

Modified K-Loop Molar Distalization Archwire for Arch Development

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ABSTRACT

Molar distalization is a non-extraction modality in gaining space to alleviate crowding in the dental units. It is also a widely used modality in Class II correction. Several techniques and appliances have been designed for this purpose. In this article a new loop configuration is proposed which can be fabricated on a continuous archwire alongwith a case report of a 14 year old whose malocclusion was managed with it. The Modified K-Loop Molar Distalization Archwire was found to effective and comfortable for the patient. There was no requirement of additional palatal hardware or miniscrews.

Keywords: Class II correction, Clinical biomechanics, Molar distalization, TMA.

INTRODUCTION

Tooth size arch length discrepancy (TSALD) refers to a malocclusion requiring orthodontic treatment wherein the tooth size and arch length of an individual are not matched. In cases where the tooth size is greater than the arch length, the orthodontist is required to create space to achieve alignment of the dental units, retraction of proclined teeth, levelling of curve of Spee, etc. Several methods of gaining space like arch expansion, tooth extractions, reduction of tooth width, proclination of teeth, uprighting of tilted teeth, de-rotation of posterior (buccal) teeth and molar distalization have been advocated. Each method has its indications and contra-indications

Molar distalization increases the arch length, by distal driving posterior teeth. Molar distalization has been found to be clinically reliable and effective in growing patients with good facial balance and jaw relationship, but with minimum to moderate crowding having hypo to normo divergent growth pattern.¹ It is a non-extraction modality extensively used in the correction of a Class II molar relationship. Various types of techniques and devices have been developed for molar distalization like cervical pull headgears, magnets, pendulum appliance, nickel titanium archwires, Greenfield distalizer, Jones jig, distal jet appliance, mini-implant supported distalization.²⁻¹⁰ While some of these appliances require patient compliance, the others require the addition of extensive hardware on the palate making it cumbersome for the patient.

Kalra V in 1995 introduced "K-Loop" appliance for molar distalization in Class II malocclusion,¹¹ which he claimed to have been developed in accordance to the 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. This spring utilized segmental mechanics but required the placement of Nance palatal button to negate the ill-effects of the spring on the non-reactive units (in this case the premolars).

The Modified K-Loop Molar Distalization Archwire (MKLMD Archwire)

The MKLM Archwire can be fabricated on a 0.017 x 0.025 inches or 0.019 x 0.025 inches TMA alloy archwire for use in a 0.018 inch or 0.022 inch bracket slot. The wire configuration consists of a bent-in stop mesial to the molar tube on the first molar, followed by a K loop of dimensions 7 mm (the two loops comprising of the K loop are at an angle of 45 degrees to each other) and another vertical stop mesial to the K loop (Figure 1). A similar K loop can be added on the opposite end of the archwire if molar distalization is required there, else a mesial stop can be formed if it is desired to keep the molar stationary. Two loops akin to the MEAW archwire are added distal to the lateral incisors on both sides. Additional lingual crown torque is added in the anterior segment of the archwire to prevent proclination of the anterior teeth.

Rationale of the MKLMD Archwire

In this article the authors would like to propose a modified Kalra's K loop molar distalization spring incorporated on a continuous archwire negating the use of a Nance palatal button and being amenable to continuous archwire mechanics thus circumventing a stage of segmental mechanics thereby reducing active treatment time.

CASE REPORT

A 14 year old girl presented with a chief complaint of a highly placed tooth in her upper jaw and crooked lower front teeth. She had no past medical or dental contributory factors.

Pre-Treatment Evaluation: Her clinical examination revealed a mesocephalic shape of head and mesoprosopic shape of face with a straight profile (Figure 2A, 2B). She exhibited good facial balance with an acceptable soft tissue configuration. On intraoral examination the presence of over-retained tooth number(s) 55 and 65, with a blocked out highly placed 13. The maxillary midline was also shifted to the right due to the displacement of tooth number 13. There was 4 mm crowding in the lower anterior dental segment. She had an end-on molar relationship on the right side and Class I molar relationship on the left (Figure 3A, 3B, 3C).

The same was collaborated on reading the orthopantomogram it also revealed the presence of tooth number 15, 17, 25, 27, 37, 47 and developing third molars in all four quadrants (Figure 3D).

In keeping mind her normodivergent growth pattern, straight profile, the future availability of E space in the maxillary arch and space requirements, it was decided to follow a non-extraction treatment modality.

A 0.018 x 0.025 in slot Pre Adjusted Edgewise (PAE) appliance of the MBT prescription was chosen. After initial alignment and levelling in the maxillary arch, the MKLMD archwire was placed (Figure 4A, 4B, 4C). In addition 3.5 oz elastics were also given to be worn in a Class II manner on both sides. On an eight week review after placement of the MKLMD archwire it was noted that tooth number 16 was distalized and space was created for guided eruption of tooth number 13. An inverted cuspid PAE bracket was then bonded over 13 and guided eruption was carried out using 0.012 Nickel Titanium archwire piggybacked on a 0.018 stainless steel base archwire to negate vertical side-effects. After finishing and detailing the occlusion the fixed appliance was removed.

Post-treatment evaluation: There was good facial balance at the end of treatment, with matched skeletal bases (Figure 5A, 5B). The dental midline matched the facial midline. The post-treatment smile was consonant (Figure 5C). Intraorally, Class I molar and canine relationship was achieved on both sides. The upper and lower midlines were also matched. The dental units were in a harmonious relationship with adjacent and opposite teeth. (Figure 6A, 6B, 6C). The post treatment orthopantomogram also revealed well positioned teeth with necessary divergence between the roots and no apical pathology was seen (Figure 6D).

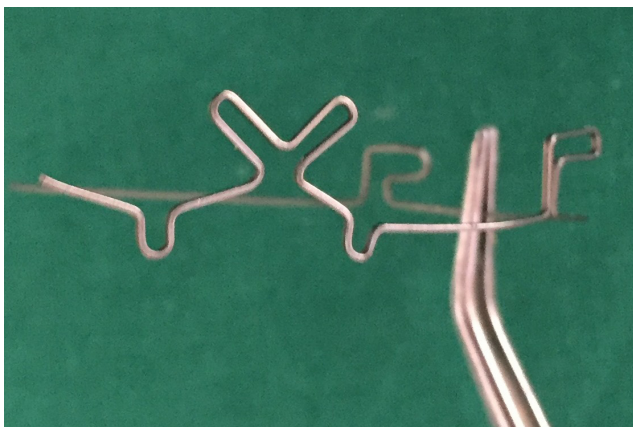


Figure 1: The MKLMD archwire



Figure 2A:
Pre-Treatment Extraroral
View: Frontal at Rest



Figure 2B:
Pre-Treatment Extraroral
View: Profile



Figure 3A: Pre-Treatment Intraoral View: Frontal



Figure 3B: Pre-Treatment Intraoral View: Left Buccal View



Figure 3C: Pre-Treatment Intraoral View: Right Buccal View

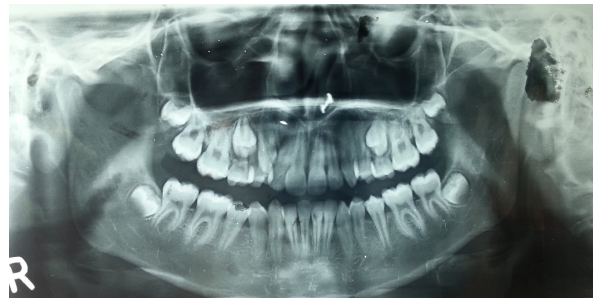


Figure 3D: Pre-Treatment Orthopantomogram



Figure 4A: MKLMD Archwire Placement: Frontal



Figure 4B: MKLMD Archwire Placement: Left Buccal View

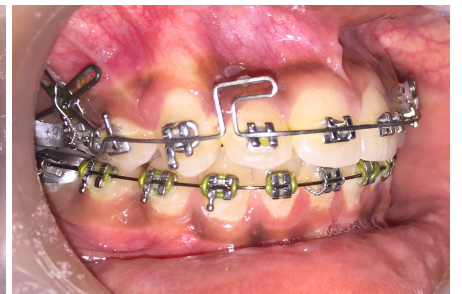


Figure 4C: MKLMD Archwire Placement: Right Buccal View



Figure 5A: Post-Treatment Extraroral View: Frontal at Rest



Figure 5B: Post-Treatment Extraroral View: Profile



Figure 5C: Post-Treatment Extraroral View: Frontal Smiling



Figure 6A: Post-Treatment Intraoral View: Frontal



Figure 6B: Post-Treatment Intraoral View: Left Buccal View



Figure 6C: Post-Treatment Intraoral View: Right Buccal View

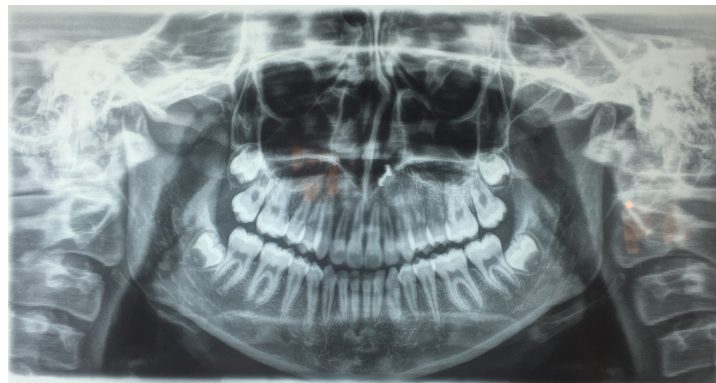


Figure 6D: Post-Treatment Orthopantomogram

CONCLUSION

The MKLMD archwire is a simple yet efficient appliance incorporating the advantages of segmental spring configuration on a continuous archwire. The moment to force ratio can also be controlled to help in achieving bodily movement, it is easy to fabricate and place and is independent of patient compliance.

In addition it does not require the presence of any additional hardware on the palatal aspect or invasive procedures to install miniscrews. This makes the MKLMD appliance comfortable for the patient. Addition of lingual crown torque in the anterior segment of the archwire is strongly recommended.

OJN

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