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Unilateral K-Loop Assisted Molar Distalization In Mesially Drifted Molar: A Case Report

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ABSTRACT

With the recent trend toward more non extraction treatment, several appliances have been advocated to distalize molars in the upper arch. This case report describes the designing, fabrication, and successful use of K-loop appliance in a case with moderate crowding, unilateral end-on molar, with good facial profile. K-loop molar distalization appliance requires minimal patient cooperation, produces bodily movement of molars with minimal tipping/rotation, and prevents anchorage loss of the anterior teeth.

Key Words: K-Loop, Molar, Distalization

INTRODUCTION

Since current trends in orthodontics have shifted towards non-extraction therapy, molar distalization mechanics and treatment modalities have become increasingly popular several appliances have been advocated to distalize molars in the upper arch. Two areas of particular concern are molar tipping and anterior movement of the anchorage teeth. If the first molar is tipped back rather than moved bodily, it will not only pose occlusal problems, but may not provide sufficient anchorage for distalizing the teeth anterior to it.

Common instance of space requirement is to relieve crowding or aligning of impacted tooth. Indication for molar distalization is the presence of good soft tissue profile, mildto- moderate space requirement (borderline case). The side effects of these appliances are the mild proclination of the anterior teeth and the opening up of the mandibular plane angle. Protrusion of anterior can be counteracted by using class-II elastics.[1] Therefore case selection according to growth pattern (horizontal/vertical grower) is very important before we use these appliances. Although there are many intraoral appliances available to move molars distally, controlling molar movement in all three directions is a difficult task.[2-6]

In 1995 Varun Kalra introduced “K-Loop” appliance for molar distalization in Class II malocclusion, which he claimed to have been developed in accordance to certain biomechanical principles as out lined by Charles Burstone and has the ability to move the maxillary molars distally with total bodily control which is of great clinical significance.[7]

The K-loop Molar Distalizing appliance has these advantages:

- Simple yet efficient
- Controls the moment-to-force ratio to produce bodily movement, controlled tipping, or uncontrolled tipped as desired
- Easy to fabricate and place
- Hygienic and comfortable for the patient
- Requires minimal patient co-operation
- Low cost

CASE REPORT

A 17-year-old female reported to the Orthodontic Department with a chief complaint of irregularly placed upper and lower front teeth. She had Class II division 1 subdivision left malocclusion with 4mm crowding in the maxillary arch and 3mm in the mandibular arch. The maxillary left canine was blocked out. Overjet was 3 mm and overbite was 2.5 mm [Figure1 A and B]. Cephalometric analysis revealed skeletal Class I maxillomandibular relation (ANB = 4°) (ANB angle is the difference between SNA and SNB angles given by Steiner which indicates the sagittal skeletal relationship between the maxilla and mandible), average growth pattern (Frankfort Mandibular plane Angle = 24°) with upright upper incisors (upper incisor to SN plane = 104°) and a distance of 16 mm from pterygoid vertical.

A) **(B)**

Figure 1: pretreatment intra-oral photographs of patients

Treatment objectives

To relieve the crowding in the maxillary and mandibular arches and achieve Class
I molar relationship on left, while maintaining a pleasing soft tissue profile, a non extraction orthodontic treatment protocol was planned by molar distalization in the maxillary arch and interproximal reduction in the mandibular arch. To obtain bodily movement of the molars without any reciprocal flaring of maxillary incisor, a K loop appliance was designed for the distalization of molar.

Appliance design

K-Ioop made of .017" x .025" TMA wire, with each loop 8mm long and 1.5mm wide. Legs of appliance bent down 20° and inserted into the molar tube and the premolar bracket. The wire is marked at the mesial of the molar tube and the mesial of the premolar bracket. Stops are bent into the wire 1mm distal to the distal mark and 1mm mesial to the mesial mark . Each stop should be well defined and about 1.5mm long. These bends help keep the appliance away from the mucobuccal fold, allowing a 2mm activation of the K-loop. The 20° bends in the appliance legs produce moments that counteract the tipping moments created by the force of the appliance, and these moments are reinforced by the moment of activation as the loop is squeezed into place. Thus, the molar undergoes a translatory movement instead of tipping. Root movement continues even after the force has dissipated.

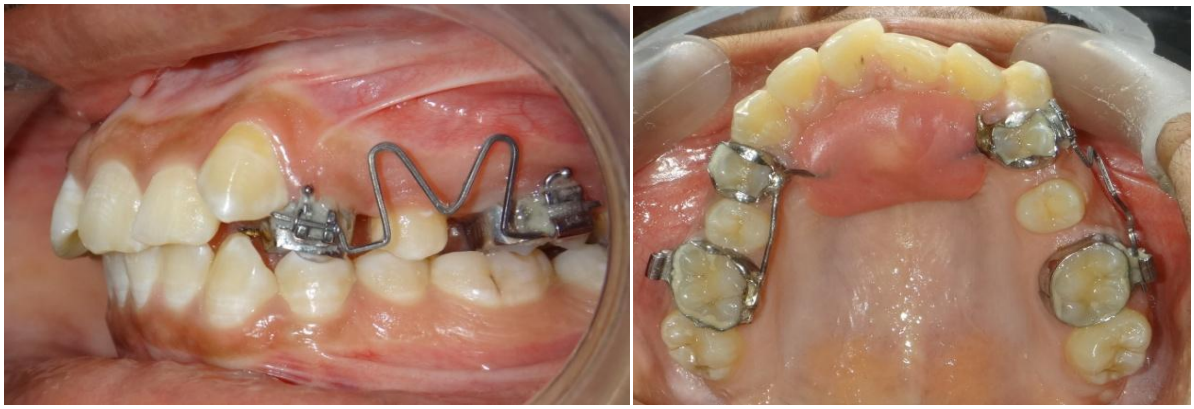
The palatal Nance button, held in place by wires extending from bands on the first premolars or first deciduous molars, is primarily responsible for preventing anterior movement of the first premolars. The button should be large enough to provide adequate anchorage and prevent tissue impingement, but should be kept away from the teeth. The acrylic should not be built up so that the button acts as a bite plane. Like the molar, the premolar experiences a translator rather than a tipping force, which adds further resistance to anterior movement. Experience has shown that the premolars move forward about 1mm during 4mm of molar distalization.

Treatment progress

The K-loops were activated to produce a combined force of 200 g. After insertion of the appliance, both the K-loops were activated by 1.5 mm every 6 weeks until a class I molar relation was obtained [Figure 2 and figure 3]. The total time period required for distalization was 3 months.

A B

Figure 2: k-loop appliance after activation in progress at 2nd month



A B

Figure 3: k-loop appliance after activation in progress at 3rd month

A B

Figure 4: intraoral photographs after space gaining and consolidation.

The post-distalization intraoral photographs following stabilization of the molars, both maxillary and mandibular arches were bonded. Alignment, levelling and finishing was completed in 12 months (figure 4).

Thus, the treatment objectives were achieved with distalization of molars, resolution of crowding, and alignment of arches, maintaining a harmonious facial Profile. The teeth were well-aligned and good intercuspation with Class I occlusion and proper overjet and overbite. The superimposition of pretreatment, postdistalization, and posttreatment showed bodily

movement of molar with no reciprocal flaring of maxillary incisors. The incisal proclination and position showed insignificant changes after molar distalization.

CONCLUSION

This case report describes the designing, fabrication, and successful use of K-loop appliance in a case with moderate crowding, bilateral Class II molar, with good facial profile. The amount of distalization achieved by this appliance was 3.5 mm with only 1° distal tipping. K-loop molar distalization appliance requires minimal patient cooperation, produces bodily movement of molars with minimal tipping/rotation, and prevents anchorage loss of the anterior teeth. Hence, this K-loop distalization appliance is an effective modality to control molar in all three planes of space.

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