

# Uprighting Mesially Inclined Mandibular Second Molars with a Modified Uprighter Jet

ANTONIO GRACCO, DDS  
LUCA LOMBARDO, DDS  
MAURO COZZANI, DDS, MSCD  
GIUSEPPE SICILIANI, MD, DDS

**P**remature loss of the mandibular second molars and first molars due to caries or periodontal disease can lead to mesioinclination of the second molars. Various orthodontic methods have been used to upright the lower molars for prosthetic rehabilitation,<sup>1-8</sup> but these generally involve molar extrusion and reciprocal movement of the anchorage unit.<sup>9</sup> Conventional flexible alloy or rectangular stainless steel archwires may not be able to control extrusive or lateral movements over such a long edentulous space.<sup>10</sup>

Dental implants have been used in extraction sites as anchorage for molar uprighting.<sup>11</sup> Miniscrews may be more effective, however, because they can be loaded immediately with light, continuous forces from nickel titanium closed-coil springs or elastomeric thread.<sup>9,12,13</sup> In addition, retromolar miniscrew insertion allows the force to be applied distal to the molar's center of resistance, facilitating vertical control during the extrusion phase.<sup>14</sup>

The Uprighter Jet\* developed by Carano and colleagues is an ideal appliance for space management in these cases.<sup>10</sup> Its spring activation provides complete three-dimensional control of molar uprighting; because the center of rotation is locat-

ed at the apex of the root, extrusion is minimized and the occlusal plane is preserved. The absence of brackets is helpful in deep-bite cases. The Uprighter Jet is also simple to insert, requiring no special patient cooperation, and is relatively unobtrusive and comfortable.

This article describes a modified version of the Uprighter Jet that can be used with miniscrew anchorage for molar uprighting in cases with excessive edentulous spacing.

## Appliance Design

Like the Uprighter Jet, our Uprighter Screw consists of a molar band with a welded lingual button that allows crown rotation when a force is applied; an .036" tube positioned parallel to the occlusal plane, below the level of the edentulous ridge; a wire with a bayonet bend on the mesial end, curving back distally from the tube, and a loop on the distal end that is screwed to the molar band; an adjustable screw clamp; and a 150g nickel titanium open-coil spring.

\*Trademark of American Orthodontics, 1714 Cambridge Ave., Sheboygan, WI; www.americanortho.com.

Dr. Gracco is a research assistant, Dr. Lombardo is a resident, Dr. Cozzani is an Adjunct Professor, and Dr. Siciliani is Chairman, Department of Orthodontics, University of Ferrara, Italy. Dr. Cozzani is also in the private practice of orthodontics in La Spezia, Italy. Contact Dr. Gracco at Via E. Scrovegni 2, 35131 Padova, Italy; e-mail: antoniogracco@gmail.com.



Dr. Gracco



Dr. Lombardo



Dr. Cozzani



Dr. Siciliani

Molar uprighting is achieved by applying a light, continuous force with the spring, which is compressed when the clamp is moved distally.<sup>10</sup> The anchorage counteracting the force of the springs is provided not by a lingual arch soldered to the premolar bands, as in the original Uprighter Jet, but by a miniscrew. To fix the miniscrew in place, a malleable steel plate is molded to the alveolar ridge in the edentulous space, pierced with a tungsten ball-nosed cutter to make two 2mm-diameter holes, and encased in transparent resin. This assembly is soldered to one end of the appliance tube.

## Case Report

A 40-year-old female presented for orthodontic treatment in preparation for prosthetic rehabilitation. She had mild anterior crowding, and she was missing the left second premolars, first molars, and third molars in both arches. The man-

dibular second molars were mesially inclined as a result (Fig. 1). Because her deep bite would have interfered with bracket placement in the lower incisor region and the upper anterior segment, we decided to upright the mandibular second molars



Fig. 2 Uprighter Screw on cast of lower arch.



Fig. 1 40-year-old female patient with missing posterior teeth in both arches and mesially inclined lower left second molar before treatment.

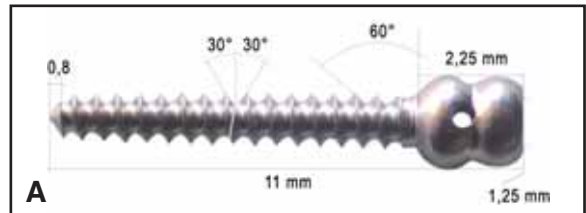


Fig. 3 A. Miniscrew Anchorage System screw. B. Uprighter Screw attached to steel plate in edentulous space and button on first premolar to keep tube parallel to occlusal plane.

to open the bite.

An Uprighter Screw was fabricated as described above to upright the left second molar. After the molar had been banded, we made a cast of the lower arch and sent it to the laboratory with precise instructions on the positioning of the pierced plate (Fig. 2). Once the appliance was placed in the mouth, we tied the mesial end of the tube to a button on the first premolar to keep the tube parallel to the occlusal plane.

A light anesthetic infiltration (mepivacaine hydrochloride 2% with adrenalin 1:100,000; 1.8ml) was administered at the site of miniscrew insertion. A Miniscrew Anchorage System\*\* screw with a length of 11mm, a head height of 2.25mm, and a diameter of .8mm at the tip and 1.25mm at the head was inserted manually through the buccal hole of the steel plate, which provided the most perpendicular positioning of the bayonet and tube (Fig. 3).

A 150g nickel titanium open-coil spring was

immediately activated by moving the clamp distally and compressing the coil spring, and a radiographic evaluation was performed (Fig. 5A). Two months later, after clinical and radiographic examination showed the miniscrew was stable, we reactivated the appliance (Figs. 4A,5B). After an additional three months, clinical and radiographic evaluation demonstrated complete uprighting of the left second molar (Figs. 4B,5C). The inclination of the long axis of the molar relative to the miniscrew was reduced from 46.5° at the start of treatment to 16.2° after five months of treatment.

### Discussion

Uprighting mesially inclined molars can be a complicated orthodontic procedure, with or without the use of skeletal anchorage. In the case shown

\*\*Micerium S.p.a., Via Marconi 83, 16030 Avegno, Genova, Italy; www.micerium.it.

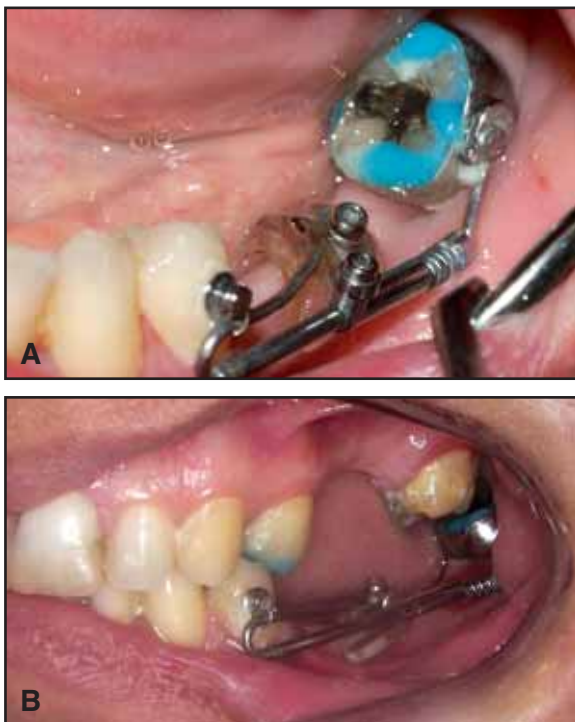


Fig. 4 A. After two months of uprighting. B. After five months of uprighting.

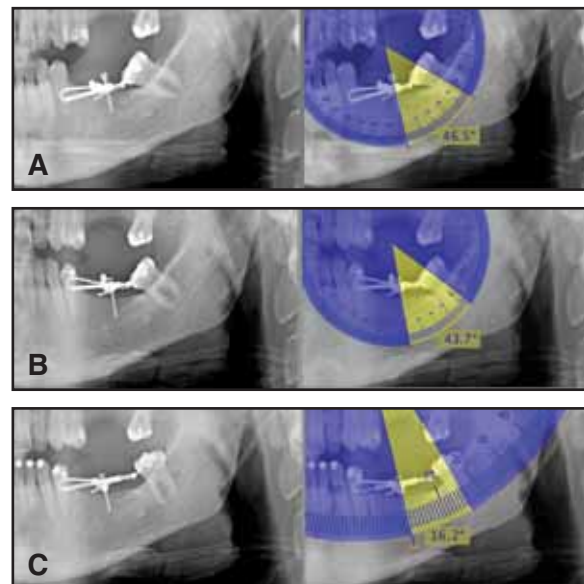


Fig. 5 Radiographs with Uprighter Screw in place. A. At time of appliance insertion, showing 46.5° inclination of second molar's long axis relative to miniscrew. B. After two months of uprighting, showing 43.7° inclination. C. After five months of uprighting, showing 16.2° inclination.

here, an Uprighter Screw achieved molar uprighting in five months using miniscrew anchorage.

This modification of the Uprighter Jet provides excellent control of the occlusal plane while preventing molar extrusion. Because a lingual arch does not need to be banded to the premolars, lower lingual attachments can be placed on either side without interference.

## REFERENCES

1. Eckhart, J.E.: Orthodontic uprighting of horizontally impacted mandibular second molars, *J. Clin. Orthod.* 32:621-624, 1998.
2. Freeman, R.S.: Mandibular second molar problems, *Am. J. Orthod.* 94:19-25, 1988.
3. Park, D.K.: Australian uprighting spring for partially impacted second molars, *J. Clin. Orthod.* 33:404-405, 1999.
4. Santoro, M.; Kim, E.S.; Teredesai, M.; and Karaggiannopoulos, N.: Modified removable transpalatal bar for rapid uprighting of impacted second molars, *J. Clin. Orthod.* 36:496-499, 2002.
5. Shapira, Y.; Borell, G.; Nahlieli, O.; and Kuftinec, M.M.: Uprighting mesially impacted mandibular permanent second molars, *Angle Orthod.* 68:173-178, 1998.
6. Roberts, W.E.; Helm, F.R.; Marshall, K.J.; and Gongloff, R.K.: Rigid endosseous implants for orthodontic and orthopedic anchorage, *Angle Orthod.* 59:247-256, 1989.
7. Tuncay, O.C.; Biggerstaff, R.H.; Cutcliffe, J.C.; and Berkowitz, J.: Molar uprighting with T-loop springs, *J. Am. Dent. Assoc.* 100:863-866, 1980.
8. Weiland, F.J.; Bantleon, H.P.; and Droschl, H.: Molar uprighting with crossed tipback springs, *J. Clin. Orthod.* 26:335-337, 1992.
9. Yun, S.W.; Lim, W.H.; and Chun, Y.C.: Molar control using indirect miniscrew anchorage, *J. Clin. Orthod.* 39:661-664, 2005.
10. Carano, A.; Testa, M.; and Siciliani, G.: The Distal Jet for uprighting lower molars, *J. Clin. Orthod.* 30:707-710, 1996.
11. Shellhart, W.C.; Moawad, M.; and Lake, P.: Case report: Implants as anchorage for molar uprighting and intrusion, *Angle Orthod.* 66:169-172, 1996.
12. Park, H.S.; Kyung, H.M.; and Sung, J.H.: A simple method of molar uprighting with micro-implant anchorage, *J. Clin. Orthod.* 36:592-596, 2002.
13. Maino, B.G.; Bednar, J.; Pagin, P.; and Mura, P.: The Spider Screw for skeletal anchorage, *J. Clin. Orthod.* 37:90-97, 2003.
14. Giaccotti, A.; Arcuri, C.; and Barlattani, A.: Treatment of ectopic mandibular second molar with titanium miniscrews, *Am. J. Orthod.* 126:113-117, 2004.