JCO-Online Copyright 2003 - VOLUME 36 : NUMBER 06 : PAGES (348-353) 2002

# Palatal and Buccal Root Torquing Springs

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This article shows how customized springs can apply local root torque in the palatal or buccal direction to solve specific orthodontic problems.

## Rotated Maxillary First Bicuspids

The twin roots of maxillary first bicuspids have a greater combined width in the buccolingual dimension than in the mesiodistal dimension1 (Fig. 1). When a maxillary bicuspid erupts in a rotated fashion (Fig. 2A), however, the narrower, mesiodistal side of the roots will develop alveolar bone in the mesiodistal direction. Such a rotation could thus reduce the normal deposition of bone,2 to the extent that a depression in the buccal alveolus may be observed (Fig. 2B).

Gingival recession of the maxillary bicuspids is common due to overzealous oral hygiene in this area.3 Furthermore, the maxillary bicuspids are among the most likely teeth to develop clinical attachment loss in cases of chronic adult periodontitis.4 When alveolar bone is lacking, and especially if the buccal root of the maxillary first bicuspid is palatally inclined above the bifurcation2 (Fig. 3), there is a high likelihood of gingival recession and penetration of the cortical plate during orthodontic rotation (Fig. 4).

To control these periodontal problems, orthodontists have several treatment options:

1. Leave the tooth in the rotated position.

2. Prescribe periodontal treatment before, during, or after orthodontic rotation.5-7

3. Follow orthodontic rotation with root torquing in the palatal direction.

A spring is shown here to accomplish the third option, which may be combined with the second at the orthodontist?s discretion.

## Palatal Root Torquing Spring

Orthodontists generally use rectangular wires to apply torque, but a rectangular wire also produces an opposite torque on the adjacent teeth. Thus, while torquing a bicuspid in the palatal direction, one risks fenestration of the cortical plate of the neighboring teeth.

To avoid this undesirable side effect, a round wire with a soldered torquing spring can be used. Boman8 and Janzen9 have previously described the use of soldered torquing springs to control the positions of the maxillary incisors. An .018" torquing spring is usually soldered to an .018" or .020" round main archwire (Fig. 5) so that it applies torque only to the desired tooth (Fig. 6).

By modifying the angle of the torquing spring, the orthodontist can customize the amount of torque for each situation. A force of 125g is generally recommended for torquing bicuspids. 10 This can be accurately measured in the mouth using a gauge; with rectangular wires, on the other hand, the force

can only be approximated.

These springs can be effective in three to five months in many cases (Fig. 7), but should not be considered a panacea for all rotated maxillary first bicuspids.

## Palatally Impacted Maxillary Canines

When the crowns of palatally impacted canines are moved into the arch, the roots sometimes remain palatally inclined (Fig. 8), and an unattractive smile may result (Fig. 9). In such a case, a customized spring can be used to apply buccal root torque.8,9,11

Prior to surgical exposure of a palatally impacted canine, a palatal expander or a palatal arch that incorporates the first bicuspids should be placed. The maxillary anterior teeth should not normally be used for anchorage to avoid excessive forces on the delicate roots of the lateral incisors.

## Buccal Root Torquing Spring

Once the impacted canine has been moved into the arch, the lingual buttons are removed from the canine, and an .022" bracket with a soldered power arm is bonded to its facial surface (Fig. 10A). The torquing spring, made of .018" Australian wire, is soldered to the main archwire (.020" Australian wire) at an angle of 30° in the buccal direction (Fig. 10B). The torquing spring is activated by hooking it beneath the power arm (Fig. 10C).

As with the lingual torquing spring, forces can be modified by changing the angle of the torquing spring to the main archwire. The torquing force, which should be about 125g for maxillary canines,10,12 can be measured with a gauge (Fig. 10D) before tying in the archwire (Fig. 10E).

This spring can torque canine roots buccally in three to five months (Fig. 11).

## Conclusion

Root torquing springs have the following advantages:

- They are simple to activate and more efficient than stainless steel rectangular wires.13
- No opposite torquing forces are delivered to the adjacent teeth.
- Torquing forces can be easily measured with a gauge.

Because tooth movement is continuous, patients can usually be seen at five-week intervals. Keeping appointments is critical, however, because the continuous force of the torquing spring could easily produce excessive root torque. The torquing force should be checked at each visit and modified, if necessary, by changing the angle of the spring to the main archwire. •

## FIGURES

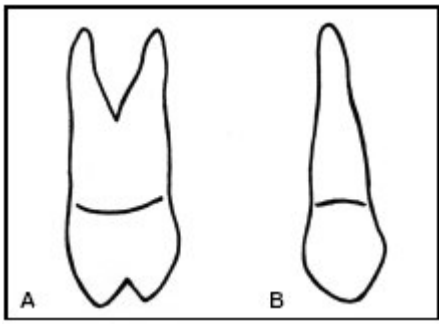


**Fig. 1** Maxillary first bicuspid roots are much wider buccolingually (A) than mesiodistally (B).

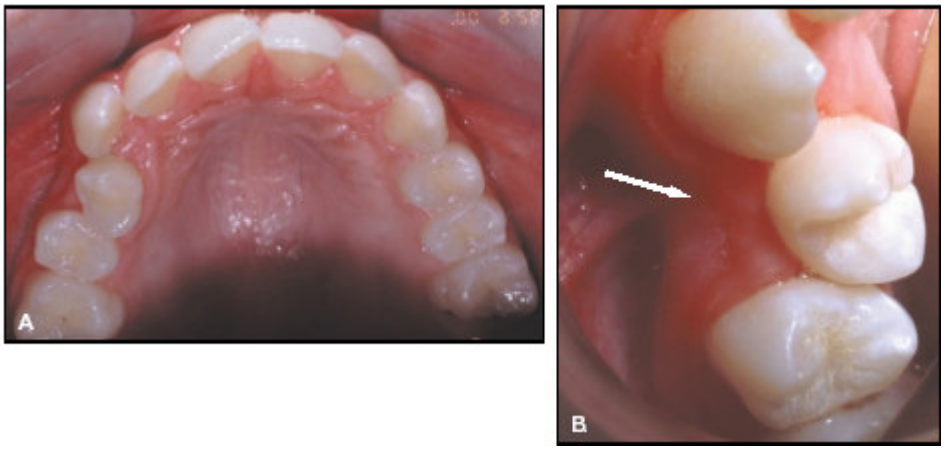


**Fig. 2** A. Rotated right maxillary first bicuspid. B. Alveolar depression (arrow) caused by rotated maxillary first bicuspid.

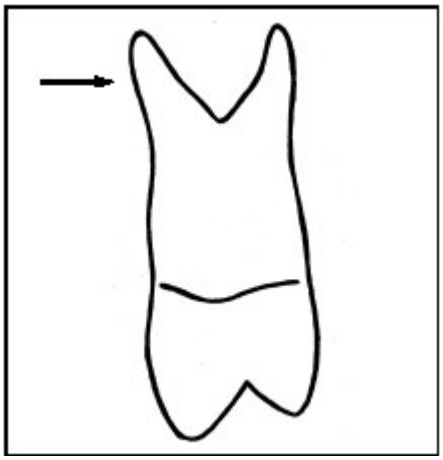

**Fig. 3** Palatally inclined buccal root of maxillary bicuspid (arrow) makes penetration of cortical plate more likely.

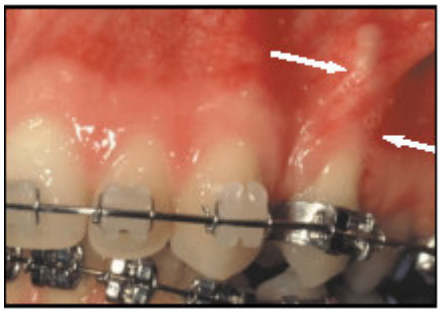

**Fig. 4** Maxillary first bicuspid after orthodontic rotation. Note gingival recession and penetration of cortical plate (arrows).

**Fig. 5** .018" lingual torquing spur soldered to .018" round main archwire.

**Fig. 6** Soldered torquing spring used to torque maxillary first bicuspid (arrow) in palatal direction.


**Fig. 7** A. Patient with rotated maxillary right first bicuspid. B. After orthodontic rotation, note buccal root prominence (arrow). C. After four months of palatal root torquing, note reduction of buccal root prominence (arrow).

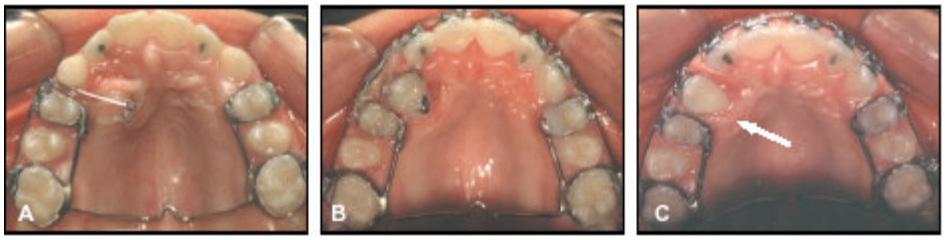


**Fig. 8** Extrusion of palatally impacted maxillary right canine. A. After surgical exposure, helical spring used as extrusion arm to canine, with soldered palatal arch for anchorage. B. Impacted canine moved buccally after extraction of deciduous canine and bonding of maxillary anterior teeth. C. Canine brought into arch, with root still palatally inclined (arrow).

**Fig. 9** Impacted maxillary right canine aligned with insufficient buccal root torque (arrow), causing unattractive smile.

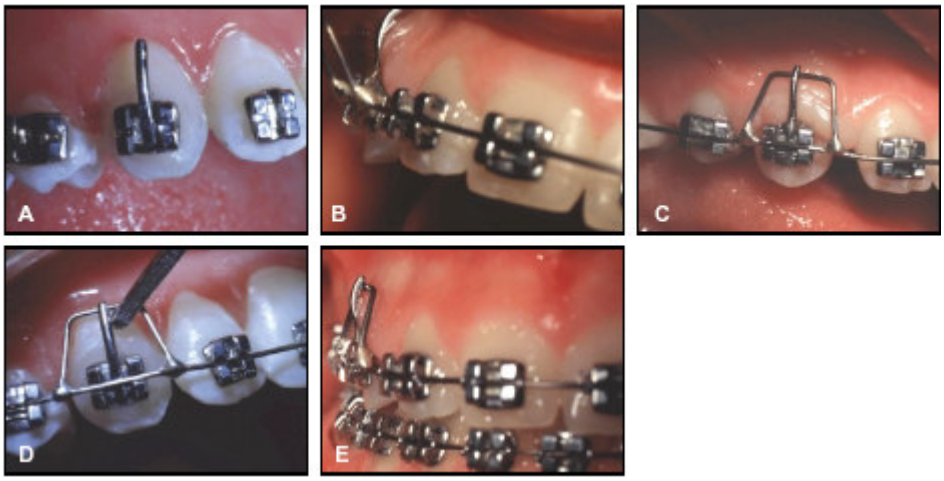


**Fig. 10** A. Power arm soldered to canine bracket. B. Passive buccal root torquing spring soldered to main archwire at 30° angle. C. Torquing spring hooked under power arm. D. Torquing force measured with gauge. E. Archwire tied in.

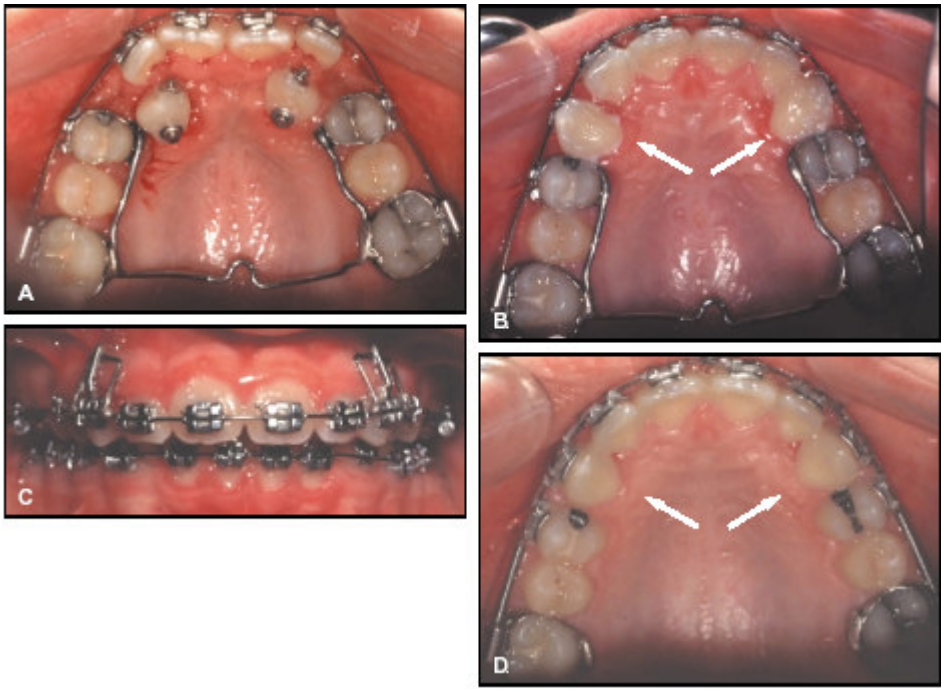


**Fig. 11** A. Patient after extrusion of two impacted maxillary canines. B. After crowns have been brought into arch, canine roots remain palatally inclined (arrows). C. Application of buccal root torquing springs. D. After three months of torquing, canine roots have moved considerably in buccal direction (arrows).

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## FOOTNOTES

**1** Correx gauge, Haag-Streit, Bern, Switzerland.

**2** Australian wire, G&H Wire Company, P.O. Box 248, Greenwood, IN 46142.