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# Surgical exposure of impacted canines: Open or closed surgery?

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**The methods for exposing impacted canines are outlined and the relative merits of using a closed versus open surgical procedure are discussed in relation to the projected long-term prognosis and appearance of the treated outcome. These surgical modalities have a wide range of variations designed for individual circumstances, each of which has advantages in specific cases. Similarly, orthodontic biomechanic protocols vary depending on the 3-dimensional location of the impacted tooth in the maxilla. Each of these factors has an influence on the final outcome. Attempts to provide answers showing a preference for one surgical technique over another using a prospective randomized clinical trial would be difficult in the face of such a wide spectrum of factors. (Semin Orthod 2016; 22:27–33.) © 2016 Elsevier Inc. All rights reserved.**

## Introduction

When an oral surgeon and orthodontist are willing to work together as a team, impacted teeth may be successfully brought into ideal alignment and made completely indistinguishable from other, normally erupted teeth in the dentition.

Standard procedure today dictates that treatment of such cases begins with the orthodontist, and the initial goal is orthodontic alignment and leveling of the teeth in the dentition, followed by the creation of space in the dental arch to accommodate the impacted tooth. The orthodontist then consolidates and stabilizes the teeth in that jaw by placing a full thickness passive archwire in all the brackets, with the intent to create an anchorage unit including all the teeth. It is against this unit that the forces designed to reduce the impaction of the tooth will be pitted, and where necessary, the unit may be further buttressed with the addition of other anchor

elements such as intermaxillary elastic forces, extra-oral forces and temporary anchorage devices. At this point, the surgeon needs to be brought into the scene to provide unobstructed access to the impacted tooth.

Differences of opinion have arisen within the 2 specialties regarding the best method of surgical exposure to produce an overall favorable condition and prognosis at the completion of treatment.<sup>1,2</sup> Opinions are based on a prediction of the expected periodontal status of the outcome, the esthetics of gingival form and post-treatment orthodontic relapse of the achieved alignment.

The aims of the surgical phase of the orthodontic/surgical modality of treatment are:

- (1) to eliminate hard or soft tissue pathologic/obstructive entities,
- (2) to provide the orthodontist with access to the impacted tooth, including the creation of a suitably isolated micro-environment for the bonding of an attachment, and
- (3) to perform these tasks with minimum tissue damage, while avoiding exposure and instrumentation of the cemento-enamel junction (CEJ) and cervical portion of the root surface.

The most frequently impacted tooth considered for treatment with this conservative modality is the maxillary permanent canine and

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the ensuing discussion will largely be described in this context.

## Open-eruption techniques

The open-eruption technique is not limited to a single option, but includes 3 principal alternatives, each incorporating minor variants: (1) window technique, (2) full flap open procedure, and (3) Apically repositioned flap technique.

### *Window technique*

This represents the simplest form of open exposure. It entails the surgical removal of the mucosa and bone immediately overlying the impacted tooth.<sup>3,4</sup> It is the most direct way of exposing an impacted canine that is located and usually palpable immediately under the surface. With a very superficially located labial tooth, this procedure can sometimes be accomplished by using only topical anesthesia in the form of anesthetic spray.

In contrast, the usually palpable, palatally impacted canine is covered by thick mucosa, bone, and follicle. As such, it is at least 5–7 mm beneath the surface and considerably more when there is follicular enlargement or when the tooth is more grossly displaced. The surgical removal of a circular area of tissue will provide exposure through a deep, raw and bleeding access channel, which will make attachment bonding highly risky. In such cases, the surgeon often prefers to place a surgical pack to prevent healing over of the tissues. Sometimes the orthodontist may be rewarded with renewed eruptive activity of the canine and the possibility of autonomous eruption.<sup>5,6</sup>

### *Full flap open procedure*

An alternative is to reflect a full palatal flap to reveal the crypt of the canine, expose the tooth to its maximum circumference and then re-suture the flap back to its former place, after having first excised a circular portion of the mucosa immediately overlying the tooth.<sup>7,8</sup>

### *Apically repositioned flap*

The main indication for this procedure is when a labially impacted tooth is situated above the level of the mucogingival junction, but not displaced

mesially or distally.<sup>3,9</sup> It involves raising a labial attached mucogingival flap from the crest of the ridge and re-suturing it at the cervical level, leaving the crown exposed.

## Closed-eruption technique

There are also 3 main approaches to the closed exposure—all incorporating minor intra-technique variations:

### *Minimal exposure technique*

In a closed procedure, a full and wide flap is reflected in the thick keratinized palatal mucosa overlying the palpable bulge and retracted to reveal the bony surface beneath.<sup>10</sup> A small area of the thin shell of bone covering the tooth is pared away to disclose the follicle. A window is cut into the follicle to expose the surface of the tooth, sufficient to provide a minimum attachment bonding area of tooth enamel, while permitting the maintenance of hemostasis. The majority of the follicle is left intact; no attempt is made to remove more bone than is necessary for access to the tooth and the CEJ area is left undisturbed. A small eyelet attachment, threaded with a ligature or chain, is bonded, followed by the complete replacement of the surgical flap to its former place, leaving only the ligature or chain exiting through its sutured edge. Ideally, orthodontic traction should start immediately.

### *Maximal exposure technique*

In an effort to standardize the procedure in a multicenter controlled study to examine periodontal outcome, the participating surgeons adopted a significantly more radical exposure than the one just mentioned, by the removal of bone and, presumably, complete enucleation of the follicle covering the tooth in its crypt, in order to achieve exposure of the tooth to its maximum circumference.<sup>7</sup>

### *Tunnel approach*

An interesting variant of the closed technique was introduced by Crescini et al.<sup>11</sup> The impacted canine is drawn downwards through the evacuated socket of the simultaneously extracted deciduous canine. This modification is aimed at ensuring the preservation of the

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