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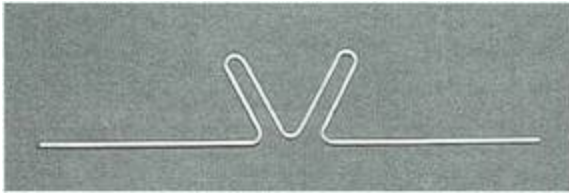
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## The K-Loop Molar Distalizing Appliance

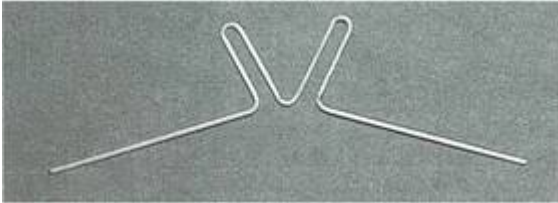
With the recent trend toward more non extraction treatment, several appliances have been advocated to distalize molars in the upper arch. Certain principles, as outlined by Burstone, must be borne in mind when designing such an appliance:

- Magnitude of forces
- Magnitude of moments
- Moment-to-force ratio
- Constancy of forces and moments
- Bracket friction (frictionless appliances are generally more predictable and efficient)
- Ease of use
- Cost

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.



**Fig.1 K-loop made of .017" x .025" TMA wire, with each loop 8mm long and 1.5mm wide.**



**Fig.2 Legs of appliance bent down 20°**

Current molar distalizing appliances do not allow effective control and manipulation of the moment-to-force ratio. By altering this ratio, the clinician can achieve bodily movement, controlled tipping, or uncontrolled tipping, as the individual case dictates. In addition, by varying the magnitude of moments between the molar and first premolar, one can produce an intrusive or extrusive force on the molar.

This article describes an appliance I developed for Class II treatment in accordance with the principles listed above.

### **K-Loop Molar Distalizer**

The appliance consists of a K-loop to provide the forces and moments and a Nance button to resist anchorage. The K-loop is made of .017" x .025" TMA wire, which can be activated twice as much as stainless steel before it undergoes permanent deformation. A loop made of TMA also produces less than half the force of one made with stainless steel.

Each loop of the K should be 8mm long and 1.5mm wide (Fig. 1). The legs of the K are bent down 20° (Fig. 2) 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 (Fig. 3).



**Fig. 3 Wire marked at mesial of molar tube and distal of premolar bracket.**



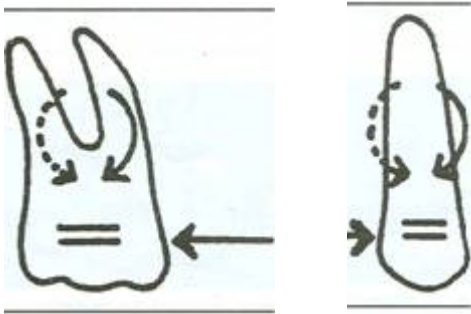
**Fig. 4 Bends placed 1 mm mesial to mesial mark and 1 mm distal to distal mark.**

Stops are bent into the wire 1mm distal to the distal mark and 1mm mesial to the mesial mark (Fig. 4). 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 (Fig. 5).

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 (Fig.6). Root movement continues even after the force has dissipated. If an extrusive or intrusive force against the molar is not desired, it is important to centre the K-loop between the first molar and the premolar.

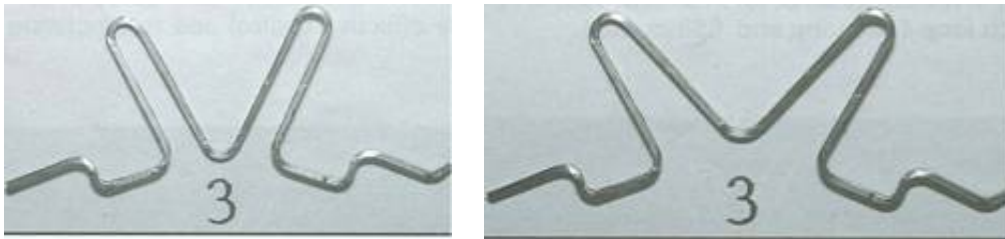


**Fig. 5 K-loop in place with 2mm activation.**



**Fig.6 Moments and forces produced by K-loop.**

For additional molar movement, the appliance is reactivated 2mm after six to eight weeks. The loop is easy to remove from the molar tube, since the distal end of the wire is not bent. If the appliance is opened in the proper sequence, the reactivation will maintain the original mechanics (Fig. 7). In most cases, one reactivation, producing a total of as much as 4mm of distal molar movement, is sufficient (Fig. 8).



**Fig. 7 A. Reactivation sequence: open loop 1 mm at (1); open loop 1 mm at (2); open at (3) to regain 20° bend of mesial and distal legs. B. After 2mm reactivation.**

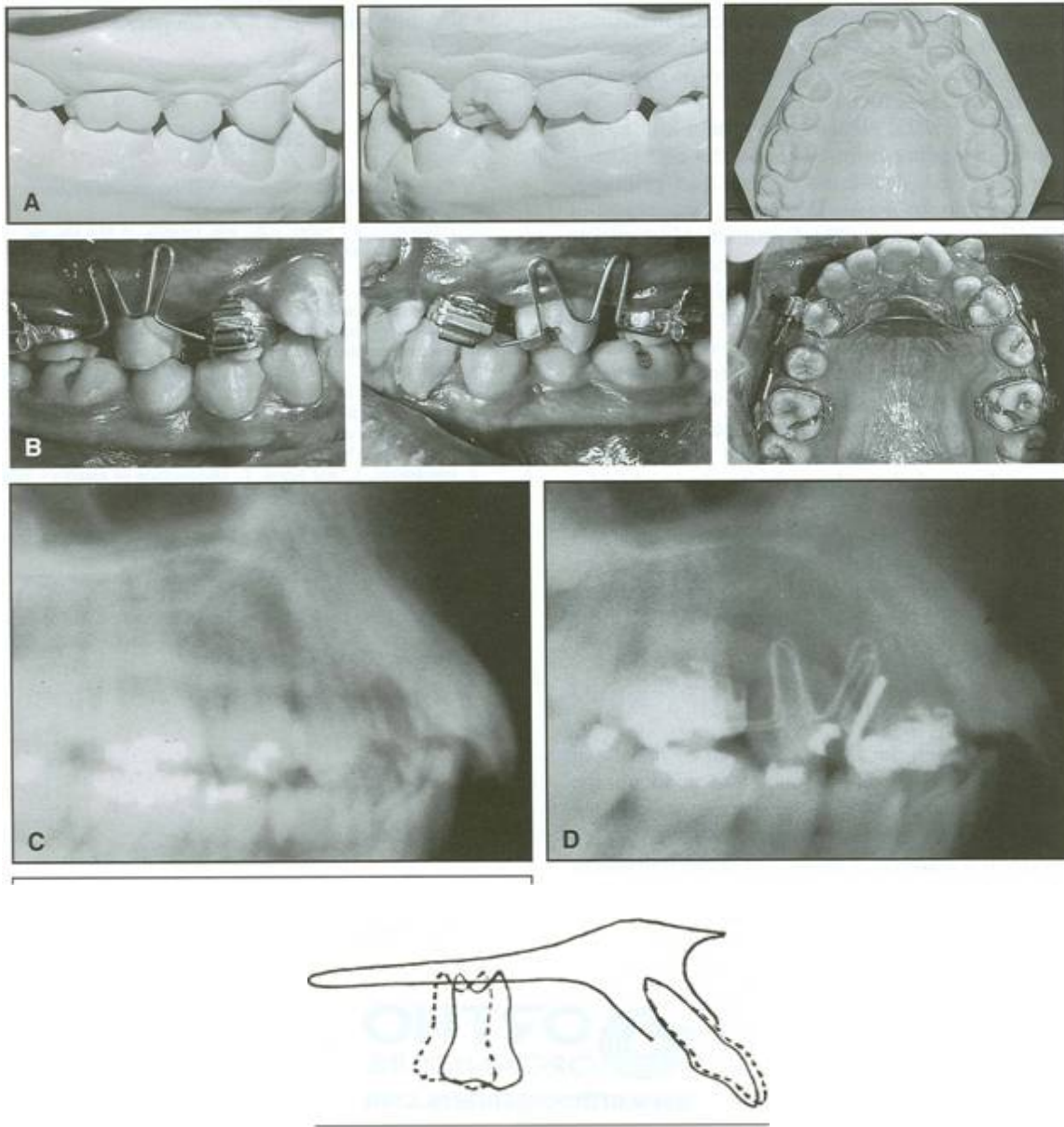


Fig. 8 A,C. Patient before treatment. B,D. After four months of treatment with K-loop appliance (premolar brackets have headgear tubes, but headgear was not needed for reinforcing anchorage in this case). E. Maxillary superimposition (dashed line = after distalization). Note about 4mm distal displacement of molar, including some tipping, and about 1 mm increase in overjet.

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 translatory 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. This amount of anchorage loss is similar to that reported with magnets or nickel titanium coil springs. If necessary, anchorage can be reinforced by attaching a straight-pull or high-pull headgear with a force of 150g to the premolars (Fig. 8).

## **DISCUSSION**

Although the first molars can be distalized with the K-loop without much loss of anchorage even after the eruption of the second molars, they are easier to move before the second molars erupt. If a significant amount of distal movement is required in a young patient, one might even consider extracting the second molars. Assuming the third molars are of good size and shape<sup>9</sup> and the second molars are extracted in time, the third molars will drift and erupt into proper occlusion.

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

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