

COMBINED ORTHODONTIC-SURGICAL APPROACH IN THE TREATMENT OF IMPACTED MAXILLARY CANINES: THREE CLINICAL CASES

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SUMMARY

Impaction of maxillary canine is a relatively frequent orthodontic anomaly which could represent functional and aesthetic problems for patients.

Nowadays, the conventional technique to impacted canines consists of a combined orthodontic and surgical approach, aimed to guide cuspids at the center of the alveolar ridge in a stable position and surrounded by healthy hard and soft tissues.

This article presents three cases studies with different combined surgical-orthodontic approaches for the treatment of infraosseous impacted canines.

An impacted maxillary canine could be guided, after adequate space is created orthodontically, to the center of the ridge through an orthodontic traction directly applied to the crown of impacted cuspid. Several surgical techniques have been proposed to expose the crown of impacted tooth. Location (buccal or palatal side) of impaction and depth influence surgical approach in order to obtain best aesthetic and functional results.

Key words: impacted maxillary canines, orthodontic approach, surgical approach.

Introduction

The maxillary canine is the second most frequent impacted tooth.

The incidence ranges from 0.92 to 3.29%, and it depends on the population examined. Cuspid impaction is about twice as common palatally and unilateral impaction has a prevalence of about 92% (1). Diagnosis of impaction could be hypothesized when one or both permanent maxillary cuspids are absent in the dental arch, beyond 14-15 years old (2). Frequent clinical signs of impaction could be the retention of primary cuspids after the physiological time of eruption, an unusual tipping of lateral incisors and the absence of buccal canine bulge (3). The impaction has to be confirmed by panoramic X-rays, and in some cases a TC scan is

required in order to obtain more details on location of impacted cuspid and its position with the adjacent teeth (4).

A combined surgical-orthodontic approach involves different phases of treatment.

#1 Initial orthodontic therapy

During the presurgical orthodontic phase, an adequate space required for the permanent canine should be created or maintained. The width of a maxillary cuspid is about 7 to 8 mm.

Bracketing the upper arch provides to increase the space needed and to obtain an adequate anchorage for traction of the impacted canine. The primary canine will be extracted at the time of surgical treatment.

#2 Surgical exposure and orthodontic traction

The impacted canine's location influences surgical technique to expose cuspid crown.

Depending on buccal or palatal position, different surgical methods are performed in order to allow the traction of the impacted tooth to the centre of alveolar ridge as described by Cooke et al. Buccally impacted canines require an open approach if the tip of the crown is coronal to the mucogingival line; gingivectomy can be used if an adequate amount of keratinized gingiva is present, while when a minimum of 3 mm of attached mucosa is not initially present, an apically positioned flap should be chosen. When the crown is apical to the mucogingival line a full-thickness mucoperiosteal flap is preferred.

A full-thickness mucoperiosteal flap, with or without window, are suggested in the case of palatally impacted canines.

Once the flap was completely realized, the bone covering the impacted tooth is removed with a low speed bur, and the pericoronal tissue is eliminated using a periodontal curette. Adequate bone removal over the crown must be performed because after the dental follicle is deflated and removed. An orthodontic button, or little mesh, is applied and bonded on the crown while a wire chain, with rings about 1.5 mm in diameter, is fixed to the attaching device. The flap is repositioned and sutured. Seven days after surgery sutures are removed and orthodontic traction is activated.

In case of buccally impaction, the force was directed palatally, and directed buccally if the canine is positioned palatally.

#3 Final orthodontic treatment

The impacted canine, erupted in the ridge, is finally aligned within the dental arch, and any tooth rotation or tip are corrected.

Orthodontic therapy is aimed to guide tooth

eruption to the centre of the alveolar ridge, while surgical approach must preserve the gingival tissues to avoid critical periodontal damage at the end of treatment (3, 5, 6).

Material and methods

This article presents three cases studies with combined surgical-orthodontic approach for the treatment of impacted canines. All patients received a presurgical orthodontic treatment, aimed to create space required to guide impacted cuspid towards the centre of alveolar ridge (6).

Surgical approaches were influenced by location of infraosseus impacted canines, according to Cooke et al. (3). Position of impacted canines were analyzed on Panoramic X-Rays and TC scans.

Case 1

This female patient was 16 years old. A panoramic radiograph showed that impacted tooth was positioned buccally, apical to the mucogingival line.

A full-thickness mucoperiosteal flap was chosen to expose cuspid crown. An intrasulcular incision was performed involving the primary canine and the adjacent teeth. The deciduos canine was extracted. The cortical bone was removed by a low-speed bur and the pericoronal tissue was eliminated using a periodontal curette. A fine mesh was bonded on the crown, a wire chain was attached to it. After 10 days, sutures were removed and traction was activated (Figures 1, 2).

Case 2

This male patient was 18 years old; he had a Buccally Coronal to the mucogingival line.

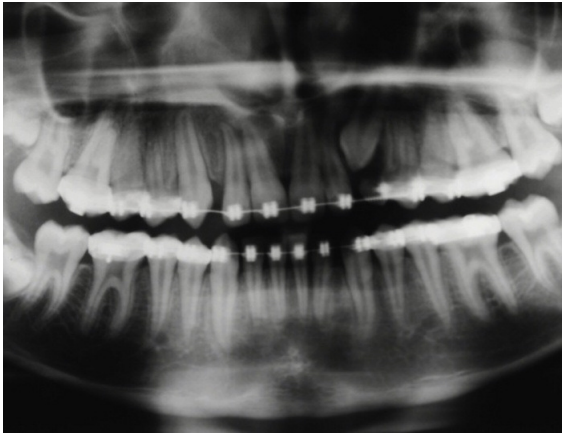


Figure 1



Figure 3



Figure 2



Figure 4



Figure 5

An apically positioned flap was used to expose impacted crown. An incision was performed on the crest of the edentulous ridge. The incisions are then extended vertically into the vestibule, raising a split thickness flap. Once removed bone and follicle from the crown, a bracket was bonded, and a wire chain ligated to it. After 10 days, sutures were removed and traction was activated (Figures 3-5).

Case 3

This female patient was 16 years old. Palatally impaction was revealed at X-rays analysis. A full-thickness mucoperiosteal flap was performed, and the deciduous canine gently extracted.

Once the flap was reflected, the cortical bone covering the impacted tooth was removed with low speed bur. Extraction of the primary canine provides an osseous tunnel, which is used to guide eruption of the impacted canine at the centre of the ridge. A fine mesh was bonded on the crown, a wire chain was attached to it. After 10 days, sutures were removed and traction was activated (Figures 6-8).

All patients received a final orthodontic treatment, to complete the alignment of impacted crown within dental arch.

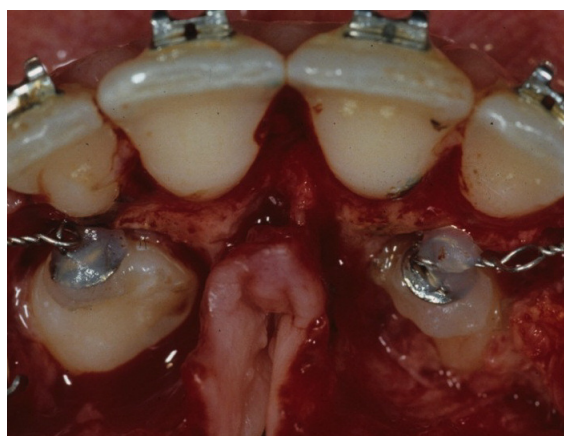


Figure 6

Discussion

Often, teeth that became impacted have anormal inclination or position during the development and teeth lose their eruptive potential once the root apex is closed.

The most common causes for cuspid impactions include: tooth size/arch length discrepancies, re-



Figure 7

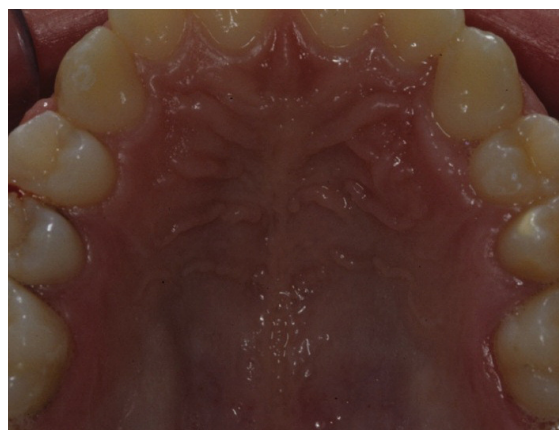


Figure 8

tention or early loss of the deciduous canine, abnormal position of the tooth bud, ankylosis, cystic neoformation and anomalies of the root (3). The management of impacted canines requires a multidisciplinary approach. The goal of treatment is a proper tooth alignment within the dental arch, in a stable position, with an adequate keratinized gingiva. The combined technique allows the traction of the impacted canines to the centre of the alveolar ridge (5, 6).

This paper presents three case studies with different surgical-orthodontic approaches in the treatment of impacted maxillary canines allow-

ing guided eruption of impacted canines in a correct alignment in the dental arch with an adequate amount of gingiva.

Conclusions

Combined orthodontic surgical approach in the treatment of impacted canines allowed eruption of intra-osseous maxillary impacted canines at the centre of the alveolar ridge. Surgical approach must preserve the soft tissues to avoid any recession or periodontal damage at the end of treatment (5). Clinical advantages of this approach include standardized phases, favourable healing process preserving soft and hard tissues, and a positive benefit-cost ratio.

References

1. Alcade RE, Sverzut C. Surgical management of impacted canines. *Journal of Pediatric Dental Care*. 2007;13(2).
2. Crescini A, Nieri M, Buti J, Baccetti T, Pini Prato GP. Pre-treatment radiographic features for the periodontal prognosis of treated impacted canines. *J Clin Periodontol*. 2007;34:581-7.
3. Cooke J, Wang H-L. Canine impaction: incidence and management. *Int J Periodontics Restorative Dent*. 2006;26:483-91.
4. Datana S, Londhe SM, Kumar P, Mathur V. Orthodontic Guidance of an Impacted Maxillary Canine-A review. *Journal of Oral Health & Community Dentistry*. 2014;8(2):101-3.
5. Crescini A, Nieri M, Buti J, Baccetti T, Mauro S, Pini Prato GP. Short- and long-term periodontal evaluation of impacted canines treated with a closed surgical-orthodontic approach. *J Clin Periodontol*. 2007;34:232-42.
6. Crescini A, Nieri M, Rotundo R, Baccetti T, Cortellini P, Pini Prato GP. Combined Surgical and Orthodontic Approach to Reproduce the Physiologic Eruption Pattern in Impacted Canines: Report of 25 Patients. *Int J Periodontics Restorative Dent*. 2007;27:529-37.

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