International Journal of Dental Sciences
www.dentaljournal.in
E-ISSN: 2663-4708, P-ISSN: 2663-4694
Received: 02-05-2025, Accepted: 01-06-2025, Published: 17-06-2025
Volume 7, Issue 2, 2025, Page No. 61-64

Orthodontic management of buccally erupted ectopic canine in a 15-year-old child using T-loop: A case report

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Abstract
Fifteen years old male patient reported with ectopically erupted upper canines with severe lower anterior crowding and Class II malocclusion. First premolars were extracted to correct ectopic position of upper canines and severe lower anterior crowding. Segmental 0.017×0.025" TMA T-loop was used in upper arch for individual canine retraction & ideal position bilaterally. Mid-treatment results showed ectopic position of upper canines was corrected, lower anterior crowding relieved with improved inclination of upper and lower incisors. Correction of ectopically erupted upper canines was achieved within 7 months & currently the patient is on space closure.

Keywords: Ectopic canine, TMA wire, T loop

Introduction

Ectopic buccally erupted maxillary canines are one of the most frequently encountered conditions in orthodontic practice. The prevalence of permanent maxillary canine impaction or ectopic eruption in the general population is approximately 1–2%. Palatally displaced canines (PDC) occur twice as frequently as buccally. However, buccally displaced canines (BDC) are commonly seen in practice. When dentitions with PDC, erupted and unerupted, are compared with dentitions with BDC, erupted and unerupted, the main difference between these two conditions is an altered tooth size–arch length relationship. Ectopic canines are believed to occur with a wide variety of systemic and local etiologies. No single etiology has been shown to explain the occurrence of a majority of ectopic eruptions or to allow differential explanation of those occurring either labially or palatally. Environmental factors may contribute to this anomaly during the long, tortuous eruption path of a canine. Another possible explanation is that a disturbance associated with the follicle of the unerupted tooth may influence the direction of eruption and contribute to the displacement of the maxillary canine [1].

Diagnosis and treatment of ectopically erupting permanent maxillary canines requires timely management by the orthodontist. Continuous mechanics in severely crowded cases results in round tripping with proclination of the anterior teeth during leveling and aligning. This is followed by en-masse retraction of the entire anterior segment thereby increasing treatment time. On the contrary, the segmental mechanics involves placing brackets only in the posterior segment and the canine initially and individually retracting the canine into the premolar extraction space. This provides space for unraveling the crowding in the upper and lower arch without proclining the anterior teeth. The segmented arch has been designed to deliver relatively light constant forces with reasonable control over the anchor units. This article describes correction of ectopic canines with T-loop in upper arch [2].

Case Presentation

A 15-year-old male patient reported to the Department of Orthodontics in the Pacific Dental College & Hospital with a chief complaint of irregularly placed upper front teeth. The patient showed no relevant medical history. On extraoral examination patient has skeletal Class II jaw bases, convex profile with hypodivergent growth pattern, competent upper lips and deficient chin (Figure 1). Intraoral examination of the patient reveales upper & lower anterior crowding, crossbite with respect to 22 & 33, ectopically & highly erupted 13, 23 and End on molar relation on both side with normal overjet & overbite (Figure 2). Cephalometric analysis showed that ANB angle of 5° & Wits appraisal of 3 mm & SN-mandibular plane angle of 27° suggestive of skeletal Class II skeletal jaw bases with hypodivergent growth pattern. The patient had normally inclined maxillary and mandibular incisors with UI-NA 2mm/23° and L1-NB. 4mm/25° (Figure 3). The panoramic radiograph showed presence of 32 teeth & third molars were in their eruptive stage. There was no evidence of root resorption of ectopic canine & no bone loss (Figure 4).

Fig 1: Pre-treatment Extraoral Photographs

Fig 2: Pre-treatment Intraoral Photographs

Fig 3: Pre-treatment Lateral Cephalogram

Fig 4: Pre-treatment OPG

Diagnosis & Treatment Objectives

The patient was diagnosed as Angle's Class II malocclusion with severe crowding on Class II skeletal jaw bases with hypodivergent growth pattern. The primary skeletal objective was to maintain the skeletal divergence in the maxillary dentition, to correct ectopic position of canines & alignment of incisors. Treatment objective in mandibular arch was to correct severe anterior crowding & to upright the lower incisors. Treatment objective for the occlusion were to correct end on molar relation, to maintain ideal overjet & overbite, to achieve canine guided occlusion. Treatment objective for soft tissue was to maintain lip competency & to achieve esthetically pleasing profile.

Treatment Plan

Extraction of upper first premolars on both sides was planned to correct ectopically erupted upper canines, & extraction of 32 was planned to relieve lower anterior crowding and to achieve Class I molar & canine relation bilaterally. The anchorage was planned to retract canines and prevent mesial movement of the molars. To enhance the anchorage, T loop was planned along with transpalatal arch in the maxilla.

Cephalometric findings		
SKELETAL		
VARIABLES	STANDARD	PRE-TREATMENT
SNA	82° ± 2°	81°
SNB	80° ± 2°	76°
ANB	2°	5°
Go-Gn – Sn	32°	27°
Wits Appraisal	0mm	3mm
DENTAL		
U1- SN	102° ± 2°	106°
U1-NA	4mm/22°	2mm/23°
L1-NB	4mm/25°	4mm/25°
IMPA	92° ± 5°	79°
SOFT TISSUE		
Nasolabial Angle	98°	113°
U Lip – S Line	0mm	3mm
L Lip – S Line	0mm	4mm

Treatment Progress

The treatment begins with extraction of 14, 24 followed by banding of upper 1st molars & the placement of 0.022×0.028″ MBT prescription brackets on 13, 23 respectively. A transpalatal arch in the maxilla was placed on banded first molars for anchorage purposes. Segmented 0.017×0.025″ TMA T loop was fabricated for segmental canine retraction. At subsequent appointments, T loop was activated by pulling the distal arm 2mm and cinched distal to the first molar (Figure 5). The canines started moving distally. Complete retraction of individual canine was achieved in a period of 7 months. After individual canine retraction, upper & lower arches were fully bonded & leveling and alignment was carried out. Initial leveling & alignment was done using 0.012" niti, 0.014" niti, 0.018" niti, followed by 0.018" SS in both the arches. During leveling & alignment of lower arch extraction of lingually placed 32 was done. The archwires were cinched distal to last banded molar to avoid maxillary and mandibular incisor proclination. Currently patient is undergoing orthodontic treatment with 0.018" SS (AJ Wilcock Wire) upper & 0.016" niti wire in lower arch.

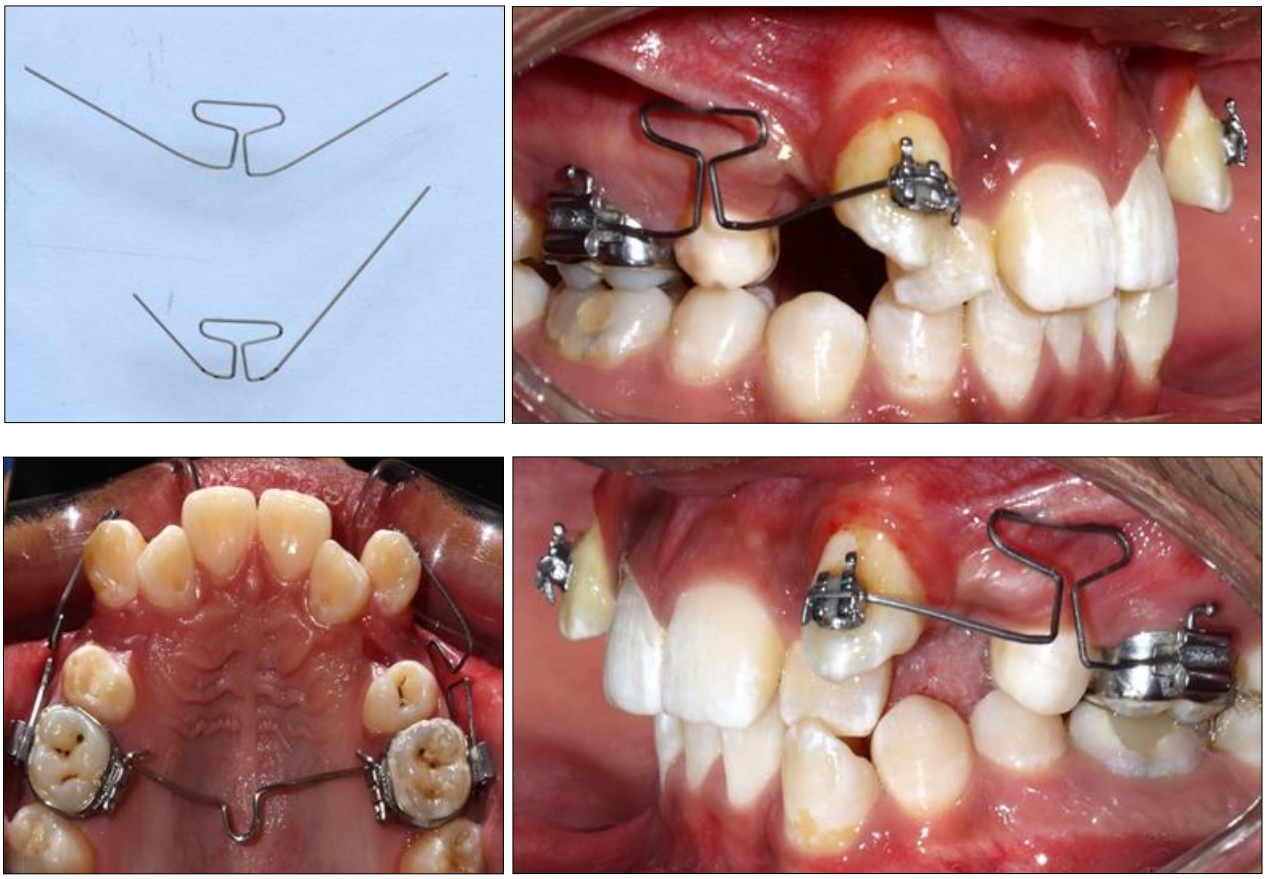

Fig 5: TPA & T loop placed

Fig 6: Mid treatment intraoral photograph after alignment of upper canines with T- loop

Treatment Outcomes

The ectopically erupted both upper canines were brought into the arch & maxillary and mandibular incisors were inclined appropriately.

Discussion

The maxillary canine is second only to the mandibular third molar in its frequency of impaction. The frequency varies from less than 0.8 to 2.8 percent (Shah *et al*. 1978; Grover

& Lorton, 1985). The condition is more than twice as common in girls (1.2 percent) than in boys (0.5 percent; Dachi & Howell, 1961) [3]. Ectopic buccally erupted maxillary canines are one of the most frequently encountered conditions in orthodontic practice. The prevalence of permanent maxillary canine impaction or ectopic eruption in the general population is approximately 1-2%. Ectopic canines are believed to occur with a wide variety of systemic and local etiologies. No single etiology has been shown to explain the occurrence of a majority of ectopic eruptions or to allow differential explanation of those occurring either labially or palatally. Environmental factors may contribute to this anomaly during the long, tortuous eruption path of a canine. Another possible explanation is that a disturbance associated with the follicle of the unerupted tooth may influence the direction of eruption and contribute to the displacement of the maxillary canine [4].

Buccal canine impactions are often associated with inadequate arch space and a vertical developmental position. If buccally impacted canines erupt they do so vertically, buccally and higher in the alveolus. Palatally displaced cuspids rarely erupt without requiring complex orthodontic treatment due to denser palatal bone and thicker palatal mucosa, as well as a more horizontal position. Palatally erupting or impacted maxillary canines occur twice as often in females than males, have a high family association and are 5 times more common in Caucasians than Asians. It is usual for maxillary canine impaction to occur bilaterally, although unilateral ectopic eruptions are more frequent. Although the management of the ectopically erupting teeth necessitates the combined expertise of many clinicians, the orthodontist has the primary role of coordinating these efforts to provide the patient the most stable and favorable outcome [5].

Generally, canine retraction can be performed using removable or fixed orthodontic appliances. With the fixed orthodontic appliance, canines will be retracted by two principal methods; either by sliding along the archwire (frictional retraction) or by sliding with the archwire (frictionless retraction). Various methods can be used for retraction of ectopically erupted canines in orthodontics like: elastics, Coil springs, Extra-oral traction using J-hook, Sliding jig and traction, Lace-back & various loops (Particularly T loop) [6].

In this case report a segmented 0.017×0.025″ TMA T-loop was fabricated to retract ectopically erupted maxillary canines bilaterally. Segmented TMA T-loop was used because it has 3-D control of tooth. Segmented T loop served as a retraction spring, which offered not only a distal driving force on the canine but also a moment for anti-distal tipping as well as torque control of canine. As the retraction progressed, the ectopic tooth was moved distally from root of lateral incisor. In the last stage, a vertical component of force operating on the canine became more desirable. Hence segmented T loop was adjusted to exert an extrusive force to bring the canine toward the occlusion but it produced reciprocal intrusive forces on the molar which was counteracted with transpalatal arch in the maxilla. In this case we have achieved proper alignment of ectopically erupted maxillary canines bilaterally using T loop within 7 months.

Conclusion

The successful treatment of a patient with an ectopic tooth and severe crowding can be a challenging task for an orthodontist. Proper treatment of an ectopic canine patient with severe crowding requires careful treatment planning by the orthodontist. Ectopically erupted canines are frequently associated with arch length deficiency. The decision to extract the premolars is to be good aesthetically, functionally, and for more stable results in these patients. Segmented 0.017×0.025″ TMA T-loop is very useful in retraction of highly placed canines because of 3-D tooth movement control.

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