



Case Report: Temporary Anchorage Devices and Molar Uprighting

by Dr. Jack C. Fisher, Jay B. Burton & Anne Marie Ross

Learning Objectives:

After reading this article you should:

- Understand the mechanics necessary to upright molars using Temporary Anchorage Devices (TADs).
- Understand the potential consequences of not uprighting molars.
- Be able to describe the reasoning for placement of TADs for the purpose of molar uprighting.
- Be able to locate the area of TAD placement for uprighting purposes.
- Describe why you cinch the wire after the molar has been dislodged from the tooth mesial to it.
- Describe the treatment plan presented in this case.

Traditionally, multiple appliances have been required to upright mandibular molars. All these appliances and methods have numerous side effects, with a major one being the unwanted movement of the tooth, or segment, to which the appliance is anchored. This movement usually occurs in a variety of ways: rotation of the tooth in the arch, uprighting the crown (tipping distally) leading to hyperocclusion, creation of unwanted space mesial to the first molar that later must be closed, and intrusion with buccal tipping of the anchored segment caused by the uprighting spring.¹ If the patient is not treated, dental caries, periodontal disease and root resorption might occur.² Conventional treatment can be expensive for the patient and time consuming for the practitioner. This case report describes an easy method of uprighting second molars that incorporates temporary anchorage devices and simple mechanics.

case report

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Diagnosis and Treatment

A 16-year-old male presented with unerupted maxillary third molars and congenitally missing mandibular third molars. The patient was referred because of an impacted lower right second molar that was partially erupted and locked beneath the crown of the lower right first molar (Figs. 1 & 2).

The treatment plan in this case consists of placement of a TAD between the lower right second premolar and lower right first molar, along with placement of a bracket on the lower right second molar. An uprighting spring was bent into the segment using 0.019x0.025-inch GAC Resolve wire and activated at an apical angle of approximately 45 degrees, providing 125 grams of force (Fig. 3). The segment is measured from the helical coil to the TAD with a hook bent apically just mesial to the TAD. The spring is then inserted into the buccal tube of the bracket and activated by lifting and resting the lever arm on the TAD. In this case, the wire extending through the buccal tube on the bracket was not cinched down; this allows the crown to dislodge. At a subsequent appointment, when it was noted that the crown had unlocked from the first molar, the wire was cinched down just distal to the buccal bracket on the second molar.

Cinching down the wire prevents further distalization of the second molar during the uprighting phase of treatment by creating a moment. This is an important feature of the mechanics used in this case. The moment uprights not only the crown, but causes rotation of the roots mesially. The mechanics used, prevent the opening of unwanted space between the first and second molars often created with traditional mechanics.

The patient was seen on a follow-up basis every six weeks (Fig. 4). During these visits, the wire was reactivated using three-prong pliers. The approximate time of completion using the mechanics presented in this case was six months. This method of treatment allows for movement of the tooth in the least invasive and most effective manner.

Treatment Results

After approximately three activations of the 0.019x0.025-inch Resolve wire, the molar roots had uprighted in proper alignment, as did the crown (Figs. 5 & 6). The patient was then informed that a more optimal position could be attained by bracketing the lower arch to get the molar into proper occlusion. However, the patient was satisfied with the result achieved and declined further treatment.

Discussion

The patient was treated with simplified mechanics using only one bracket, one TAD and one wire. Compared to the technique of bracketing the buccal segment of the side of the impacted molar, the use of skeletal anchorage with the mechanics presented provide for no unwanted movement of adjacent teeth. The practitioner was concerned about the possibility of the molar being super-erupted; however, this was not found to be a problem. It should be noted that using these mechanics prevented space from being created between the first and second molar, thereby negating the time spent closing additional space created during treatment.



Fig. 1: Pre-treatment panoramic image



Fig. 2: Pre-treatment photograph



Fig. 3: Molar uprighting spring. Prior to TAD placement and tissue removal, the area was infiltrated with local anesthesia. Notice that the tissue around the lower right second molar was removed using a diode laser.



Fig. 4: Molar uprighting spring during treatment reactivated with three-prong plier



Fig. 5: Post-treatment panoramic image



Fig. 6: Post-treatment photograph

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"If the patient is not treated, dental caries, periodontal disease and root resorption might occur.² Conventional treatment can be expensive for the patient and time consuming for the practitioner."

One possible unwanted effect is that the second molar might have a tendency to tip buccally due to the moment created on the bracket. This is due to the lever arm, which is placed away from the center of rotation. Though this is a valid concern with the applied mechanics, no significant tipping was observed.

Retromolar TAD placement is another option for uprighting lower second molars; however, there are some challenges associated with this type of placement.¹ Such challenges include:

- 1) Creation of space between the first and second molars that will later need to be closed by tipping the crown. With this type of force application, the clinician is not able to create a moment.
- 2) TADs placed in the retromolar area are at risk of possible occluding forces from the opposing arch. To avoid the occlusion on the TAD, it might be necessary to place it more distally, which decreases its mechanical use in uprighting the second molar.
- 3) Tissue thickness can become a problem. In order to fully seat the TAD in this area, it is often necessary to place the TAD subgingivally. Even when tissue thickness isn't a problem initially, there is the possibility that tissue might grow over the TAD during treatment. Therefore, it is often necessary to attach an accessory, such as a steel ligature, that will remain accessible at follow-up visits. At time of removal it might be necessary to remove the overgrowth of tissue to remove the device.
- 4) Anatomically, placement in the retromolar area can be problematic due to the course of the long buccal and lingual nerves. Although the chances of damaging one of these nerves would be slim, it is possible.

For these reasons, placement of the TAD between the second premolar and first molar is recommended. Mechanically, this area allows for the movement of the root in a mesial direction, thereby uprighting the molar. ■

References:

1. Lee, K.J.; Park, Y.C.; Hwang, W.S.; and Seong, E.H.: Uprighting mandibular second molars with direct miniscrew anchorage. *J. Clin. Orthod.* Vol. 41:627-635, 2007
2. Sawicka, M.; Racka-Pilszak, B.; and Rosnowska-Mazurkiewicz, A.: Uprighting partially impacted permanent second molars, *Angle Orthod.* 77:148-154, 2007.

Author Bios

Jay Burton is a graduate of Bethel University with a degree in Business, and a graduate of the University of Tennessee, Martin, with a Master of Business Administration. He will graduate in May of 2011, from the University of Louisville School of Dentistry. He is from McKenzie, Tennessee.

Dr. Jack Fisher graduated from University of Louisville School of Dentistry in 1979. He completed his residency through Medical College of Georgia in 1982 with a certificate of orthodontics and concentrations in TMD disorders, distraction osteogenesis, surgical treatment of orthodontic patients and temporary orthodontic anchorage devices. He currently works in private practice in Memphis, Tennessee, and is an adjunct professor at University of Louisville and New York University, both in their departments of orthodontics. Fisher has published five articles on the subject of orthodontic mini implants.

Anne Marie Ross is a 2006 graduate of the University of Kentucky, with a degree in Biology. She will graduate in May of 2011 from the University of Louisville School of Dentistry. She is from Glasgow, Kentucky.

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1. When uprighting a second molar, the mechanics discussed in the article are applied in order to avoid all of the following *except*:
 - a. rotation of the tooth in the arch.
 - b. uprighting the crown (tipping distally) leading to hyperocclusion.
 - c. creation of unwanted space mesial to the first molar that later must be closed.
 - d. intrusion with buccal tipping of the anchored segment caused by the uprighting spring.
 - e. extrusion of the second molar.
2. This case report describes:
 - a. a complicated method of uprighting second molars that incorporates temporary anchorage devices (TADs) and simple mechanics.
 - b. an easy method of uprighting second molars that incorporates temporary anchorage devices (TADs) and simple mechanics.
 - c. a complicated method of uprighting first molars that incorporates temporary anchorage devices (TADs) and simple mechanics.
 - d. an easy method of uprighting first molars that incorporates temporary anchorage devices (TADs) and simple mechanics.
3. If the patient is not treated, all of the following might occur *except*:
 - a. dental caries.
 - b. periodontal disease.
 - c. super-eruption.
 - d. root resorption.
4. The treatment plan in this case consists of:
 - a. placement of a TAD between the lower right second premolar and lower right first molar.
 - b. placement of a bracket on the lower right second molar.
 - c. A & B
 - d. None of the above
5. In order for the crown to dislodge, the wire extending through the buccal tube on the bracket:
 - a. was cinched down.
 - b. was not cinched down.
 - c. was secured with ligature wire.
 - d. was secured with Class II elastics.
6. Once the crown had unlocked from the first molar, the wire:
 - a. was cinched down just distal to the buccal bracket on the second molar.
 - b. was cinched down just mesial to the buccal bracket on the first molar.
 - c. was cinched down just distal to the buccal bracket on the first molar.
 - d. was cinched down just mesial to the buccal bracket on the second molar.
7. Cinching down the wire:
 - a. allows further distalization of the second molar during the uprighting phase of treatment by creating a moment.
 - b. allows further distalization of the first molar during the translation phase of treatment by creating a moment.
 - c. prevents further distalization of the second molar during the uprighting phase of treatment by creating a moment.
 - d. prevents further distalization of the first molar during the translation phase of treatment by creating a moment.
8. After approximately _____ activations of the 0.019x0.025-inch Resolve wire, the molar roots had uprighted in proper alignment.
 - a. One
 - b. Two
 - c. Three
 - d. Four
 - e. Five
9. One possible unwanted effect is that the second molar might have a tendency to tip buccally due to the movement created on the bracket. This is due to the lever arm, which is placed away from the center of rotation.
 - a. The first statement is true; the second statement is false.
 - b. The first statement is false; the second statement is true.
 - c. Both statements are true.
 - d. Both statements are false.
10. The patient was treated with:
 - a. complex mechanics using only one bracket and one wire.
 - b. complex mechanics using only one bracket, one TAD and one wire.
 - c. simplified mechanics using only one bracket and one wire.
 - d. simplified mechanics using only one bracket, one TAD and one wire.

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