

# A New Device for Forced Eruption of Palatally Impacted Canines

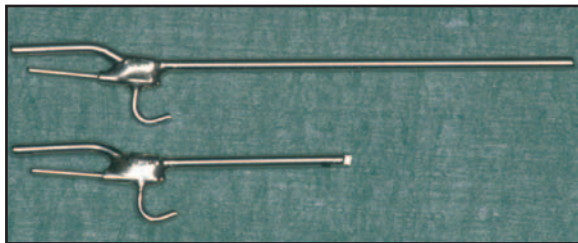
ALBERTO CAPRIOGLIO, DDS

**M**any techniques have been proposed for moving a palatally impacted canine into the arch following surgical exposure.<sup>1-6</sup> Direct bonding of an eyelet and traction with a stainless steel ligature is relatively non-invasive and seems to be the most reliable method.<sup>7</sup>

The mechanics of traction can vary, depending on the clinician's preference, but should meet the following requirements<sup>8</sup>:

- Rigid and substantial anchorage.
- Continuous elastic force with an average intensity of 3-4oz, concentrated in the space over which the canine is to be moved.
- As direct a force application as possible, assuming there is no obstacle blocking the canine's path of eruption.

This article presents a new method for forced eruption of palatally impacted canines, called "Easy Cuspid", that satisfies those requirements.



**Fig. 1** Jones Jig modified by soldering double terminal to distal end and cutting off mesial half of auxiliary arm.



**Fig. 2** .017" × .025" stainless steel wire segment soldered to auxiliary arm.

## Appliance Design

Easy Cuspid is a modification of the Jones Jig,\* which was originally developed for molar distalization (Fig. 1). The most noteworthy addition is a soldered double terminal with a larger end for insertion into the molar band's headgear tube and a smaller end for the auxiliary tube. A triple-tube molar band is used so that a stabilizing wire can be inserted into the main archwire tube, providing solid anchorage for the ballista system. Half of the Jones Jig's auxiliary arm is cut off, and an .017" × .025" stainless steel wire segment is soldered to the remainder (Fig. 2).

To align the arch in preparation for movement of the impacted canine, as many teeth as possible, including the upper second molars, should be bonded or banded. The recommended archwire sequence is .014" nickel titanium, .016" stainless steel, and .018" stainless steel.

After initial alignment, a transpalatal arch is attached to the upper first molars, either passively adapted or activated slightly on both sides to produce a crown-buccal torque that will counteract the force of the ballista system on those teeth. A mesial helix is bent into the .018" stainless steel upper archwire to keep it from sliding laterally. Placing the helix between the central incisors rather than more distally will avoid

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**Fig. 3** Eyelet with attached metal chain bonded to exposed surface of impacted canine.

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interference with the canine eruption.

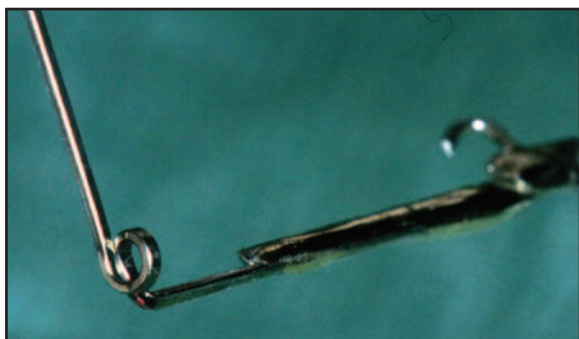
Surgical exposure of the canine should be scheduled for one month after placement of the transpalatal arch. The transpalatal arch and upper archwire are removed temporarily for the surgery, in which an eyelet attached to a metal chain is bonded to the exposed surface of the canine (Fig. 3). The chain is tied to the first premolar bracket with an elastic thread.

Seven days after surgery, the sutures are removed, the transpalatal arch is replaced, and the Easy Cuspid is fitted to the molar tubes. To form the crossover wire for attachment to the canine, a helix is bent into the mesial arm of the appliance (Fig. 4). This helix has two functions: to increase the elasticity of the force system and to stabilize the arm after insertion of the main archwire. It is important to place the helix in the interocclusal space where it will offer the greatest possible freedom of action and the most patient comfort.

The end of the Easy Cuspid arm is then marked where it will attach to the metal chain from the impacted canine. A second helix is bent at this point to hold a stainless steel ligature tied to the terminal link of the chain (Fig. 5). An additional security ligature is connected from the

hook on the molar tube to the distal hook on the Easy Cuspid. The soldered portion of the appliance is adapted to conform as closely as possible to the archform (Fig. 6). The main archwire passes through the first helix on the Easy Cuspid arm (Fig. 7).

This system will deliver about 3-4oz of traction force. The appliance should be reactivated at two-to-three-week intervals for a total of three to four months. Once the canine breaks through the palatal mucosa, the upper archwire should be replaced with a series of superelastic nickel titanium wires for alignment before proceeding with conventional orthodontic therapy.



**Fig. 4** First helix bent into mesial arm to form crossover wire.



**Fig. 5** Second helix bent into end of crossover wire for ligation to chain from impacted canine.



**Fig. 6** Soldered portion of Easy Cuspid adapted to archform.

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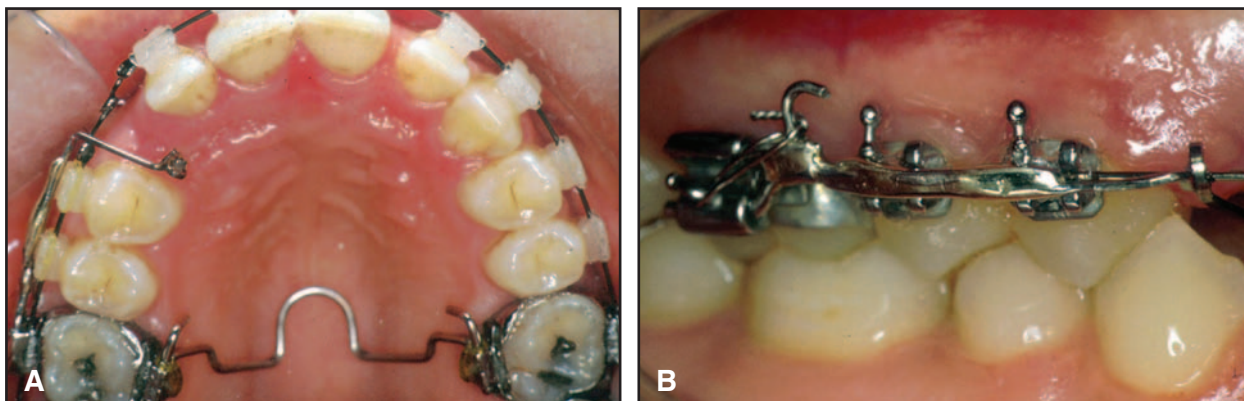


Fig. 7 A. Transpalatal arch in place. B. Main archwire passing through helix on Easy Cuspid arm.



Fig. 8 11-year old female patient with retained upper deciduous canines and impacted upper permanent canines.

### Clinical Study

We used the Easy Cuspid to treat 31 palatally impacted canines in 19 patients (13 female and six male), ranging in age from 10 to 21, with an average age of 13 years, 9 months. Twelve of the 19 patients had bilateral impactions.

Three-dimensional computed axial tomography scans (CT-3D) were taken of each patient's maxillary arch, along with conventional records including a panoramic radiograph, a lateral cephalogram, intraoral radiographs of each impacted or unerupted tooth, an upper occlusal plane radiograph, photographs, and plaster casts.

The average period of canine eruption was 76 days from surgical exposure to the appearance of the cuspid tip.

### Case Report

An 11-year-old female patient presented with retained upper deciduous canines and a

slight labioversion of the upper lateral incisor crowns (Fig. 8). Conventional radiographs were unable to distinguish between labial and palatal impaction of the permanent canines, but the CT-3D scans clearly revealed a labial impaction of the upper right canine and a palatal impaction of the upper left canine, as well as the positions of their crowns relative to the roots of the lateral incisors (Fig. 9).

A fixed maxillary appliance was placed, and a transpalatal arch was attached to the upper first molars (Fig. 10). The space needed for the two impacted canines was obtained by closing the anterior diastemas. The maxillary arch was completely leveled and aligned in five months using an .018" stainless steel archwire with a helix between the central incisors.

After removal of the archwire and transpalatal arch, the upper left deciduous canine was extracted, and the palatally impacted left permanent canine was surgically exposed. One

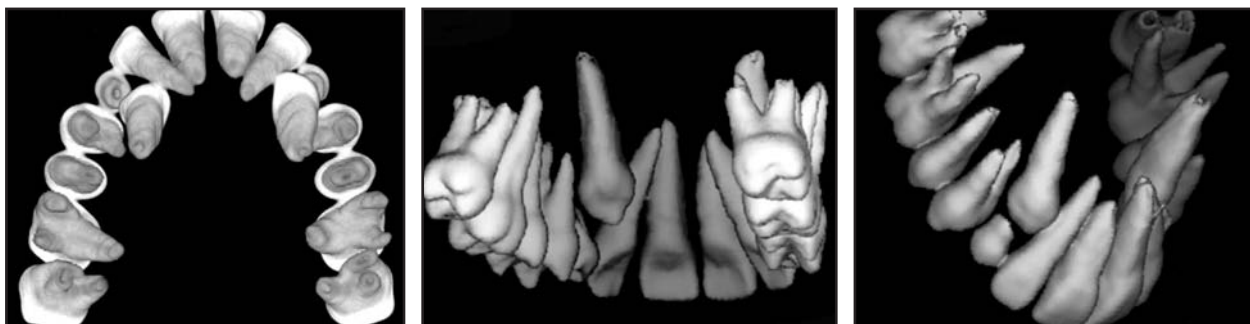


Fig. 9 CT-3D scans show labial impaction of upper right permanent canine and palatal impaction of upper left permanent canine.

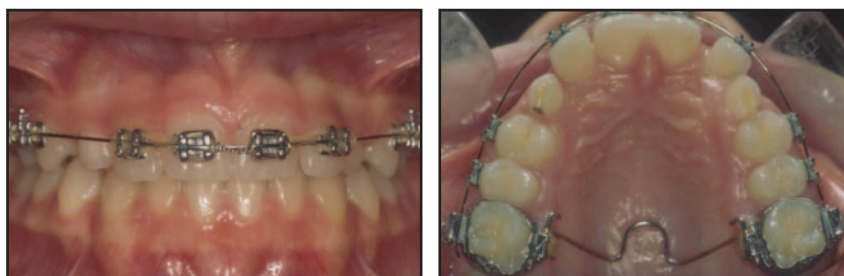


Fig. 10 Initial maxillary appliance for anterior space closure, leveling, and alignment, with transpalatal arch attached to first molars for anchorage.



Fig. 11 Easy Cuspid placed after surgical exposure of palatally impacted upper left permanent canine.



Fig. 12 Surgically exposed upper right permanent canine moved into arch with elastic traction to helix on maxillary archwire.

week later, the sutures were removed, the transpalatal arch was replaced, and a unilateral Easy Cuspid system was fitted as described above (Fig. 11).

The impacted upper left canine erupted in 66 days, and traction was then removed until the eruption of the contralateral canine. The labially impacted upper right canine was surgically exposed, and an eyelet with a metal chain was bonded to its surface. Traction was applied with an elastomeric ligature connected at each appointment to one of three helices bent into the archwire between the adjacent teeth (Fig. 12).

Once both impacted canines had erupted enough to bond brackets to their labial surfaces, treatment continued with a conventional fixed appliance (Fig. 13). Total treatment time was 25 months (Fig. 14).

## Discussion

The use of a stainless steel sectional wire for the Easy Cuspid arm simplifies the soldering, adaptation, and reactivation procedures. Proto-

types with TMA\*\* and nickel titanium arms are currently being tested. Because of the greater load-deflection range of these materials, they would not have to be reactivated, reducing the frequency of patient visits, but appliance fabrication would be more complicated and expensive.

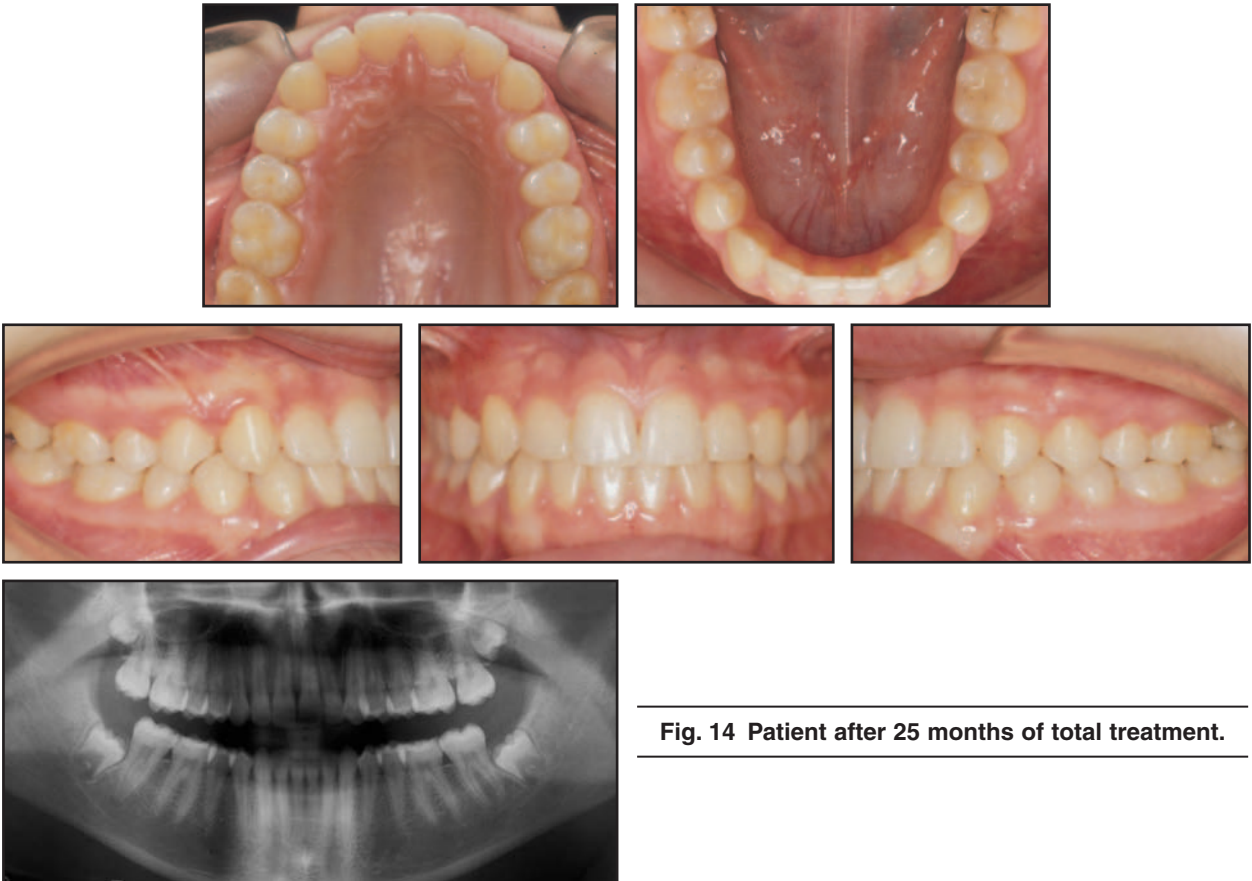
The Easy Cuspid's double terminal protects against undesirable rotations of the auxiliary, while the transpalatal arch and main archwire provide stability. Labial insertion of the appliance allows anchorage reinforcement on the palatal side, thus avoiding crown-palatal torque of the first molars. The system can be applied bilaterally or unilaterally.

Further security is provided by ligating the molar hook to the Easy Cuspid hook and by passing the main archwire through the Easy Cuspid helix. Although this configuration is more comfortable for the patient, it involves more chair-time at reactivation appointments. The clinician will have to determine whether the added stability and comfort are cost-effective.

\*\*Trademark of Ormco/"A" Company, 1717 W. Collins Ave., Orange, CA 92867.



**Fig. 13 Brackets bonded to labial surfaces of both upper canines after sufficient eruption for case completion.**



**Fig. 14 Patient after 25 months of total treatment.**

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