Interarch Traction Strategy for Palatal Cuspid Impactions

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ABSTRACT

Aim: To disimpact a palatally impacted canine using a novel, compliance dependent technique.

Background: Orthodontic traction of palatally impacted teeth warrants careful mechanical strategies to avoid complications that include root damage to adjacent teeth and resorptions. Sound biomechanical control to avoid these side effects is considered paramount in planning the traction.

Technique: The palatally impacted canine was pulled into the arch with the aid of a modified power arm on the exposed canine and a miniscrew on the lower arch.

Conclusion: The impacted canine was successfully brought into occlusion in under 11 months.

Clinical significance: This paper highlights the use of a simple strategy using interarch mechanics and temporary anchorage devices (TADs) to aid in the safe mechanical eruption of impacted palatal canines without the need to bend complex wire designs.

Keywords: Impacted canine, Interarch traction, Miniscrew, Modified power arm.

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INTRODUCTION

The maxillary canines are the most frequently impacted teeth except the third molars, with 85% of them lying palatal to the arch. There are innumerable approaches to bring palatally impacted canines into the arch. Some of them include the use of Ballista springs, Kilroy springs, magnets, interarch elastics, overlay wires for the traction of such canines, and the versatile helical traction mandibular arch (VHTMA).

Treatment strategies are dictated by various factors including the age of the patient, skill, and expertise of the clinician, anticipated patient compliance, and most importantly anatomical position of the canine (canine crown horizontal overlap with the laterals, the vertical height of the canine crown from the occlusal plane, canine angulation to midline and position of canine root apex horizontally).

Sound biomechanical planning is necessary to erupt impacted canines without altering the occlusal plane and morphology of adjacent teeth iatrogenically. Other deleterious effects of prolonged treatment may involve greater chances of root resorption and loss of vitality of the impacted tooth. Literature has definitively also reported higher chances of root resorption of teeth adjacent to the impacted tooth if the mechanical eruption is undertaken. This paper highlights the use of a simple strategy using interarch mechanics and temporary anchorage devices (TADs) to aid in the safe mechanical eruption of impacted palatal canines.

CASE DESCRIPTION AND DIAGNOSIS

A 17-year-old girl complained of non-coincident upper and lower midlines and spaces in her upper front teeth area. She was diagnosed with a mesioangular upper right maxillary canine impaction. A cone beam computed tomography (CBCT) revealed a complete overlap of the lateral incisors and central incisors, with more than a 30° angulation to the midline and, the apex lying above the roots of the second premolar. The canine crown was placed between both the central incisors and vertically at the apex of their roots (Fig. 1).

TECHNIQUE

The impacted canine was brought into the oral cavity with the help of intermaxillary elastics hooked onto a miniscrew that was inserted in the opposite arch (Fig. 2). As the impacted canine was inaccessible for elastic placement by the patient, an attachment consisting of a lingual button with a long power arm was fabricated, that was then bonded to the exposed surface of the canine.

A small hook was fabricated from an 0.016" × 0.022" stainless steel wire, and then wound around a lingual button (Fig. 3A). The flowable composite was added to the open end of the wire to avoid impingement of the wire into the palatal tissues (Fig. 3B).

A miniscrew (1.6 mm diameter × 8.0 mm length) (Absoanchor, Dentos Inc., Daegu, Korea) was inserted in-between the lower first bicuspid and canine on the side with the impacted canine. The position of the miniscrew may be altered according to the position of the impacted canine on the opposing arch. The miniscrew must be angulated almost perpendicular to the occlusal plane, as an angulated insertion may cause the elastic to disengage more often from the miniscrew head-on activation.

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An intermaxillary elastic with small diameter and medium force (1/8", 4.5 oz) connected the custom attachment on the exposed canine to the miniscrew on the opposing arch (Fig. 5). On activation, the elastic generated a traction force of about 150 g. The patient was asked to wear the elastics throughout the day and change them every 8–12 hours. The elastic wear was discontinued once the canine approximated the base archwire.

Following approximately 11 months of traction, the palatally impacted canine was brought to occlusion (Fig. 6). Some tongue interference and discomfort was reported by the patient during the traction process. This discomfort was reported to be reduced a month into the traction process.

Since it would be easy for food or other debris to get stuck within the attachment, the patient was asked to maintain good oral hygiene, or else there would always be a risk of halitosis or infections.

**Discussion**

Untreated impacted canines may lead to cystic lesions around the canine, ankylosis of the canine, recurrent infections, internal resorptions, external resorptions of the canine, and adjacent teeth.11
The sequel of events following external resorption of the adjacent tooth, if left untreated may also lead to tooth loss. Proper diagnosis, timely intervention, and the use of calculated treatment strategies and biomechanics are critical to avoid such complications and correct such challenging malocclusions.

There are innumerable techniques that may be used for the traction of such palatally impacted canines. Many of these techniques involve bending wires into complex designs to achieve the biomechanically correct force vectors. They also tend to lacerate the surrounding gingiva causing pain and discomfort to the patient. The abovementioned technique provides for an easy, compliance dependent method to bring down impacted canines.

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