READER'S FORUM

Su-Jung Mah, Ji-Eun Kim, Eun Jin Ahn, Jong-Hyun Nam, Ji-Young Kim, Yoon-Goo Kang

Analysis of midpalatal miniscrew-assisted maxillary molar distalization patterns with simultaneous use of fixed appliances: A preliminary study.

- *Korean J Orthod* 2016;46:55-61.

I would like to appreciate authors presenting excellent biomechanical options for distalizing maxillary molars utilizing palatal miniscrews. After reading the article, I have several clinical questions as follows:

Q1. Will it work adjusting the horizontal arm of pendulum inserted into the lingual sheath to control distal tipping of the molar?

Q2. To distalize the posterior teeth effectively, how much force do you recommend on the lingual arch type appliance?

Q3. To distalize maxillary molars in a planned direction using lingual arch type appliance, authors described that vertical length of the miniscrew connected wire arm can be adjusted. Please describe in detail how authors determine the length.

Questioned by

Cheol-Hyun Moon

Department of Dentistry, Gachon University Gil Medical Center, Incheon, Korea

Thank you for asking critical biomechanical points of the pendulum arm system.

A1. As Byloff et al.¹ suggested in their article, a conventional pendulum appliance can control molar root tipping by putting uprighting bend in the distalizing arm of the pendulum appliance. Of course we suppose the same biomechanical principle can be applied to the system we presented. However, our system uses single stranded 0.215 × 0.250 inches stainless steel wire unlike conventional pendulum arm which uses double folded 0.9 mm titanium-molybdenum alloy (TMA) wire and that difference results in more play of the wire in the lingual sheath slot. Therefore we can anticipate uprighting bend given on the single stranded 0.215 × 0.250 inches sized stainless steel wire may not be effective. More uprighting bend should be given to apply effective molar root uprighting moment or multiple fold of the wire can be an another option.

A2. Since the optimal amount of force for distalizing maxillary molars was not clearly defined, it is hard to recommend force level for maxillary molar distalization. According to authors' personal clinical experiences, maxillary molar distalization requires heavy force. We apply both nickel-titanium (NiTi) heavy coil springs and elastomeric chains simultaneously to give approximately 150–200 mg force per each side. For better understanding, Wong et al.² used 250 mg of distalizing force in the pendulum appliance.

A3. There are several opinions on the determination of the center of resistance for maxillary molars, but in most instances it is believed that the center of resistance is located somewhere near the furcation area. The center

of rotation changes according to the force level relative to the position of center of resistance: rotation occurs while force direction is off the center of resistance.³ We always take a lateral cephalogram after delivery of a lingual arch type appliance to roughly evaluate the relation of the force direction to the center of resistance: if it passes directly to the center of resistance, bodily movement is expected as shown in the result of our article.

Replied by

Yoon-Goo Kang

Department of Orthodontics, College of Dentistry, Kyung Hee University, Seoul, Korea

References

1. Byloff FK, Darendeliler MA, Clar E, Darendeliler A. Distal molar movement using the pendulum appliance. Part 2: The effects of maxillary molar root uprighting bends. *Angle Orthod* 1997;67:261-70.
2. Wong AM, Rabie AB, Hägg U. The use of pendulum appliance in the treatment of Class II malocclusion. *Br Dent J* 1999;187:367-70.
3. Worms FW, Isaacson RJ, Speidel TM. A concept and classification of centers of rotation and extraoral force systems. *Angle Orthod* 1973;43:384-401.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.