Forced Eruption of Palatally Impacted Canines Using Bracket-Head Miniscrews

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The incidence of maxillary canine impaction is reportedly 1.7%, with palatal impaction two or three times more prevalent than labial impaction. Impacted canines, which generally require both surgical and orthodontic intervention, can cause complications such as root resorption of adjacent teeth, especially the lateral incisors.

The conventional technique for orthodontic management of palatally impacted maxillary canines, using a heavy rectangular base archwire to neutralize reaction forces during initial alignment with fixed appliances, has several drawbacks. Placing a bracket on the adjacent lateral incisor may bring its apex closer to the resorptive follicle of the impacted canine; when a rectangular wire is inserted, the resulting torque can cause further root resorption of the lateral incisor. De-impaction is usually slow as long as the resorptive follicle of the impacted tooth remains active, taxing anchorage requirements and potentially leading to unwanted movement of the anchor teeth.

Orthodontic miniscrews, with their ease of placement and removal, minimal need for patient compliance, and relatively low cost, allow clinicians to move teeth in ways that were previously considered impossible. This article describes a new method for moving impacted canines away from the neighboring roots before fixed appliances are placed, using palatal miniscrews to anchor the orthodontic force and avoid unwanted side effects.

Case Report

A 15-year-old female presented with the chief complaint of unerupted maxillary canines. She had a Class I malocclusion with the dental midline deviated about 2mm to the left (Fig. 1). There was no crowding in the upper arch and 2mm of crowding in the lower.

Clinical examination indicated that the maxillary right and left permanent canines were unerupted and the deciduous canines were retained. The panoramic x-ray showed that both permanent canines were impacted; cone-beam computed tomography (CBCT) confirmed that the teeth were impacted palatally, with their crowns adjacent to the lateral incisor roots (Fig. 2).

The treatment objectives were to move the crowns of the impacted canines away from the roots of the neighboring lateral incisors before initiating comprehensive orthodontic therapy. We planned to use palatal bracket-head miniscrews to provide skeletal anchorage for forced eruption of the canines.
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Fig. 1 15-year-old female patient with impacted maxillary permanent canines and retained deciduous canines before treatment.
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Using the self-drilling method, we inserted two bracket-head miniscrews (Dual-Top,* 8mm × 1.4mm) on each side of the palate, mesial and distal to the upper left and right second premolars. The patient was then referred to a periodontist, who removed the tissue coronal to each impacted upper canine, along with a trough of bone around the widest part of the crown to prevent bone migration over the enamel while we were waiting for the tooth to erupt.

Ten days later, the periodontal dressings were removed, and brackets were bonded to the exposed palatal surfaces of the canines. A 50g single-point


Fig. 2 Cone-beam computed tomography showing palatal canine impactions, with crowns adjacent to lateral-incisor roots.

Fig. 3 Canines emerging in palate after five months of forced eruption.
force was applied to each bracket from an .017” × .025” TMA** cantilever spring tied into the slots of the adjacent miniscrew bracket heads. Thus, the force was directed distally, away from the lateral-incisor roots. The miniscrews were covered with composite for patient comfort.

The loops in the TMA springs allowed easy modification of the magnitude and direction of the applied force. The patient was seen every three weeks for adjustments, and the canines emerged into the palate after five months of treatment (Fig. 3). The miniscrews were then removed, the deciduous canines were extracted, and full fixed appliances were placed. Following initial leveling and alignment, the erupted canines were guided into occlusion using a nickel titanium overlay wire.

After finishing and debonding, the patient received a conventional Hawley retainer. Total treatment time was 18 months (Fig. 4).

Discussion

Schmidt and Kokich suggested exposing palatally impacted canines and allowing them to erupt on their own for six months before applying any traction.9 The resulting tissue and bone levels between the canines and lateral incisors are much healthier with this kind of natural eruption, but the results will be unsatisfactory if the axial inclinations of the impacted canines are inappropriate. Other disadvantages include slow eruption and an inability to guide the eruption path.

Because a palatally impacted canine may already have affected the roots of neighboring teeth, a reasonable alternative is to move the impacted tooth distally, away from the lateral-incisor roots, before initiating comprehensive orthodontics.10 The angle of the impacted tooth’s root should be considered before applying a force with traction from a temporary anchorage device (TAD) or a looped wire. If the root of the canine is angled to the distal (as it is in most cases), then distal crown tipping and mesial root movement will be required. This can best be accomplished with a single-point contact on the canine, rather than engagement of the bracket slot. Proper placement of the bonded canine button is important to

avoid rotation. The TAD is inserted in the palate, usually between the second premolar and first molar, and a nickel titanium spring is attached from the impacted canine to the TAD. Single-point force application with a nickel titanium spring is far easier to manage in a busy clinical setting when the canine root is angled to the distal; if the root is vertical or angled to the mesial, the method shown in this article will be preferable.

Forced eruption is difficult to achieve with button-head miniscrew anchorage, because elastics and springs are unable to control the three-dimensional force vectors required for such movement. By using bracket-head miniscrews and rectangular wires, we were able to guide the impacted canines precisely during eruption while avoiding the unwanted movement of anchorage teeth seen in conventional forced-eruption treatment. The technique presented here is especially useful in patients with evident root resorption of the lateral incisors, since it allows the application of three-dimensional forces without adverse side effects.

Measuring root volumes from pre- and post-treatment CBCT images with Amira software, we found no lateral-incisor root resorption in this case. The patient was happy to have her deciduous canines remain in place for esthetic reasons during the five months of forced eruption, and she also appreciated having no visible appliances during that period. She reported no pain or discomfort from the miniscrew insertion and traction.


REFERENCES