

Mechanical Treatment of Class II Division 1: A Case Report

A Tlig*, I Dallel, S Tobji and A Benamor

Orthodontics Department, University/Organization, Faculty of Dental Medicine of Monastir, Tunisia

***Corresponding Author:** A Tlig, Orthodontics Department, University/Organization, Faculty of Dental Medicine of Monastir, Tunisia.

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Abstract

A study case of Class II division malocclusions represents 27% of the Tunisian population. The chief complains to patient who has previously treated by activator, including maxillary incisors proclination with an elongated appearance of the face and chewing difficulties. The treated malocclusion is characterized by a narrow maxillary arch with disto-position of the molars, long upper incisors, short lips and a recessed chin. The treatment of the identified severe promaxilla required a rapid management by distalization mechanics in order to establish correct aesthetics and oral function. The management of this clinical situation with a narrowed transverse sense may complicate the treatment. The use of mechanics was preferred and allowed a better solution employing orthodontic forces to generate well directed growth. The technique also allowed the treatment of mouth breathing and lingual dysfunction as the primary causes of the observed defects. A molar and canine class 1 and correction of the malocclusion were obtained. The Improving of facial aesthetics and smile enlarging were also ensured.

Keywords: Distalization; Maxillary; Proclination; Orthodontic

Introduction

Class II division 1 is one of the most common occlusal anomalies to be treated in our daily practice. This type of malocclusion is characterized by a narrow maxillary arch with disto-position of the molars, long upper incisors, short lips and a recessed chin. This may be due to dentoalveolar adaptations to functional disorders or it may be of congenital origin [1,2].

According to a recent study in a Tunisian population, the classes II malocclusion represents about 27.2% of our daily consultations [3].

The management of class II div 1 depends primarily on the skill of the practitioner, the age and compliance of the patient, and the severity of the gap between the two arches. The orthodontist can choose between a treatment with or without extraction by using mechanical distalization by the use of elastic in particular [4].

Several molar distalization systems have been used to correct class II dental offsets, namely: distal active concept, pendulum, elastic-based mechanics or even sliding by "jig" [5,6].

This case report presents the treatment of a class II division 1 with significant open bite: this severe promaxilla requires a rapid management by distalization mechanics in order to establish correct aesthetics and oral function.

Dental clinical examination and diagnosis

The patient (IS), thirteen years old, consults at the Orthodontic Department of Dental Clinic at Monastir in Tunisia. The chief complaint was aesthetic and functional. She complains of protruding maxillary incisors and an elongated appearance of the face (Figure 1). Also, she reports chewing difficulties. Moreover, it is noted during the anamnesis that she had previously benefited from a palatal activator.

Figure 1: Pretreatment facial photographs.

A complete clinical examination was performed.

She presents in the front view prominent lower part of the face. The median sagittal plane is straight and the lips are in inocclusion with the upper incisors that touch the lower lip.

She also exhibits an ortho frontal profile and a marked labial-mental groove in profile view.

An intraoral examination reveals a bilateral Class II (Figure 2). A deviation of the inferior midline of 2 mm to the left and a unilateral posterior open bite are both identified in the transverse direction. The maxillary arch is V-shaped and the mandibular arch is U-shaped with a slight DDM at the incisors.

Figure 2: Pretreatment intraoral photographs.

Moreover, a dysfunctional swallowing associated with macroglossia is observed.

Cephalometrically, the patient presents a skeletal class I with an ANB angle of 2°. In the transverse direction, she presents an open bite face with a GOGN/SN angle equal to 41° (Figure 3). In addition, a proclination of the maxillary incisors with an I/F angle of 122° and a retroclination of those mandibular resulted in an IMPA angle of 80°, and therefore this induces a fairly increased overjet of 10 mm.



Figure 3: Beginning pretreatment radiographs.

Treatment objectives

These include: (i) correction of lingual dysfunction; (ii) procuring an expansion of the maxilla and resolution of the reverse joint; (iii) obtaining a molar and canine class I and correction of the malocclusion; (iv) correct the midline with harmonization of overjet and overbite; and (v) enlarging the smile and improving the facial aesthetics.

Treatment options

The narrowness of maxilla in this case imposed a disjunction in priority. When considering the dental origin of our class II malocclusion, our treatment option was orthodontic treatment with disjunction of the midline suture and mechanical distalization of the upper arch.

The IMPA angle allows a vestibular version of the mandibular incisors and the overjet between the two arches makes it possible to attempt inter-arch mechanics.

During the mechanical phase, the vertical direction must be controlled because our patient has an hyperdivergent face.

Treatment progress

After obtaining the patient's consent, a maxillary disjunction was performed using a palatal expander. This step is followed by a stabilization phase of at least three months. Then, the patient returned for the bonding of brackets for the upper teeth.

The orthodontic phase was initially started by leveling the maxillary arch using NITI arches in the following sequence: 0.014 “, 0.016” then 0.018 “. Afterwards, a 0.018” stainless steel arch wire was left for two months to increase the expansion of the jawbone. The mandibular arch was bonded during this phase and the same arc sequence was used. A proclination of the lower incisors was observed gradually.

Rectangular arches were progressively used to express the torque of the teeth. That's why the following NITI arch sequence was used in the maxilla and mandible: 016 * 022”, 017 * 025” and 018 * 025” (Figure 4).

As soon as the torque was expressed, two stainless steel arches 0.018 * 0.025” were placed in the two arches. After a month, 5° of lateral torque in the lower arch were added (Figure 5).



Figure 5: Intraoral photographs for the jig distalization.

For the class II correction, a jig with horizontal elastic at the level of the mandibular molar was preferred. This system allowed a good control of the vertical direction. Intermaxillary elastics (4 mm, 4 oz) was used that the patient changed whenever they wore out. This correction phase lasted 5 months and resulted in a correction of the molar and canine class.

After the stabilization of occlusal result, the final phase was initiated. On the same stainless-steel arches, artistic bands were performed to correct some dental position defects (Figure 6).

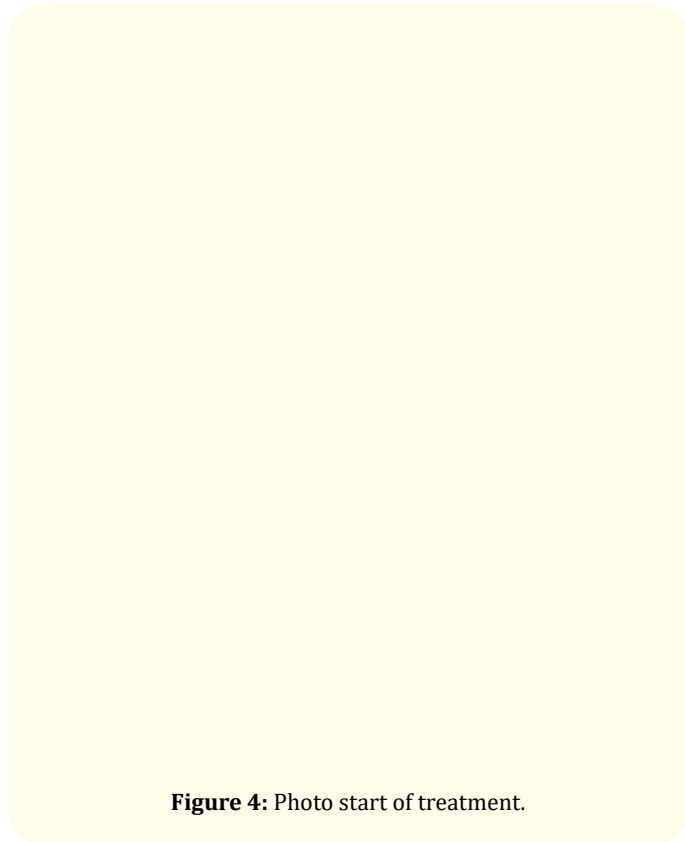


Figure 4: Photo start of treatment.



Figure 6: The end of jig distalization photographs.

Fixed retainers were finally bonded both in the upper and lower arches in addition to a Hawley plate to improve the inclination of the maxillary incisors (Figure 7).

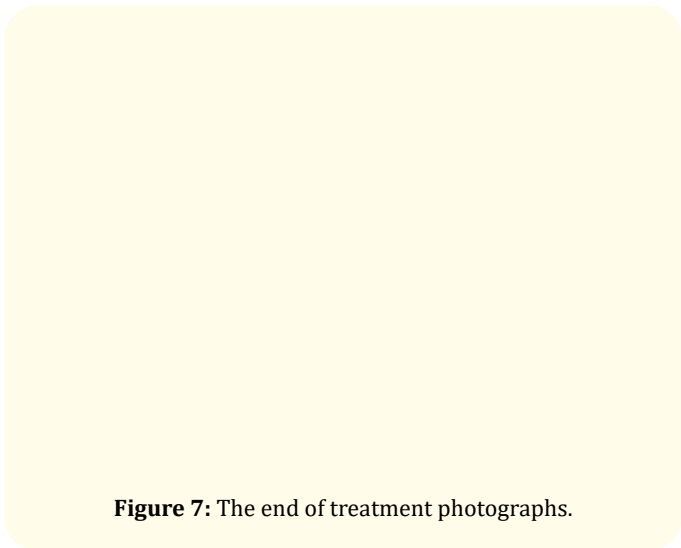
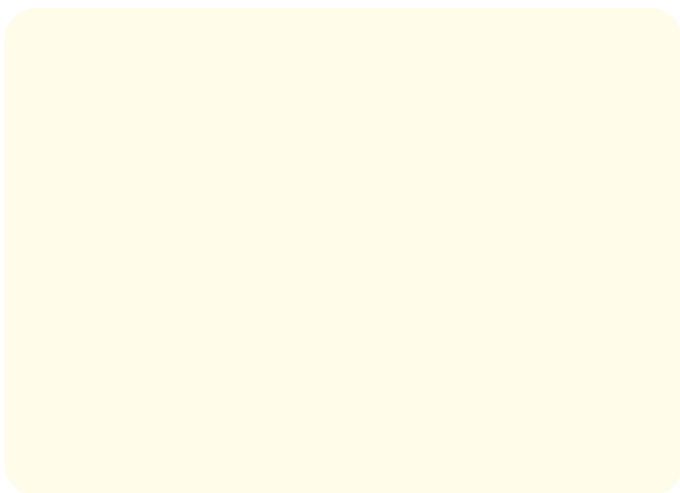


Figure 7: The end of treatment photographs.

Treatment results

Comparing the appearance of the face before and after the treatment, a projection of the mandible with a less marked labial groove was observed by side view. This result was obtained without opening the mandibular angle (Figure 8).

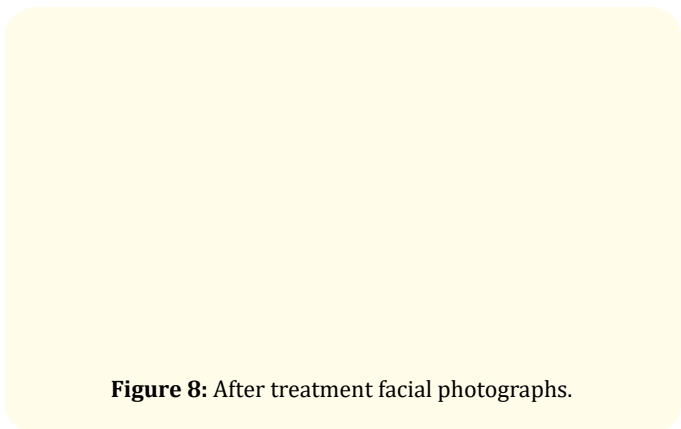


Figure 8: After treatment facial photographs.

The smile on the front has been widened and the lips can be kept in contact.

The molar and canine class I were acquired and the incisal coverage was normalized (2 mm overjet and 2 mm overbite). Furthermore, the anterior and lateral occlusion became more functional.

No TMJ disorder was detected. Finally, a panoramic X-ray shows parallelism of the roots and a lateral tele radiography makes it possible to assess the amount of mandibular arch advance (Figure 9,10).

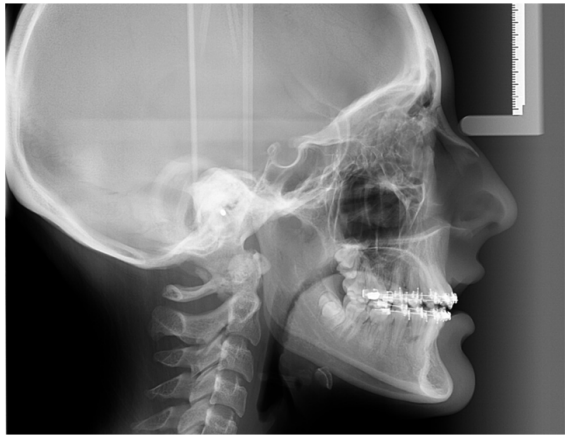


Figure 9: After treatment radiographs.

well as transverse directions. Indeed, for a long time the role of the thumb and tongue in the deformation of jawbones has been demonstrated.

Dysfunctional swallowing in combination with thumb sucking causes proclination of the upper incisors associated with slower growth of the lower arch [7,8]. This dysfunction also causes a lowering of the tongue and therefore a lack of transverse growth of the maxilla.

All these dysfunctions lead to a reverse lateral occlusion and less activity of the masticatory muscles which may explain the origin of class II. That's why the maxillary expansion was managed first [9].

On the other hand, without mandibular crowding, mono-maxillary extraction could have been a treatment option [10]; however, this approach avoids the potential onset of mouth breathing due to the narrowing of the lingual space and thus offers some stability to the treatment [11].

From another point of view, the advancement of the mandibular arch has also been proposed as a solution to class II division 2 malocclusion. According to a systematic review written by Cozza et al., the effectiveness of different means of advanced lower arch have been shown to be effective [12].

In such type of class II malocclusion, global arcade mechanics were used. This makes it possible to mobilize the entire arch without moving inside the arch. Equally, the use of Jig decreases the vertical component of the applied force [13]. Moreover, the use of elastics leads to an advance of the dental arch rather than a skeletal advance. However, these light forces help prevent dental damage from other devices [14].

According to the case report published by Manni et al. [15], the use of mini screws to increase anchorage in the mandibular arch may be justified in this case. This results in distal movement of the maxillary arch without any movement of the inferior arch and stabilization of the IMPA angle [15].

It should be noted that according to a meta-analysis carried out by Decosta et al. [16], the means of distalizing the upper arch using a bone anchor are more efficient than those using a conventional anchor. The use of mini screws to correct the maxillary advance allows to a better correction of class II division I [16].

Figure 10: Total superimposition radiographs.

Discussion

The achievement of treatment goals was a challenge, whereas a high patient motivation was demonstrated throughout the treatment. Maintaining hygiene at a respectable level has also been crucial.

The present case is a typical class II division 1 malocclusion caused by oral dysfunctions causing disturbances in the sagittal as

Conclusion

In this case report, the management of the three senses of growth was shown. The transverse sense was first managed to correct the origin of the malocclusion. Then the use of elastic associated with a jig allowed us a good sagittal advance and a maintenance of the vertical growth. Thus, extractions were avoided and the lingual space was preserved.

This type of treatment helps to acquire a better aesthetic result by a wider smile and to prevent the installation of a future mouth breathing.

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