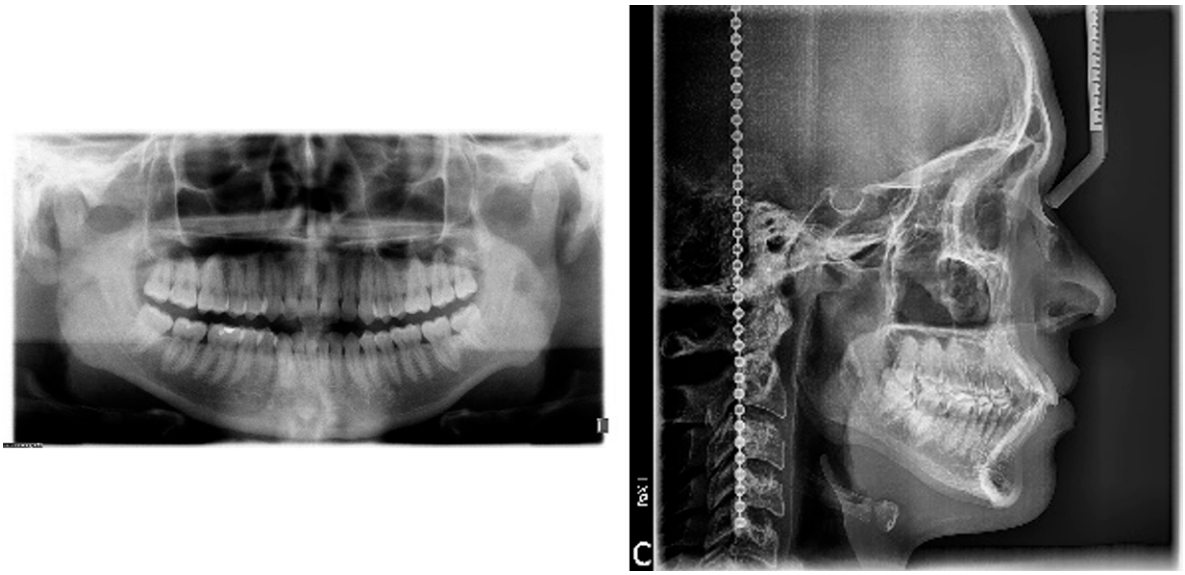

Figure 3. Initial orthopantomography and lateral headfilm radiographs

The biomechanics consisted of distalizing the upper and lower arches with the temporary anchorage devices from the initial phase of treatment with medium elastic chains placed from the implant to the cuspid bracket of each quadrant (Figure 4). A force of 150-200 grams was used. The elastic chain was changed every two weeks throughout the treatment. Spaces were observed between cuspids and upper laterals on each side. In the working phase, crimpable hooks were placed in a 0.019“ x 0.025” stainless steel archwire between the cuspid and lateral on each side, and an elastic chain was placed from the mini-implant to the corresponding crimpable hook on each side in both upper and lower arches. To achieve greater closure of these spaces, an elastic chain was placed from the mini-implant to the bracket of the cuspid passing it through the incisal part of the bracket of the four upper incisors and placing it again to the contralateral canine and then to the contralateral implant. In the finishing phase, the mini-implants were removed, a 0.019” x 0.025” braided archwire was placed in the lower arch, together with a 0.019” x 0.025” stainless steel archwire.

The following archwire sequence was used during treatment: initial phase, NiTi 0.014”, NiTi 0.018”, Thermal NiTi 0.016” x 0.022”, Thermal NiTi 0.017“ x 0.025” archwires; working phase, Thermal NiTi 0.019” x 0.025”, Stainless steel 0.019” x 0.025”; finishing stage, 0.019” x 0.025” braided both in the lower arch and in the upper arch, Stainless steel 0.019” x 0.025” with 3/16” 2 Oz inverted “N” seating elastics from lower cuspid to upper cuspid, lower first bicuspid and upper first bicuspid on both sides, ¼” 2 Oz. “M” elastic from lower second bicuspid to upper second bicuspid, lower first molar, upper first molar, and lower second molar on both sides. Fixed appliances were removed with bracket-removing pliers. The excess resin was cleaned with titanium-tipped forceps followed by a high-speed multi-blade bur with irrigation and polished with Soflex discs. An upper circumferential removable retainer and a lower fixed retainer made with 0.017” Respond wire were placed from 3 to 3. Finally, orthopantomography, lateral head film (Figure 5), and cephalometric superimposition (Figure 6) were taken.

At the end of orthodontic treatment, favorable changes consistent with the objectives set at the beginning of the treatment were observed. Clinically, retroclination of the upper incisors was noted, an increase in the overbite, bilateral molar class I was preserved, and bilateral canine

Figure 4. Intraoral photographs of the treatment performed and the mechanics used

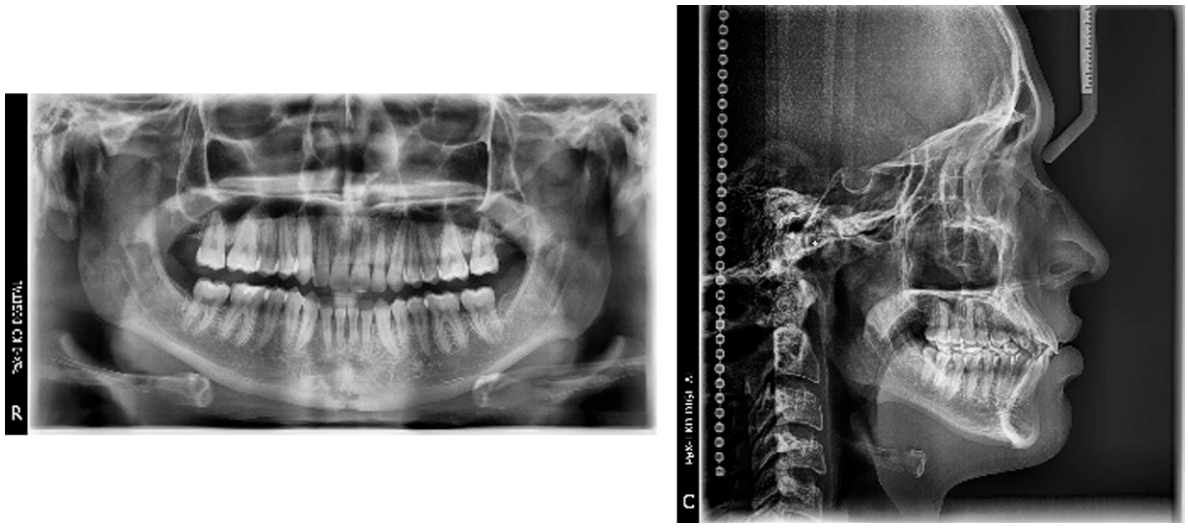

Figure 5. Orthopantomography and final lateral headfilm radiographs

class I was achieved. There was a correction of the mild crowding and rotations; the soft tissue changes observed were retrusion of the upper and lower lips and a straight labial step (Figure 7). Skeletally, there was a 1° decrease in the SNA angle while the SNB angle remained unchanged. The interincisal angle increased, indicating that there was considerable retroclination. The angle of the upper incisor to the palatal plane decreased indicating retroclination, and the angle of the lower incisor with the mandibular plane also showed retroclination at the end of treatment (Table 1).

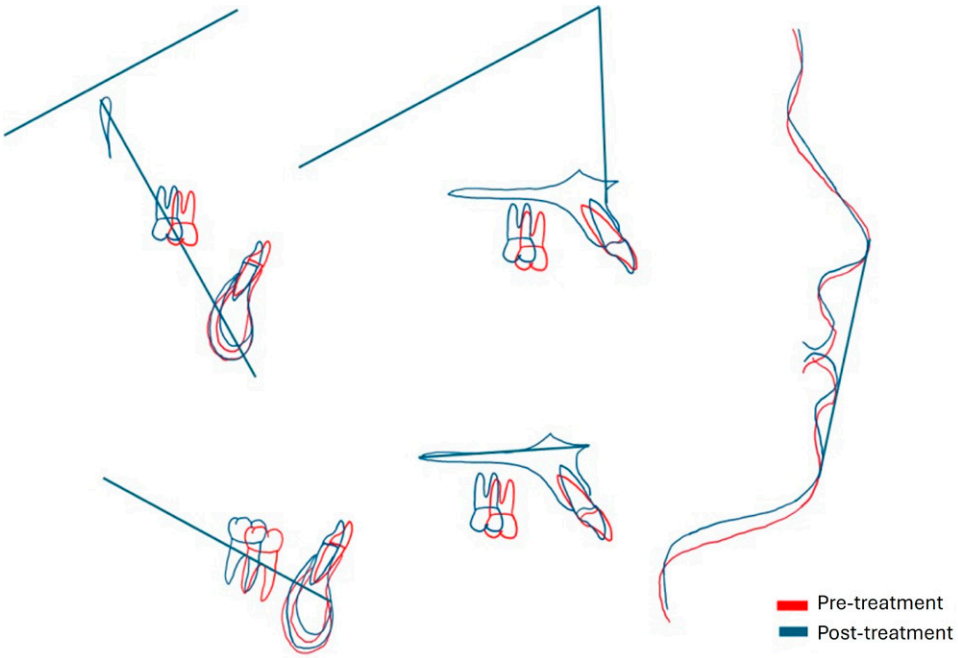

Figure 6. Ricketts pre-treatment and post-treatment cephalometric superimpositions

Figure 7. Final extraoral and intraoral photographs

Table 1. Initial and final cephalometric data

VALUE	INITIAL	FINAL
SNA	82°	81°
SNB	80°	80°
ANB	2°	1°
INTERINCISAL ANGLE	106°	121.9°
ANS-PNS, U1	128.6°	119°
IMPA	103°	93°
UPPER MOLAR POSITION	24.9 mm	17.7 mm

DISCUSSION

According to Lew[9], Tan[10,] and Kurz[11], the treatment to reduce facial convexity in dentoalveolar protrusions consists of extractions of upper and lower first bicuspids with retraction of the anterior segments thus reducing lip biprotrusion. However, at present, the tendency to perform this kind of procedure has decreased due to new alternatives to solve different malocclusions. An example of this is the introduction of mini-implants and the simplification of the mechanics that require maximum anchorage and sliding.

In 2003, Lin and Liou[14] published a paper on the placement of mini-implants in extra-alveolar areas, such as the infrazygomatic ridge, to achieve full-arch distalization mechanics in dental CII patients. Since then, the same concept of extra-alveolar mini-implant placement has been used for distalization mechanics in the lower arch for dental CIII patients, with the mandibular shelf as the insertion site.

In this case, the patient was presented with two treatment alternatives: one consisted of extracting the upper and lower first bicuspids to treat the dentoalveolar biprotrusion; the alternative was to distalize the dental arch with mini-implants without the need for premolar extractions and extract the four third molars instead. The patient accepted the second treatment plan.

Depending on the force vector formed with the mini-implant head at the anterior retraction point and its relationship with the center of resistance, distalization can perform a simultaneous movement of distalization and posterior intrusion[6,16]. It was decided to perform distalization with a force vector passing under the center of rotation of the posterior maxilla and mandible. This would achieve distalization with the intrusion of the posterior teeth, extrusion, and palatalization of the anterior teeth. This way we met our initial objectives, which were to distalize the upper arch and achieve retroclination of the upper and lower incisors.

CONCLUSION

Distalization with mini-implants in infrazygomatic crest and mandibular shelf for the treatment of dentoalveolar biprotrusion is an efficient and more conservative alternative for dentoalveolar retrusion and retroclination without the need for bicuspid extractions, obtaining favorable functional and esthetic results.

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