

## Correction of Class II malocclusion with the pendulum appliance. Report of a case.

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### Abstract

**Introduction:** Different devices allow the correction of class II malocclusion, taking into account the etiology of the problem. This report describes the orthodontic treatment in which the conventional pendulum-type device was used for the distalization of the upper molars, then the treatment with fixed appliances will continue.

**Results:** The photographic and radiographic records show the distal movement of the upper molars. for the correction of class II malocclusion presented by the patient without compromise in the facial profile or long-term stability of the lower dental organs. **Conclusions:** the use of the pendulum-type device can be of great help for the correction of class II malocclusion as long as the secondary effects are controlled either during the use of fixed appliances or using bone anchorage.

**Keywords:** class II malocclusion, molar distalization, pendulum.

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### I. Introduction

The pendulum-type distalizer is indicated for the treatment of dental class II malocclusions in which no extractions will be performed during early or mixed permanent dentition. This device gives us dentoalveolar effects in a very short treatment time, in such a way that in three or four months it is possible to see the results of the distalization that is approximately five mm from the molars (1). That is why the distalization of the upper molars has been more popular in treatments without extractions, since it helps us in mild or moderate arch length discrepancies, having benefits in the sagittal plane (2).

There are different devices to resolve Class II malocclusion, these vary according to the growth pattern, etiological factor, age, and cooperation of the patient. Treatment can vary in the case of extractions or not, use of headgear, intermaxillary elastics, functional or mechanical orthopedic appliances, and fixed intraoral appliances (3). The cooperation of the patient can be crucial to achieving the success of the treatment, which is why they use of devices that require minimal cooperation should be the first choice (4).

For the correction of class II malocclusion with the use of distalizers, it is considered as the first phase of the treatment as is the case of the use of the pendulum and after this, fixed appliances are placed acting as a second phase and thus correcting the effects of the distalization as well as the malocclusion that the patient presented (5).

The movement of the molars occurs mainly due to distalization but is also associated with the loss of anchorage as well as the mesialization of the premolars and canines, giving a protrusion of the anterior segment. To achieve a stable occlusion, it is important to consider that the transverse dimension should not be affected since a decrease in the intercanine width may occur when using narrow arch forms (1).

Since the beginning of the Hilgers tooth-supported pendulum, modifications have been made to the size, position, and incorporation of the expansion screw of the palatal button, in the extensions for the premolars there can be two or four with the variant of being welded to bands or attached with resin to the occlusal surfaces and finally, the springs can have modifications in the number of loops, all this to improve their effectiveness in the treatment (6). There are alternatives to counteract the secondary effects that are obtained when using the pendulum with the occlusal supports in the premolars, such as the use of microscrews in the palatal region located parallel to the midline, to achieve maximum anchorage and avoid mesialization of the teeth premolars. (7)

## II. Case report

A 13-year-old male patient attends the orthodontic postgraduate clinic of the Universidad Autonoma de Baja California campus Tijuana, Mexico accompanied by his father, he was referred from the pediatric dentistry clinic of the same institution, upon questioning the father commented that the patient does not present a systematic or allergic history that interferes with orthodontic treatment.

**Extraoral analysis:** a patient with superciliary and bipupillary lines with apparent asymmetry, brachifacial biotype with labial compatibility is observed. There is a convex profile with a very accentuated mentolabial groove and a flat smile with exposure of 20% of the clinical crown as well as narrow buccal corridors. (Fig. 1)



Fig. 1 Initial extraoral photographs

**Intraoral analysis:** it is observed in your analysis of models and initial intraoral photographs; a right class II molar relationship, left class I, bilateral class II canine relationship with slight crowding in the upper and lower arch, coincident midlines with a vertical overbite of 95% and a horizontal overbite of 4 mm. (Fig. 2)



Fig. 2 Initial intraoral photographs

**Radiographic analysis:** in the cephalometric lateral radiography a neutral skeletal pattern is observed with a class II relationship due to a retrognathic mandible and a normal maxilla, the upper incisors in normal and the lower incisors proclined with a witts of 3mm. (Fig. 3)



	NORMA	INITIAL
SNA	82° ± 2	80°
SNB	80° ± 2	76°
ANB	2° ± 2	4°
Ang Ix / SN	104° ± 2	104°
I1 / Gto-Gto	90° ± 2	105°
Ang Gto-Gto / SN	32° ± 2	31°
Witts	0mm	3mm

Fig.3 Initial cephalometric radiograph

In the orthopantomography, 24 erupted permanent teeth can be observed, the presence of the germs of the third molars in the fifth stage of Nolla, as well as the second permanent molars in the process of eruption, asymmetric condyles in length and size, are appreciated. (Fig. 4)



Fig.4 Initial orthopantomography

**Treatment plan:** to achieve the objectives of obtaining a bilateral Class I molar and canine relationship, correcting the horizontal and vertical overbite as well as crowding, and thus obtaining a functional occlusion.

The treatment consisted of an orthodontic phase with fixed MBT Slot 0.018" appliances as well as the use of the pendulum to distalize the molars. (Fig.5)



Fig. 5 Initial phase of treatment

The sequence of treatment of the orthodontic phase: it began by placing the pendulum in the upper part with pre-activated for the distalization of the molars as well as turbo bite in the premolars with a duration of four months with periodic activations, later the upper pathology was placed with a 0.016" NiTi archwire and the pendulum was kept for three more months for retention (Fig.6), the lower appliance was placed with a 0.012" NiTi archwire as well as the removal of the pendulum and placement of the transpalatal arch, the upper and lower arch as well as the distalization of the premolars and upper canines, during arches sequence the 0.016" x 0.022" arch was used with which the sliding technique was performed, as well as the use of intermaxillary elastics. (Fig.7)

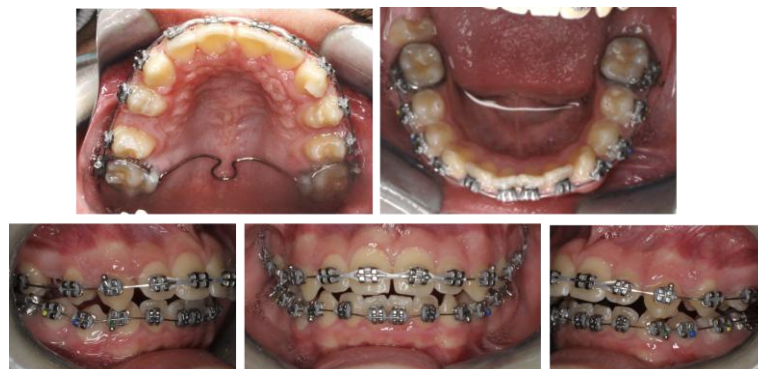


Fig. 6 Intermediate phase of treatment



**Fig. 7** Final phase of treatment

**Final studies:** at the end of the orthodontic treatment, intraoral and extraoral, as well as radiographic examinations, were carried out, which indicated that a facial balance and an adequate profile were achieved with a lip seal, dental midlines coinciding with the facial midline, smile consonant showing 90% of clinical crowns. (Fig. 8)



**Fig. 8** final extraoral photographs

Intraoral photographs show the success of the treatment, a bilateral molar and canine class I relationship is achieved, with a correct overbite as well as coincident dental midlines, in lateral intraoral photographs the consolidation of canine and molar class I can be appreciated. as well as the adequate intercuspation, the correction of the deep bite as well as the maxillary and mandibular dental crowding that the patient presented. (Fig.9)



**Fig. 9** final intraoral photographs

The lateral cephalometric radiograph shows a class I skeletal pattern associated with a retrognathic mandible with the maxilla in normal, and the lower incisor proclined, with a Witts of 0.5 mm.

### **III. Results**

The objectives proposed in the treatment plan were adequately fulfilled, correcting the deep vertical overbite from 95% to 30%, achieving a class I canine and molar relationship as well as the mild dental crowding that the patient presented with the use of the appliance was freed. fixed MBT prescription. At the end of the treatment, an adequate canine and incisive disocclusion guide were achieved, allowing us a functional occlusion and a pleasant smile.



In the lateral skull X-ray, an improvement in the skeletal pattern of  $1^\circ$  was observed, thus achieving better harmony, an improvement in the proclination of the lower incisor of  $8^\circ$  was also obtained, bringing with it greater periodontal stability. (Fig.10) In the orthopantomography, 28 teeth were observed in the mouth, the lower third molars were extracted for orthodontic indication and the upper third molars will be kept under observation. For retention and stability of the treatment, in addition to preserving the intercanine distance and achieving correction in incisor inclination, Hawley-type retainers were placed in the upper and lower arch. (Fig.11)



	NORMA	Final
SNA	$82^\circ \pm 2$	80
SNB	$80^\circ \pm 2$	77
ANB	$2^\circ \pm 2$	3
Ang Is / SN	$104^\circ \pm 2$	103
I1 / Go-Gn	$90^\circ \pm 2$	97
Ang Go-Gn / SN	$32^\circ \pm 2$	34
Witts	0mm	0.5

**Fig. 10** final radiographs



**Fig. 11** final orthopantomography

#### **IV. Discussion**

Caprioglio et al. In their evaluation of stability found that the main relapse of the distal movement of the molars occurs during the treatment with fixed appliances, however, they obtain stable post-treatment retention.(6)

Patel and Caprioglio in their studies determine that the pendulum-type device causes changes in the position and inclination of the molars during distal movement, as well as an increase in the vertical dimension during the distalization phase as well as during treatment with fixed appliances.(4,6)

Bozkaya et al. In their comparative study where they evaluated two modalities of pendulum-type devices with the anchor variant. They identified qualities in the pendulum with bone anchorage, which surpasses the conventional pendulum, identified a greater movement as well as better control in the inclination of the molars at the moment of distalization. At the level of the first premolars, a better anchorage was achieved, in the second premolars they had a spontaneous distalization, less proclination, and protrusion of the upper incisors were obtained.(7)

#### **V. Conclusion**

It is important to take into account the etiological factors of class II malocclusion to plan a successful treatment that allows us to meet the specific objectives of each patient. This requires knowledge for the selection of the appropriate appliance, in this case, the pendulum-type device allowed us to achieve the correction of the malocclusion without affecting the position of the upper incisors and allowing us adequate vertical control.

Another point to consider is the alternative of placing micro screws as an anchor to control the side effects of this type of device.

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