



## Case report

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# Uni-lateral Molar Distalization with Palatal Miniscrew Anchorage

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### Abstract

**Introduction:** An appliance to correct unilateral Class II molar relationship was described, the clinical and laboratory procedures for the construction of the appliance were explained. The clinical application for the unilateral molar distalization was illustrated by a case report. The advantages and disadvantages of the appliance were presented.

**Methods and materials:** Palatal TAD was inserted just mesial to the first molars, close to their centers of resistance. The appliance that inserted on the lingual sheath of the maxillary molar band on the Class II side extending parallel to the mid-palatal raphe as anteriorly as possible. The mesial end of the same wire acts as a hook which NiTi coil spring was placed while the distal end was cinched in the lingual sheath.

**Results:** The clinical application showed a Class I molar and canine relationships were established. Acceptable overjet and overbite were also achieved. The post-treatment panoramic radiograph showed that the roots of the teeth were fairly parallel. The post-treatment panoramic radiograph showed that the roots of the teeth were parallel, and the supporting tissues appeared healthy. The post-treatment cephalometric radiograph showed no significant changes in the skeletal measurements after treatment.

**Conclusion:** The appliance was found to be effective in correcting unilateral molar Class II malocclusion, and therefore it is recommended for clinical use on cases indicated for its use.

**Keywords:** Distalization, Molar, Mini-implant; Orthodontics

**Abbreviations:** TAD: Temporary Anchorage Device; St.st: Stainless Steel; NiTi: Nickel Titanium

### Introduction

Dental Angle Class II sub-division patients can be treated with either uni-lateral distalization of the maxillary posterior teeth or asymmetric extraction [1]. Since current trends in orthodontics have shifted towards non-extraction treatment, molar distalization mechanics have become increasingly popular [2-5].

The traditional approach to uni-lateral distalization of maxillary molars, especially in the maxilla, is extra oral traction [6]. Such a treatment requires much compliance from the patient. Alternatively, several methods have been introduced for uni-lateral molar distalization to diminish the need for patient co-operation. Among these intra-oral distalization techniques such as pendulum appliance, Jones jig, and distal jet and vestibular or palatal coil springs were also described [2,4,5,7].

This report describes the fabrication of an appliance to distalize maxillary molars using implant-supported distalizing appliance.

### Appliance Design

#### Components of the appliance

- Maxillary first molar bands with welded lingual sheath.
- 0.9” Stainless Steel (st.st) wires.
- Mini-screw\* implant (Temporary Anchorage Device (TAD)) (8 mm in length).
- Super elastic Nickel Titanium (NiTi) closed-coil springs.

### Appliance fabrication

- Palatal TAD was inserted just mesial to the first molars, close to their centers of resistance.
- Upper molars were banded and lingual sheath were welded on palatal aspect, keeping them parallel to the buccal tubes.

- 0.9” st.st wire that inserted on lingual sheath extending parallel to the mid-palatal raphe as anteriorly as possible. The mesial end of the same wire acts as a hook which NiTi coil spring was placed and tied using ligature wire while the distal end was cinched in the lingual sheath. The arm extensions should also be at the level of the molars’ centers of resistance to ensure bodily movement during distalization. Longer extension arm will allow greater accessibility of coil spring to be attached to the mini-screw to generate a distalizing force on the first molars.

### Case Report

A 19-year-old female patient presented with a unilateral Class II molar relationship on the left with minimal crowding and a crossbite on the right canine. Over retained maxillary deciduous canine was present on the right side of the maxillary arch while the permanent canine was present in a crossbite (Figure 1-3). The initial panoramic radiograph showed no missing teeth, and alveolar bone and root formation were within normal limits (Figure 2). Cephalometrically, the patient had an SNA angle of  $80.54^\circ$ , an SNB angle of  $79.56^\circ$ , and an ANB angle of  $0.98^\circ$ . The upper incisors had a  $114.34^\circ$  angle relative to the palatal plane and the lower incisors had a  $103.44^\circ$  angle relative to the mandibular plane (proclined lower incisors) (Table 1). The temporomandibular joint evaluation showed no signs of clicks or crepitation, and the facial and masticatory muscles were asymptomatic.

The patient did not want to wear an extra oral appliance, and she requested the retraction of the upper anterior teeth, without extractions.

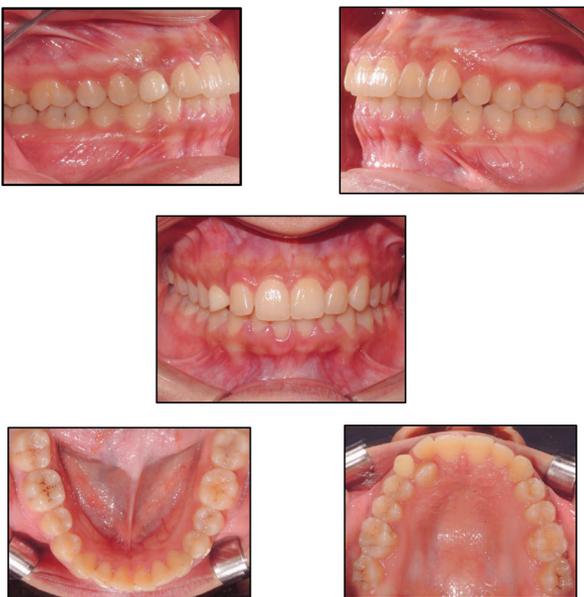


Figure 1: Initial intra-oral photographs.



Figure 2: Initial Radiographs.

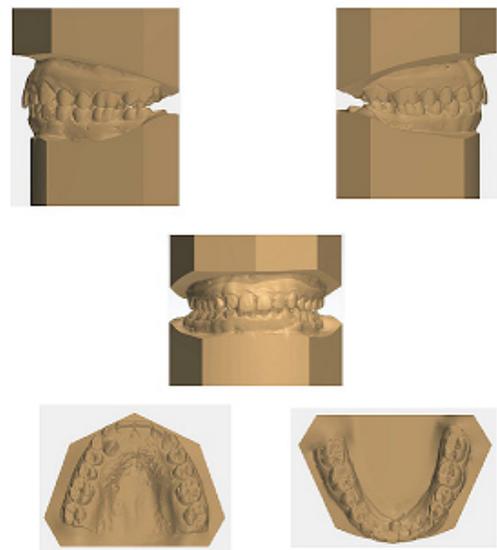


Figure 3: Initial models.

Variables	Before treatment	After treatment
A) Skeletal		
1 SNA(°)	79.50	80.71
2 SNB(°)	78.52	78.76
3 ANB(°)	0.98	1.95
4 AO-BO (mm) (wits)	3.36	4.56
5 MMA(°)	26.85	28.18
6 Jaraback (%)	64.88	64.44
B) Dental		
7 U1/PP(°)	114.34	117.38
8 L1/MP(°)	103.44	105.07
9 U/L1(°)	115.37	109.36
C) Soft tissue		
10 UL-E Line	2.98	2.25
11 LL-E Line	-0.24	-0.86
12 Nasio-Labial (°)	115.71	107.64

**Table 1:** Cephalometric summary.

### Treatment Objectives

Treatment objectives were to, a) The extraction of over retained deciduous teeth, b) Correct Class II sub-division by uni-lateral molar distalization and c) Achieve proper placement of maxillary and mandibular incisors with a well-intercuspated bilateral Class I molar and canine relationship.

### Treatment Alternatives

There were three treatment alternatives for this case:

- 1) Extraction of the upper left first premolar.
- 2) Distalization of the upper left molar.
- 3) Extraction of upper first premolars and lower right first premolar.

### Treatment Progress

The patient chose the non-extraction alternative, and a distal movement of the upper left first molar was planned. To achieve this movement, the use of intraoral distalization mechanics was planned. We selected a modified implant-supported distalizing appliance for treatment.

Initially: After extraction of over retained deciduous teeth is done, preadjusted fixed appliances (0.022 × 0.028-inch, ROTH) were placed in both arches, alignment was carried out using 0.016” NiTi wire for 4 weeks followed by 0.018” NiTi wire for subsequent 4 weeks, followed by 0.017\*0.025” NiTi wire for subsequent 4 weeks, which was replaced by 0.017\*0.025” st.st wire with open

coil springs placed between right lateral and first premolar on the right side while on the left side. The mini-screw implant was inserted palatally between the upper left second premolar and first molar. Then, the distalization appliance was inserted on the lingual sheath of the left first molar band. The palatal closed coil spring was attached between TAD and hook of the distalization appliance (Figure 4). Extra 0.014” NiTi wire was ligated to main archwire 0.017\*0.025 stainless steel to align the maxillary right canine, followed by 0.018” NiTi wire then ligated to the main archwire. Overcorrected Class I molar relationship was achieved uni-laterally in the meantime distalization period of five months.



**Figure 4:** Uni-lateral molar distalizing appliance.

### Finishing

Finishing was carried out by an average time duration of four months, using 0.017” × 0.025” TMA archwires with settling elastics (Figure 5 and 6). Vacuum retainers were delivered in both maxillary and mandibular arches for retention.



**Figure 5:** Final intra-oral photos.

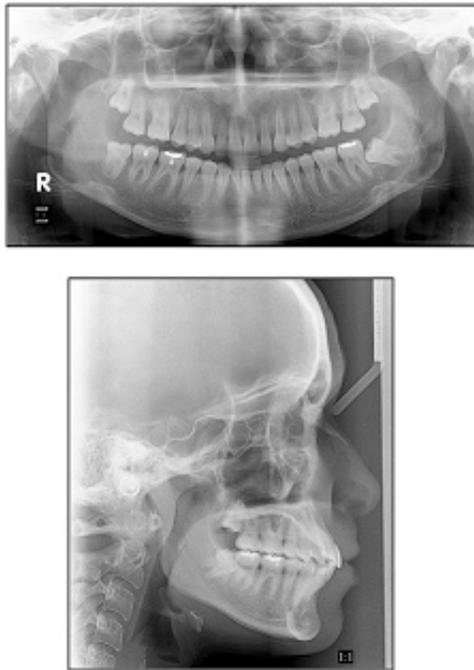


Figure 6: Final Radiographs.

## Treatment Results

A Class I molar and canine relationships were established. Acceptable overjet and overbite were also achieved (Figure 5). The post-treatment panoramic radiograph showed that the roots of the teeth were fairly parallel. The post-treatment cephalometric radiograph showed no significant changes in the skeletal measurements after treatment (Figure 6).

## Discussion

The aim of the treatment was achieved and the left unilateral class II molar relationship was corrected by the molar distalization appliance described above. The appliance was developed as an alternative to those which rely on patient compliance. The appliance was developed to avoid using non-compliance appliances [8], which involved the active participation of the patient in the treatment process. The molar moved bodily through the occlusal plane. The rationale for this sequence is based on the concept that the movement of one molar is supported by all the other teeth, thus maximizing anchorage [4]. Anchorage must be controlled to make sure that ideal class I relationship was achieved. The maxillary left second premolar will drift posteriorly, due to the pull of the transseptal fibers [8].

Several methods have been used for molar distalization including headgear, the pendulum, and the distal jet, but all of these techniques require a high level of patient compliance and show anchorage loss [9]. The noncompliance intraoral molar distaliza-

tion methods have been an excellent compromise for patients who are unwilling to wear headgear.

In contrast to the intraoral distalization appliances as Pendulum appliances [4], which require the placement of “Quick Nance” to maintain molar distalization [2], the described appliance in this paper achieved excellent bodily molar distalization which can be easily removed as it is inserted in the lingual sheath of the molar band. Recent clinical studies on the Pendulum appliances have shown that the appliances were efficient in producing distal movement of the molars [9], without the need for high level of patient’s cooperation [2]. However, as a result of molar distalization, a slight amount of bite opening was reported with pendulum appliance but was reported as not clinically significant [10,11]. The bite opening reported could be due to lingual movement of the molars and/or distal tilting. The mini-implant supported distalizing appliance described and used above has many distinct advantages. First, the appliance design and construction is simple. Second, the maxillary molars distalization was mainly bodily movement. Third, the appliance was hygienic and comfortable for the patient and orthodontic treatment could continue without discontinuity in the treatment mechanics.

## Conclusion

This uni-lateral molar distalizing appliance has these advantages: a) simple yet efficient, b) easy to fabricate and place, c) hygienic and comfortable for the patient, d) requires minimal patient cooperation and e) low cost.

## Authors’ Contributions

Dr. Ahmed Atalla was the constructor of this distalizing appliance and treating the case. Prof. Dr. Hisham Afifi provided his scientific expertise in orthodontics.

## Competing Interests

The authors declare that they have no competing interests.

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