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Case Report .

Treatment of an Ectopically Erupted, Highly Placed Canine Using Segmental T-Loop: A Case Report

Jatin Kumar Sahwal[1], Mridula Trehan[2], Sankalp Agnani[1], Saraswa[1]

[1]PG student, [2]Professor & HOD,
Mahatma Gandhi Dental College and Hospital, Jaipur, Rajasthan, India.

ABSTRACT

A 16-year old male presented with ectopic eruption of upper left canine and Class II molar relation with skeletal class II pattern. Maxillary premolars extraction was planned to gain space in the arch and to correct the position of highly placed canine. Segmental 0.017×0.025" TMA T loop was used to retract the canine into ideal position.

Treatment results showed the position of canine was corrected, bilateral Class I canine relation achieved and finishing the molars in class II. The overall treatment took 23 months.

Keywords: Ectopic Eruption, canine.

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***Correspondence to:**

Dr. Jatin Kumar Sahwal,
PG student,
Mahatma Gandhi Dental College and Hospital,
Jaipur, Rajasthan, India.

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INTRODUCTION

Ectopic eruption of maxillary canines is not uncommon. Ectopic canines are believed to occur due to wide range of systemic and local causes. Environmental factors may contribute to this anomaly due to the long, tortuous eruption path of canine. The etiology of ectopic eruption of tooth has long been related to an arch-length deficiency.[1]

According to Moyers, the maxillary cuspid follows a more difficult and tortuous path of eruption than any other tooth. At the age of 3 it is high in the maxilla, with its crown directed medially and somewhat lingually. It moves towards the occlusal plane, gradually uprighting itself until it seems to strike the distal aspect of the root of the lateral incisor. It then seems to be deflected to a more vertical position; however, it often erupts into the oral cavity with a marked mesial inclination.[2]

According to McBride, the failure of permanent teeth to erupt into their normal position in the dental arches is usually due to a discrepancy between tooth size and over-all arch length. Where such a disharmony exists, the teeth which erupt later in the series are either impacted or diverted from their normal eruption paths.[3]

Deviations from their (upper canines) normal eruption path are usually explained by the fact that the tooth germ of the maxillary canine forms high in the anterior wall of the antrum, below the floor of the orbit. It therefore has a long and tortuous eruption path to its correct position in the maxillary arch. Where upper arch crowding prevents such a tooth from following its normal eruption path, it will be diverted either buccally or palatally.

Von der Heydt[4] states that because the total arch length for the permanent teeth is primarily established very early in life, at the time of eruption of the first permanent molars, and because the canine is large and late in erupting, it is often not found in the alignment of the arch.

Bishara et al[5] summarized Moyer's theory that impaction is caused by:

1. Primary Causes:

A. Rate of root resorption of deciduous teeth.
B. Trauma of the deciduous tooth bud.
C. Disturbances in tooth eruption sequence.
D. Availability of space in the arch.
E. Rotation of tooth buds.
F. Premature root closure.
G. Canine eruption into the cleft area in persons with cleft palate.

2. Secondary Causes:

A. Abnormal muscle pressure.
B. Febrile diseases.
C. Endocrine disturbances.
D. Vitamin D deficiency

Two approaches have been developed for canine retraction: sliding mechanisms and loop mechanisms.[6] Many patients with ectopic maxillary canines show deficiency of space, extraction of premolars should be required in such cases. Segmented arch technique is found to be highly successful in treatment of such cases. It consists of multiple wires found in different portion of arch. The force system is relatively constant with long range of activation and optimum force level; thus the resultant movement is predictable.[7] Burstone stated that moment/force ratio; magnitude of force and force constancy determines the success of the appliance. Segmented retraction of canines with frictionless mechanics reduces the strain on posterior teeth.[8]

CASE PRESENTATION

A19 year old female patient reported with a chief complaint of irregularly placed upper front teeth. The patient revealed no significant medical history.

She showed class II molar relation, skeletal Class II pattern with retrognathic mandible, convex profile and average growth pattern. **(Figure 1)**

She showed etopically erupted upper left canine and Class II molar relation on both sides. Crowding was present in the upper arch. The lower lateral incisor was congenitally missing. (Figure 2)

The pre-treatment panoramic radiograph showed all teeth except missing lower lateral incisor, highly placed upper left canine and horizontally impacted lower left third molar with no evidence of bone loss. (Figure 3)

The pre-treatment lateral cephalometric radiograph showed Wits appraisal of 4 mm, ANB angle of 5° and Beta angle of 25° indicative of Class II skeletal pattern.

The patient had proclined maxillary and with UI-NA 4mm/30° and proclined mandibular incisors with L1-NB 5mm/34°. (Figure 4)

Figure 1 (A-C): Pre-treatment extraoral photographs

Figure 2 (A-E): Pre-treatment intraoral photographs

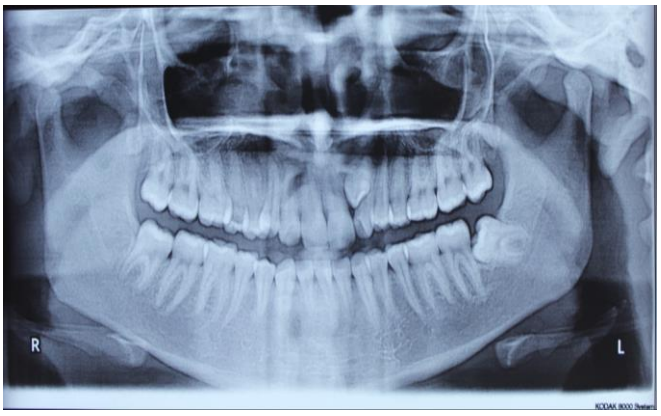

Figure 3: Pre-treatment OPG

Figure 4: Pre-treatment lateral cephalogram

TREATMENT OBJECTIVES

The primary objectives were to incorporate the ectopically erupted canine into the arch while maintaining class II molar relation. Other objectives were to achieve ideal overjet, overbite and achieve normal mandibular inclination.

TREATMENT PLAN

Extraction of maxillary left first premolar and right second premolar was planned to overcome the arch length deficiency. The upper right second premolar had a bluish discoloration and showed internal root resorption.

Thus group A anchorage was planned for maxillary arch to retract the canines and group C anchorage was planned for mandibular arch. Nance palatal arch in the maxilla and T-loop mechanics was planned in the maxillary arch.

TREATMENT PROGRESS

MBT appliance with 0.022×0.028″ slot was used. A nance palatal arch in the maxilla was banded on first molars to enhance the anchorage. Alignment and leveling of anchor teeth was done with progressive archwire change. After alignment and leveling, a segmented 0.017×0.025″ TMA T-loop was placed on the bracket of ectopic canine and accessory molar tube. (Figure 5)

T-loop was activated by 3mm at subsequent appointments. The activation was done by pulling the distal arm and cinching it distal to the first molar.

Complete retraction of individual canine was achieved in a period of 6 months.

After individual canine retraction, alignment and leveling was accomplished with progressive archwires. The archwires were cinched distal to molar to avoid maxillary and mandibular incisor proclination. The remaining extraction space in first quadrant was closed by retraction of anteriors.

TREATMENT OUTCOME

The ectopically erupted canine was brought into the arch and a class I molar relation was established. Mid stage intraoral (Figure 6) and extraoral photographs (Figure 7) and lateral cephalogram (Fig 8) showed that the maxillary and mandibular incisors were inclined appropriately. The panoramic radiograph showed adequate root parallelism in both upper and lower arches. (Fig 9)

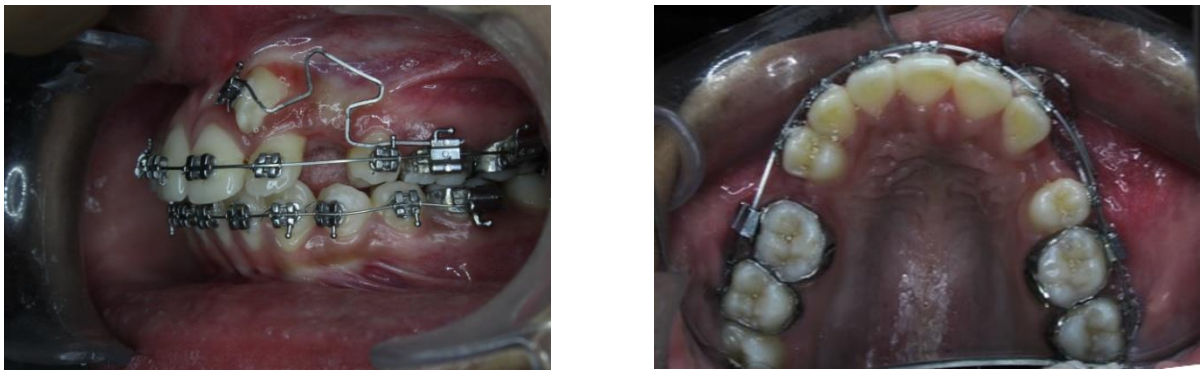

Figure 5: (A,B): Placement of Segmented T-loop on the bracket of ectopic canine and accessory molar tube

Figure 6: (A-C): Mid stage intraoral photographs

Figure 7: Mid stage extraoral photographs

Figure 8: Mid stage lateral cephalogram

Figure 9: Mid stage OPG

DISCUSSION

Maxillary canines that are potentially impacted or ectopically erupting may be inadvertently overlooked in the mixed dentition patient. This is due to individual variations in eruption patterns and timing. Ectopic eruption and impaction of canines is a commonly seen clinical problem.

The space required for the incorporating canine into the arch can be gained by expansion of the maxillary arch, proclination of maxillary incisors, or extraction of the permanent premolars. The segmented T-loop served as a retraction spring, which offered not only a distal traction force on the canine with active tying back, but also a moment for anti-distal tipping as well as torque control of the canine produced by bending up the mesial horizontal portion on the full size 0.017 x 0.025 T.M.A. wire. As the retraction progressed, the ectopic tooth gradually moved distally toward the proper anteroposterior position while the canine still kept its axial inclination.

Unlike the continuous arch wire, in which actions and reactions may occur between adjacent teeth, segmental principles can be used to diminish the undesirable side effects produced on adjacent brackets because it is independent of other parts of the appliance. An additional advantage of the t-loop is that is provides a relatively continuous force which is well controlled and can be easily modified.

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. The decision to extract the premolars is to be good aesthetically, functionally, and for more stable results in these patients.

T.M.A. has excellent spring back properties with good formability. The ectopic tooth is retracted by a segmented T-loop spring made with T.M.A. that accumulates a continuous force from being active tied back, and received an anti distal tipping moment by tip forward bend on the mesial horizontal leg of the t-loop.

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