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Segmental retraction in Orthodontic Treatment of Patient with Ectopic Eruption of Maxillary Canine: A Case Report

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Abstract

Introduction: Ectopic canines are permanent teeth that develop outside of their normal position in the jaw and can be caused by genetic or environmental factors. And require orthodontic treatment to correct it. **Objective:** This case report involves orthodontic treatment using segmental retraction to correct ectopic maxillary canine. **Case Report:** A 13-year old girl complained that her canine tooth was above the other teeth in the right maxilla. The maxillary midline shifted to the right by 3 mm. Cephalometrics showed SNA 810, SNB 770, ANB 40, and overjet and overbite were normal. The molar and canine relation on the right side was class II, and the left side was class I. The patient was treated with segmental retraction to correct the position of the maxillary right canine with extraction of the maxillary right first premolar and extraction of the maxillary left premolar to fix the right shifted midline. After 19 months of orthodontic treatment, facial profile changes were achieved (convex to straight tendency), and ectopic maxillary right canine and shifted midline were corrected. **Conclusion :** Segmental retraction in orthodontic treatment of ectopic canine provides satisfactory results and quick correction for patients and improves occlusion function and aesthetics.

Keywords: ectopic canine, segmental retraction, orthodontic treatment.

INTRODUCTION

Ectopic eruption of canines can lead to further dental problems and discomfort for the patients and can cause the resorption of all or part of the adjacent tooth root or be superimposed on it. Mechanisms of ectopic canine eruption include unknown local pathological processes, trauma, mechanical interference, odontoma, cysts and tumours in the eruption path of permanent teeth, and over-retained deciduous teeth. In addition, displacement of the dental lamina to an abnormal position early in life can cause an abnormal eruption path.[1] The ectopic eruption and impaction of maxillary canines is a frequently encountered problem. The prevalence is estimated to be between 0.92% to 2.2%. It is found to be palatal to the dental arch in about 85% of cases and buccal only in about 15%.[2] Orthodontic treatment is justified because ectopic canine teeth can migrate in the jaw bone and may damage the adjacent teeth roots and bone. Orthodontic treatment is also justifiable for aesthetic reasons. Diagnosing and treating ectopically erupting permanent maxillary canines requires timely management by the orthodontist. The most common sequel is the internal or external root resorption of teeth adjacent to the ectopic canine.[3]

Several treatment options have been suggested to correct maxillary ectopic canines. Extraction treatment of the maxillary first premolars and the mandibular first premolars with maximum anchorage on the maxillary and mandibular arch was one option to correct the canine relationship and crowding in the mandibular arch.

Another option was distalizing the maxillary molars and premolars of the right side to create space for the accommodation of the canine and extracting the mandibular first premolars to correct the crowding with maximum anchorage.[2]

DIAGNOSIS AND ETIOLOGY

A 13-year-old girl came to the orthodontic clinic at the Faculty of Dental Medicine Hasanuddin University Dental Hospital with concerns about her canine tooth above the other teeth in the right maxilla. Intraoral examination found good oral hygiene, healthy gingiva, standard tongue size, normal labial frenulum, correct regio canines Class I and left regio Class II, right regio first molar Class I and left regio Class II, normal overjet and overbite, ovoid-shaped maxillary and mandibular arch and shallow palate. On extraoral examination, the patient had a leptoprosopic face shape with a convex facial profile, competent lips, no TMJ abnormalities, and maxillary dental midline shifted to the right by 3 mm. Examining the study model analysis, an overbite of 2.5 mm and an overjet of 2 mm were obtained.

Model analysis based on the Arch Length Discrepancy (ALD) analysis revealed a discrepancy of 11.5 mm in the maxilla and 2.5 mm in the mandible. Tooth Size Discrepancy (Bolton) analysis gave a lower presentation value than the average presentation, and Howes's analysis showed that the tooth cannot be adequately accommodated at the apical base. In contrast, Pont's analysis showed dental arch contraction in the premolar and molar regions. Panoramic radiographs showed an erupted upper and lower third molars. Lateral cephalogram analysis showed a Class I skeletal malocclusion (ANB 4°) with the normal maxilla (SNA 81°) and retrognathic mandible (SNB 77°).

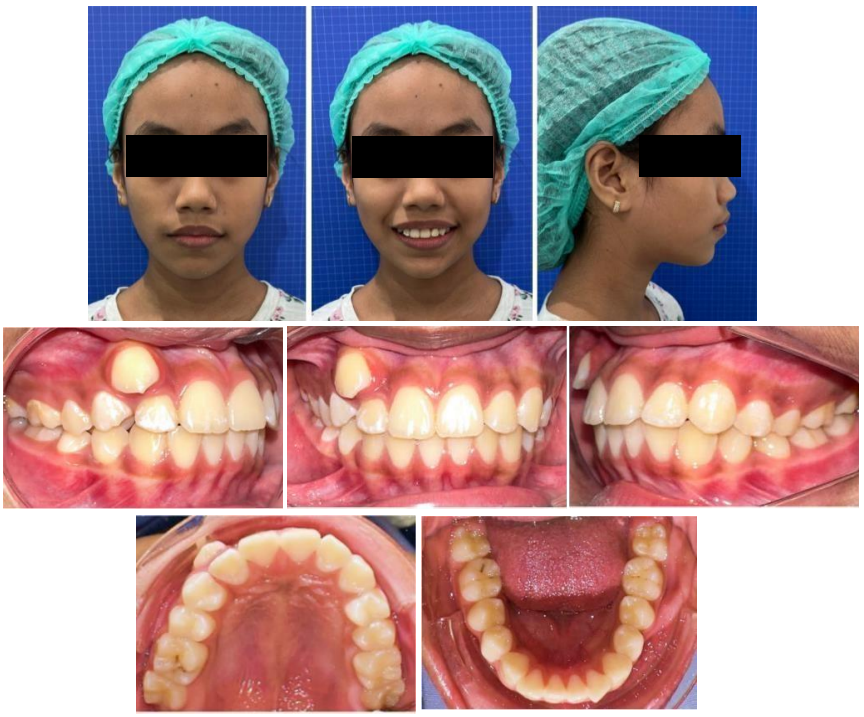

Fig 1. Extraoral and intraoral photograph pretreatment

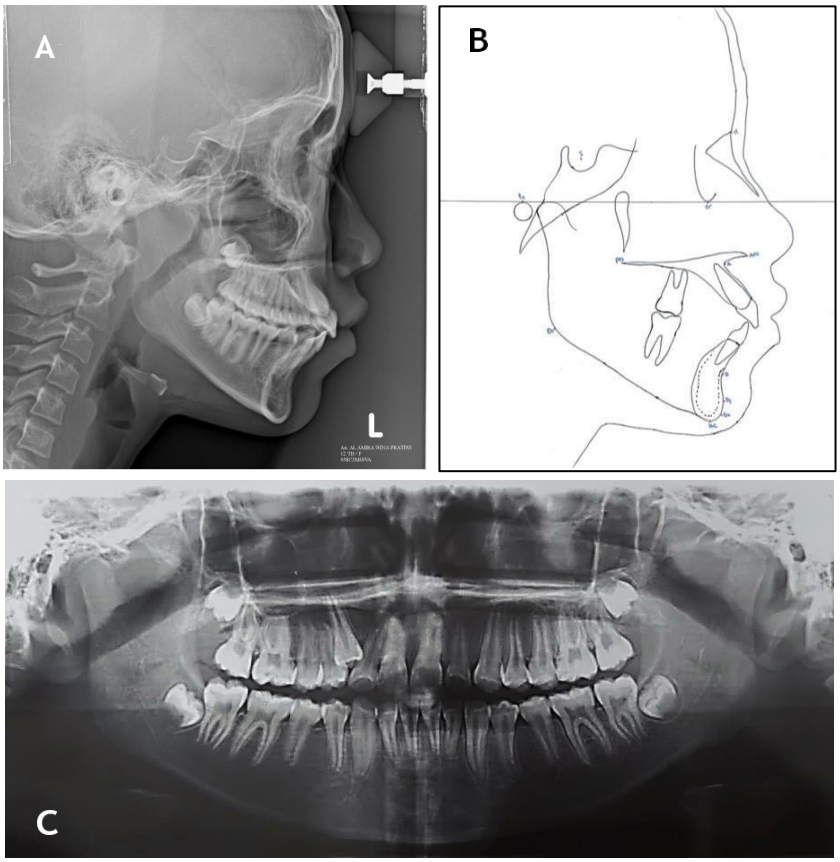

Fig 2. Pretreatment radiographs and tracing. A, Lateral cephalometric radiograph; B, lateral cephalometric tracing; C, panoramic radiograph.

TREATMENT OBJECTIVES

The treatment objectives are to improve dental aesthetics, dental and jaw function, and facial profile; obtain class I canine and molar relationships; and correct dental (ectopic maxillary canine and median line shift).

TREATMENT ALTERNATIVES

If surgical exposure and orthodontic traction of the canine into the dental arch is considered difficult or impossible, autotransplantation or surgical extraction is preferred. Pathological conditions that restrict treatment options to surgical extraction include ankylosis, age-related replacement resorption, invasive cervical root resorption, and pre-eruptive intracoronal resorption.

TREATMENT PROGRESS

Patients are given informed consent before orthodontic treatment and oral hygiene education is conducted. Adherence to oral hygiene measures, especially during orthodontic treatment, is essential to ensure the success of orthodontic treatment. The treatment started with the placement of a molar band on the first maxillary and mandibular molars. Fixed standard edgewise brackets with 0.018×0.022” slots were placed on maxillary and mandibular arches; maxillary first premolars were extracted. Before using the segmented T loop, the ectopic canine was levelled using the lace back ligature wire. Segmental “T” loops were bent from stainless steel 0.014 round wire, ligating the ectopic maxillary right canine for retraction.

The mesial and distal legs of the T-loops were made at different heights because the mesial was shorter than the distal leg to ensure that the extrusion force was as biological as possible. Gradually, this difference between the heights of the legs was diminished, providing extrusion and levelling of the canines in the dental arch. It took approximately 3-4 months to retract the right maxillary canine. At the same time, levelling and alignment of maxillary and mandibular teeth using multiple loop stainless steel 0.014 archwire to relieve crowding. After the ectopic maxillary right canine was corrected, all the teeth on the maxillary and mandibular teeth were level and aligned; the maxillary shifted midline was correct to the left side.

Finishing was accomplished through symmetric and coordinated archwires, maintaining the original dental arches form with rectangular stainless steel archwires. The total treatment time was 19 months. To ensure continued satisfactory post-treatment alignment of the maxillary and mandibular anterior dentition, the continued use of retainers is recommended indefinitely.

TREATMENT RESULT

Post-treatment records revealed that treatment objectives were achieved. Facial photographs showed an improved profile. Class I canine relationships were established with canine- protected occlusion. The crowding of the maxillary and mandibular arch was corrected. Overjet and overbite were maintained, and the midlines coincided with each other and the face. The patient was satisfied with her teeth and profile: good intercuspation and interproximal contacts.

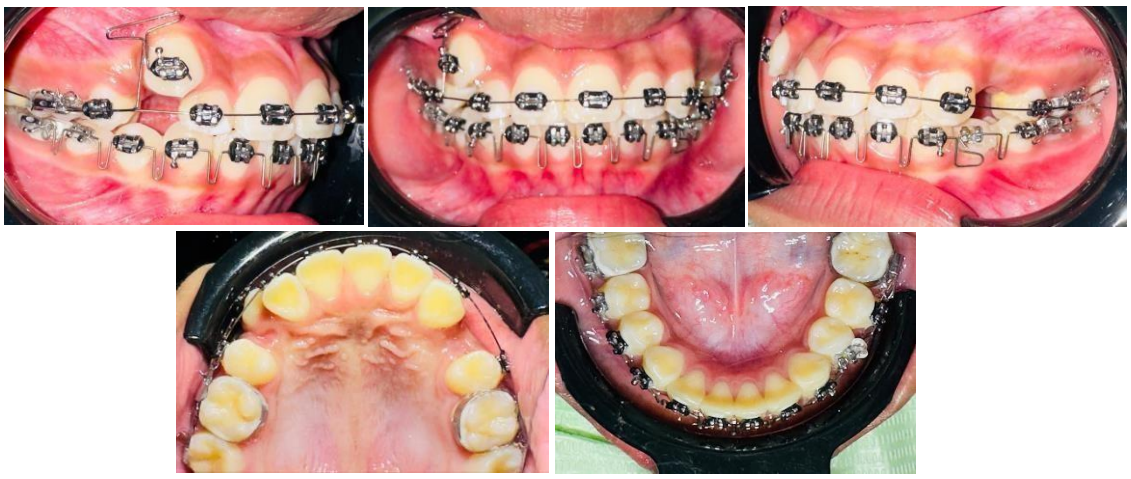

Fig 3. Intraoral Photograph Using Segmental T-loop

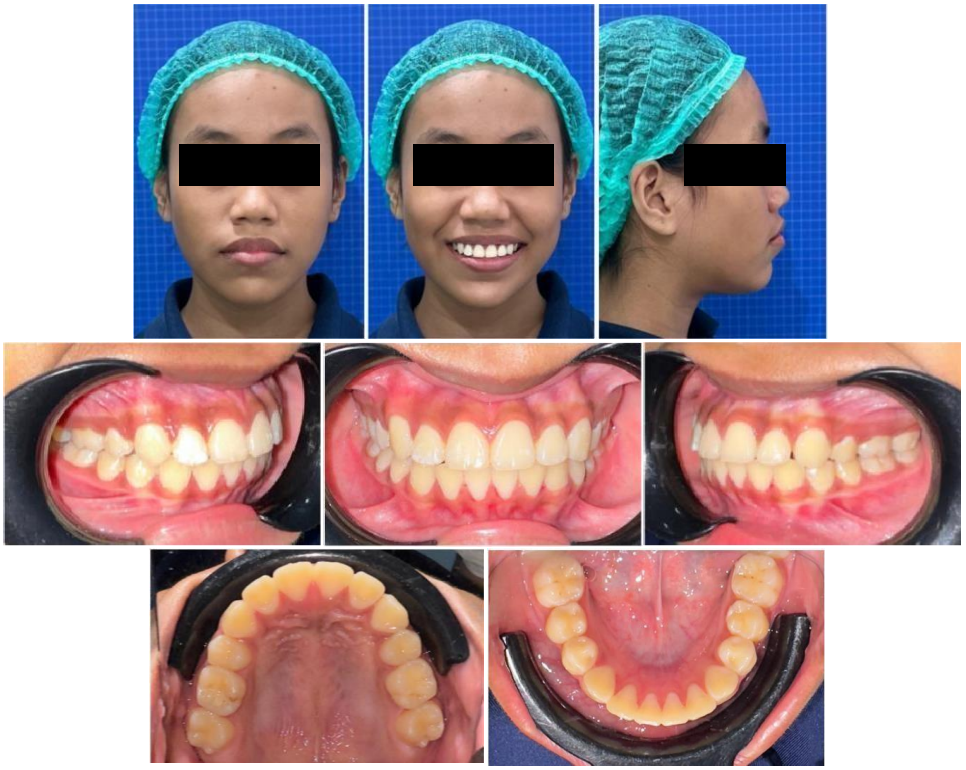

Fig 4. Extraoral and intraoral photographs after 19 months of orthodontic treatment.

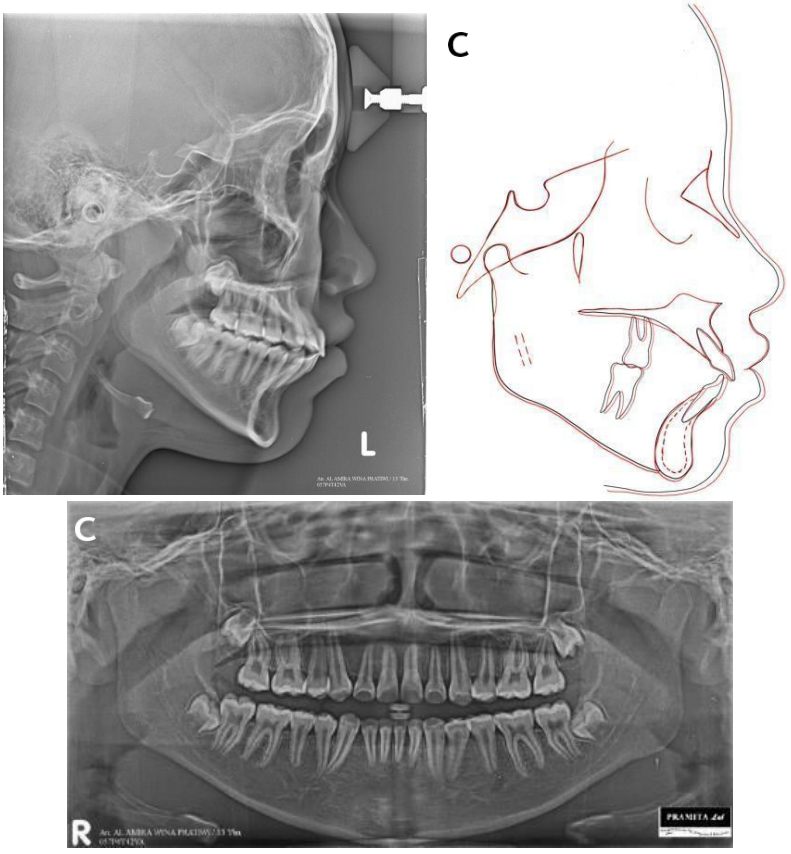

Fig 5. Pretreatment radiographs and tracing. A: Lateral cephalometric radiograph; B, superimpose cephalometric tracing; C, a panoramic radiograph.

Table 1. Pre and post-treatment cephalometric measurement

Parameter	Norm (mean±SD)	Pre	Post
Horizontal skeletal (^{0})			
SNA (^{0})	82 ± 2	81	82
SNB (^{0})	80 ± 2	77	78
ANB (^{0})	2 ± 2	4	4
Wits Appraisal (mm)	1 ± 1	-3	1
The angle of convexity (^{0})	0 ± 5	8	7
Vertical skeletal			
Y-Axis (^{0})	60 ± 4	63	63
FMA (^{0})	25 ± 3	29	31
Dental			
Interincisal angle (^{0})	135 ± 10	115	111
U1-NA (mm)	4 ± 2	7	8
L1-NB (mm)	4 ± 2	9	12
IMPA (^{0})	90 ± 5	97	100
Soft tissue			
Nasolabial angle	Rickets: 115± 2	84	85
	Mc. Namara: 102 ± 8	84	85

DISCUSSION

The ectopic eruption of the canine may be broadly classified under systemic and local factors. McBride states, "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 overall arch length.[5] The buccally displaced canines were also associated with the hyperdivergent growth pattern, constricted maxillary arch, and crowded upper anterior. Identifying the root resorption of the neighbouring tooth before treatment is essential.[6]

Segmental T-loops are used in maxillary canine retraction. The resulting orthodontic load (force and moment) system on the canine is affected by multiple factors, including changes in inter bracket distance (IBD) and tooth angulations.[7]

Canines can be retracted in two ways: Frictional (sliding) mechanics and Non-frictional (non-sliding/loop) mechanics. In the second type, frictionless mechanics, i.e., loops can be fabricated in a segmental or complete archwire and closing loops are usually used in loop mechanics to extract space closure. The significant advantage of segmental loop mechanics is the lack of friction between the bracket and archwire during space closure. The T-loop has been recognised as an effective means to achieve desired tooth movement by differential moments between the anterior and posterior segments.[8]

In cases where the ectopic canine is present, with or without transposition, the correct diagnosis for positioning this tooth in its respective bone bases proves to be vital. Tooth movement should be performed in the centre of the alveolar ridge and in areas where the band of attached gingiva is at its largest. It should be emphasised that proper biomechanical control, with simple procedures combined with the need to create spaces for tooth movement (which includes the need for extractions), are some of the essentials of orthodontic practice.[9]

Corrective treatment was the choice in the present case because of the advanced stage of the dentition when the patient sought treatment. Significant factors were taken into account when determining the ectopia treatment plan for maxillary canines. The positioning of crowns and roots of canines and upper lateral incisors, the absence of root resorption, the crowding, and the patient's motivation were noted.

CONCLUSION

The successful treatment of a patient with an ectopic tooth and crowding can be a challenging task for an orthodontist. Proper treatment of an ectopic canine patient with crowding requires careful treatment planning by the orthodontist. Thus, the use of Segmental mechanics is effective as it helps in reducing the unwanted effects of continuous arch mechanics. Controlled movements of the canines with the aid of segmental T-loop springs with helicoids and proper anchorage control enabled a simple and predictable approach. The ectopic canine was successfully aligned with normal overbite and overjet. The shifted upper midline was also corrected. The patient’s occlusion and smile esthetics were significantly improved with normal and stable occlusion between the maxillary and mandibular arch.

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