CLINICAL INDICATIONS FOR THE DISTALIZATION OF MAXILLARY FIRST MOLARS

Molar distalization at the maxillary arch is an important part of the therapeutical armaments in the everyday orthodontic practice. Clinical indications for this type of dental movement are represented by the majority of disharmonies with Class II molar relationships. In particular, the technique is efficient in the correction of distal molar relationships associated with maxillary skeletal protrusion. Other targets for molar distalization therapy are the mesial position of upper first molars due to different causes and tooth-size/arch-size discrepancies at the maxillary arch.

In greater detail, clinical indications to distalization of maxillary first molars can be classified as follows:

a) skeletal problems:
   - maxillary protrusion
   - maxillary protrusion associated with mandibular retrusion
b) dento-alveolar problems:
   - mesial position of the upper dental arch
   - tooth-size/arch-size discrepancy at the upper arch
c) dental problems:
   - mesial position of maxillary first molars (due to caries, early resorption, or severe infraocclusion of second deciduous molars).

The anatomical features of maxillary first molars, the role of these teeth within the occlusion, and the biomechanic requirements concerning their orthodontic movement make molar distalization a complex chapter of contemporary orthodontics. This is witnessed by the great variety of appliances that have been proposed for molar distalization during the two last decades.

APPLIANCES FOR MOLAR DISTALIZATION

The appliances for molar distalization can be classified as extra-oral appliances and intra-oral appliances (Table). One of the fundamental requirements of any orthodontic appliance, those for molar distalization included, is the need for a minimal amount of patient's compliance. This is why intra-oral devices have become progressively more popular as an alternative to headgears starting from the 1980s. Several intra-oral appliances for molar distalization, however, necessitate patient's cooperation as they require the use of either extra-oral tractions (Cetlin's technique) or intermaxillary Class II elastics (distalizing arch by Wilson, Locasystem, NiTi springs). Esthetics has been a major goal in the creation of new intra-oral appliances to be positioned on the palatal side of the upper arch. Best choices in this regard are the Pendulum, the Distal Jet, the First Class, and the Distalizer according to Veltri. Further, biomechanical considerations concerning the possibility to achieve a bodily movement of maxillary first molars associated with the least amount of anchorage loss in the anterior part of the upper arch have a direct influence in the selection of appliances for molar distalization. While waiting for data regarding anchorage loss for
other intra-oral devices, the literature indicates a significant anchorage loss of about 20-25% for the Jones Jig (Haydar and Uner, 2000) and for the Pendulum (Bussick and McNamara, 2000).

THE NEW DISTALIZER

The new appliance for molar distalization that we present here originates from a former idea by Dr. Nicola Veltri (Veltri, 1999) with our subsequent personal modifications. This is the reason why we will refer to the appliance with the generic name of “New Distalizer”. The appliance consists of a palatal sagittal screw for bilateral molar distalization according to Veltri (Leone A0629-08 or Leone A0629-11) which is connected to bands on maxillary first molars and on maxillary second premolars (or maxillary second deciduous molars). Auxiliary device for anchorage is represented by a Nance button which is soldered to the body of the screw (fig. 1).

As for the clinical management of the appliance, the screw is activated by means of a customized key (fig. 2) at the rate of two quarters of a turn every week (e.g., one quarter of a turn every Tuesday and another quarter of a turn every Friday). If we consider that every quarter of a turn corresponds to an activation of the appliance of 0.2 mm, the amount of molar distalization in one month is about 1.5 mm. The correction of a full Class II molar relationship (about 5 mm) requires an average 3-month-and-a-half period of active therapy. At the end of the active phase of therapy, the appliance is removed, the screw may be blocked, and the arms connecting the screw to the bands on the second premolars are cut off. The appliance, which now consists of the screw, the Nance button and the molar bands, is cemented once again as a retention appliance.

In presence of mesial rotation of the maxillary first molars it is recommended to correct this anomaly by means of a transpalatal arch before molar distalization.

The advantages of the New Distalizer with respect to other intra-oral devices for molar distalization include:

1) From a biomechanical point of view, the New Distalizer is able to induce a bodily movement of the maxillary first molars. The point of force application is situated at the level of the body of the screw, due to the extreme rigidity of the system comprising the screw, the connecting arms, and the bands. Therefore, the force vector passes through the center of resistance of maxillary first molars (fig. 3).

2) The activation of the appliance is very easy for the patient due to the use of the customized key (fig. 2).

3) Esthetics is warranted by the palatal location of the appliance.

4) The laboratory cost for the appliance is lower when compared to other palatal devices for molar distalization.

5) The clinical management of the appliance is extremely simplified by the fact that, at the end of the active period of
therapy, the appliance can be transformed directly into a retention appliance during a single appointment, without any other additional laboratory phases.

6) The evaluation of a few clinical cases treated with the New Distalizer suggest that the amount of anchorage loss in the anterior part of the upper arch is smaller than in cases treated with either the Jones Jig or the Pendulum.

**CLINICAL CASE**

The clinical effects of the New Distalizer are better illustrated when we describe the dento-skeletal modifications that occurred in a young patient.

M.B., 12 years old, presents with the following features before treatment:

- Class I molar relationship on the right side and end-to-end molar relationship on the left side.
- Tooth-size/Arch-size discrepancy with crowding, especially at the upper arch (upper canines are blocked out of occlusion).
- Skeletal retrusion of both the maxilla and the mandible (fig. 4).
- Normal vertical relationships (fig. 4).
- Flat facial profile (fig. 4).

Due to unfavorable characteristics of both skeletal sagittal relationships and facial profile, treatment of tooth-size/arch-size discrepancy with extractions appeared contraindicated. Treatment plan, therefore, included molar distalization at the upper arch by means of the New Distalizer.

After application of elastic separators for three days, bands are adapted to maxillary first molars and second premolars. The appliance is then cemented at the upper arch (fig. 5a, b, c). Once obtained a molar distalization of about 4.5 mm (after 3 months from start of therapy, i.e. 24 activations of the screw), the appliance is removed, the arms and bands connected to the second premolars are cut off, and the appliance is cemented again as a retention appliance. The retention appliance then consists of the bands on the maxillary first
molars, the corresponding arms, the palatal screw, and the Nance button for anchorage (fig. 6a, b, c). Radiographic examination shows the bodily distalization of the maxillary first molars, with normal appearance of both the alveolar bone and the periodontal ligament of both molars and second premolars (fig. 7a, b).

A superimposition evaluation of patient’s cephalometric tracings (according to the structural method by Björk and Skieller) before and after active phase of therapy with the distalizer reveals the amount of distal movement of maxillary first molars and of anchorage loss measured as mesial movement of the maxillary incisors (fig. 8).

The superimposition shows a net distalization of maxillary first molars of 4.3 mm and 4.1 mm when measured at the mesial cusp and at the mesial apex respectively. The minimal
difference between these two measurements indicates that a bodily dental movement has occurred with a minimal amount of distal tipping. The amount of anchorage loss as measured as mesial movement of the maxillary incisors at the end of the active phase of molar distalization is approximately zero. After about two months, premolars spontaneously migrate posteriorly due to the traction exerted by transeptal fibers (fig. 9a, b, c). The left maxillary canine accommodates in the upper arch. The patient is now ready for final therapeutical strategies to gain further space in the upper arch (stripping and proclination of maxillary incisors) in order to also accom-

modate the right maxillary canine in the arch. The occlusion will ultimately be finished by means of fixed appliance therapy.

Fig. 9a, b, c - M. B., intraoral views after spontaneous posterior drifting of premolars

Fig. 9b

Fig. 9c

REFERENCES


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