Mini-implant-supported Molar Distalization

Amit Goyal, JPS Kalra, Suchinder Singla

ABSTRACT

Temporary anchorage devices popularly called mini-implants or miniscrews are the latest addition to an orthodontist’s armamentarium. The following case report describes the treatment of a 16-year-old girl with a pleasant profile, moderate crowding and Angle’s Class II molar relationship. Maxillary molar distalization was planned and mini-implants were used to preserve the anterior anchorage. After 13 months of treatment, Class I molar and canine relation was achieved bilaterally and there was no anterior proclination. Thus, mini-implants provide a viable option to the clinician to carry out difficult tooth movements without any side effects.

Keywords: Mini-implants, Anchorage, Molar distalization.

INTRODUCTION

The nonextraction treatment of a Class II malocclusion without extraction requires posterior movement of the maxillary dentition, anterior movement of the mandibular dentition or a combination of both. Many appliances techniques have been developed and used to distalize the maxillary molars with positive clinical results. However, patient cooperation is a serious problem; orthodontic mechanics requiring minimal patient cooperation are desirable.1,2 Intraoral appliances for maxillary molar distalization, such as the pendulum, push coils, magnets, superelastic nickel-titanium wires, the distal jet and the molar slider, do not require extensive cooperation from patients.3-11 These techniques effectively distalize both the first and second molars.

However, these appliances always exert reciprocal, adverse side effects. Anterior teeth tend to move forward during distalization of the molars and need to be retracted thereafter against the distalized molars. The forward movement of the distalized molars during anterior tooth retraction often offsets the treatment effect of the distalization appliances.12 Furthermore, the treatment time is prolonged. These adverse tooth movements or changes on the reactive part should be eliminated, if possible.

The solution to this obstacle has been provided by recent improvements in implant dentistry. With the use of dental implants, miniplates and implants as anchorage, the distal movement of the anterior teeth or posterior teeth (or both) without anchorage loss has become possible.13-19 Among these devices, the mini-implants have the advantages of easy placement and removal with minimal anatomical limitations because of their small size and low cost.17 Therefore, their clinical applications have been expanded and they have been adopted for molar distalization.

Sliding mechanics with the aid of the mini-implant anchorage and its application for the treatment of skeletal Class I and II malocclusions have been described previously.17,18 Its application in nonextraction treatment, however, has not been widely discussed. The following case report highlights the use of mini-implants as an anchorage aid for distalization of maxillary molars.

DIAGNOSIS AND TREATMENT PLAN

A 16-year-old female patient presented with a full cusp Angle’s Class II molar relation on the left side, end on molar relation on the right side, moderate crowding in the upper arch, mild crowding in the lower arch, normal maxillomandibular relationship and a normal overjet and overbite (Fig. 1).

As she presented with a straight pleasing profile (Fig. 2), extraction was ruled out. Distalization of the upper molars was planned and to prevent the proclination of the anterior teeth during distalization, mini-implants were sought to strengthen the anterior anchorage. The mild crowding in the lower arch would be relieved by proximal stripping.

TREATMENT PROGRESS

Upper first molars were banded and 0.022" stainless steel brackets were bonded only on upper first and second premolars. After aligning these posterior teeth, a segmental 0.019" × 0.025" stainless steel wire was placed. A stiff archwire is necessary to minimize the distal tipping and rotation of the molar. A nickel-titanium open coil spring was inserted between the second premolar and the first molar to...
provide the distalizing force. However, it was necessary to prevent the loss of anterior anchorage. Temporary anchorage devices, popularly called mini-implants were used to prevent the flaring of the anterior teeth.

Two titanium mini-implants (0.8 mm in diameter and 11 mm in length) were inserted between the second premolar and first molar on both sides in the upper arch. Stainless steel ligature wire (0.010" diameter) was tied to first premolar brackets from these mini-implants to prevent their mesial movement (Fig. 3).

Within a month, the right molar was distalized by 2 mm and the left by 1 mm. The lower arch was also bonded and 0.014" nickel-titanium wire was placed after proximal stripping. Distalization was continued in the upper arch.

Within 3 months, a molar distalization of 3 mm was achieved on the right side and 5 mm was achieved on the left side (Fig. 4). A transpalatal arch (TPA) was then placed and the second molars were also banded. The open coil springs were now placed between the first and second premolars to push the second premolar distally. After distalizing the second premolar, the rest of the maxillary arch was bonded and the first premolar and the canine were retracted with elastic chains directly from the implants (Fig. 5).

After this, the closure of residual spaces and the final settling of occlusion was carried out (Fig. 6). The entire procedure took 13 months to complete.

TREATMENT EFFECTS

Good alignment was achieved in the maxillary and mandibular arches with a full cusp Class I molar and canine relation on both sides without any premolar extractions (Fig. 7). The
profile was maintained (Fig. 8) and any proclination of anterior teeth was avoided with the use of mini-implant anchorage.

**DISCUSSION**

Intraoral distalizing appliances cause an adverse, reciprocal mesial movement of the anterior teeth and premolars during distal movement of the molars. This adverse forward movement of anterior teeth is inevitable using an intraoral molar distalization appliance. The forwardly placed anterior teeth should be retracted back after creating space by distalizing the molars and premolars. During this anterior tooth retraction, the posterior teeth are used as anchorage so that the distalized...
molars are moved forward, which offsets the efficiency of distalization using intraoral distractors. Moreover, the overall movement of the anterior teeth is a round-trip as they are proclaimed during the distalizing of the molars and then retracted into the created space. On the other hand, distal movement using mini-implants is a group movement of buccal segment teeth. There is no forward movement of the anterior teeth in mini-implant–aided mechanics. Therefore, these procedures did not produce any adverse side effect on the anterior teeth. Antonarakis and Kiliaridis found in their systematic review that tooth-borne distractors could move maxillary molars distally on average 2.9 mm; however, the associated undesirable incisor mesial movement was 1.8 mm. In the present case, the findings indicate that reinforcement of anchorage with orthodontic implants increased the amount of molar distalization. The distal movement of the maxillary molars in the studies with comparable distalization techniques were from 3.9 to 6.4 mm. At the same time, the maxillary incisors remained stable. This implies better outcomes produced by mini-implant reinforced distalization than by tooth-borne distalizing appliances.

CONCLUSION

Mini-implants can be used successfully for distal movement of posterior teeth. They shorten treatment time and prevent the flaring of anteriors. So, in cases where extraction is contraindicated, molar distalization using implants might be the best option.

REFERENCES