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Uncovering and autonomous eruption of palatally impacted canines

ABSTRACT

Background The palatal impaction of maxillary canine is a quite common yet challenging clinical condition that orthodontists have to face in the everyday practice. The purpose of this report is to describe and discuss a case involving the uncovering of an upper canine and its subsequent spontaneous eruption.

Case report The diagnostic and therapeutic protocol of a case with a palatally impacted canine is presented. The upper right canine was uncovered with an open surgical approach. Removal of the attached gingiva and bone covering the crown enhanced the tooth spontaneous eruption, while the first levelling and aligning phase of the treatment was performed. This approach results in a shorter overall treatment time. This protocol produced an aesthetic, healthy and functional result, which was stable at the two-year post-treatment follow-up.

Keywords Autonomous eruption; Maxillary canine; Orthodontics; Palatal impaction; Surgical uncovering.

Introduction

From the beginning of their calcification at approximately 12 months of age, between the roots of the first deciduous molar, until eruption in the dental arch, the maxillary canines have the longest eruption path compared with any other tooth [Lai et al., 2014].

Probably due to this reason, impaction of the upper maxillary canines is a quite common clinical finding, and its prevalence ranges between 1 and 3%, being the second more affected tooth after the lower third molar. Palatal impaction is more frequent than the labial one [Topkara and Sari, 2012].

Treating a malocclusion with an impacted canine can be challenging. A longer treatment, root resorption of the lateral incisors, gingival recession and bone support loss are some of the most common problems the clinician could face treating this anomaly [Yan et al., 2012]. Many surgical and orthodontic procedures are advocated to prevent or treat this clinical situation [Fujita et al., 2011]. The two main approaches to a palatally impacted canine are a closed surgical exposure followed by an immediate orthodontic traction or the preorthodontic uncovering and spontaneous eruption [Becker and Chaushu, 2013]. Compared with the closed approach, the open approach allows the tooth to erupt spontaneously, thereby shortening the overall treatment time, since the space should not be open prior to the orthodontic traction [Mathews and Kokich, 2013].

If the canine is ankylosed it will fail to erupt spontaneously. Ankylosis can be diagnosed at an early stage and the canine extracted prior to brackets placement. This will avoid all the side effects of tractioning an ankylosed canine. Moreover, in most of the cases the deciduous canine extraction could be avoided initially, maintaining acceptable aesthetics.

The purpose of this report is to describe and discuss diagnostic and therapeutic protocol of a case on the uncovering of an upper canine and its subsequent spontaneous eruption.

Case report

The present case report highlights the diagnostic and therapeutic protocol of the case of a 14.2 years-old female patient who was referred to the clinic of the Universidad Europea de Valencia due to the lack of eruption of the upper right canine. The patient presented a bilateral Class I, both in the molar and premolar region. The overbite was 3 mm, the upper midline was coincident with the facial midline and the lower one presented a 3 mm shift towards the left. The lower jaw presented a moderate crowding in the incisor region (Fig. 1). The cephalometric data were within the norm both from a dental and a skeletal point of view. On the orthopantomography the impacted canine appeared to be quite vertical but high on the occlusal plane and with the crown overlapped with the root of the lateral incisor (Fig. 2).

To allow the impacted canine to erupt autonomously and reduce time in orthodontic appliances the treatment started with the surgical uncovering of tooth 1.3, following the technique reported by Smidth and Kokich in 2017. A mucoperiosteal flap was elevated, and once it was determined that the crown was covered in bone, all palatal bone down to cement enamel junction was removed. Finally, a hole was made in the flap, and it was repositioned and sutured over the crown of the impacted canine. A button was bonded on the canine tip to help to hold a cement packing performed with a



FIG. 1 Pre-treatment intraoral photos.



FIG. 2 Pre-treatment Orthopantomography showing the impaction of the 1.3 and the relationship with the root of the lateral incisor.

common temporary filling material (Cavit™, 3M ESPE). At the time of surgery the extraction of tooth 5.3 was avoided for aesthetic reasons.

One month after the surgery the patient was fully bonded in the upper and lower jaw using a self-ligating 0.22" MBT appliance (Smartclip™, 3M Unitek, Monrovia, CA), except for the deciduous canine. The levelling and aligning phase was performed with a sequence of .016 NiTi, 018x018 NiTi, 019x025 NiTi and 019x025 SS. Figure 3 shows how the canine is self-erupting while the levelling and aligning phase is performed and adequate space is opened to

locate tooth 1.3 in the arch.

After the first 6 months of treatment and with the patient in full size archwires, the active traction was initiated and the deciduous canine extracted. The crown of the deciduous canine was retained and bonded to the arch wire via a bonded bracket, to mask the space and fulfil the patient's aesthetic requirements (Fig. 4) (it is possible to quantify how much the canine self-erupted at this stage). Once in place, a Warren spring in green Elgiloy™ (RMO, Denver, CO) was used on a 016x022 NiTi upper archwire for two months in order to improve the buccal root torque (Fig. 5). After a finishing and detailing procedure, with a .014 SS wire and up and down seating elastics 1/8 6oz., fixed retainer was bonded in the upper

FIG. 3 Occlusal photo taken on the day of bonding (A), two (B), 3 (C), and 4 months later, showing the autonomous eruption of tooth 1.3.



FIG. 4 Lateral and occlusal photos at the beginning of the active traction, the crown of tooth 5.3 was used to keep the patient aesthetics.

FIG. 5 Frontal intraoral photo showing the use of the Warren spring for 1.3 torque improvement.



FIG. 6 Post-treatment intraoral photos at the time of debonding.



FIG. 7 Post-treatment intraoral photos two years after treatment.



and lower jaw. After 18 months of active treatment the patient was debonded (Fig. 6), in addition to the fixed retainers, an upper and lower vacuum formed retainer were dispensed.

At the end of treatment aesthetic, healthy and functional result was obtained and at two years follow-up (Fig. 7).

Discussion

The orthodontic treatment of an impacted canine is usually quite long. Stewart et al. [2001] reported an average of 25.8 months of treatment for the unilateral-impacted group, and 32.3 months for the bilateral-impacted canine group. Iramaneerat et al. [1998] reported an average treatment time of 28.8 months in those cases. It is indeed clear that there is a need to shorten the treatment time. A long time in treatment has definite disadvantages, including increased burdens for the patient in terms of attendance and costs. Moreover, a longer treatment could lead easily to side effects such as white spot lesion, caries or periodontal disease [Pavoni, 2014]. Cassina et al. [2018] published a systematic review on canine impaction and concluded that based on existing evidence, open surgical exposure seems to be superior in treatment duration and ankyloses risk with respect to the closed technique.

Conclusions

As shown in the present case report, an open surgical uncovering of a palatally impacted canine could enhance its spontaneous eruption. An accurately planned treatment could significantly shorten the overall treatment time. This management protocol can produce aesthetic, healthy, functional and stable results. These findings are confirmed by the literature.

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