

ORTHODONTIC MANAGEMENT OF UNILATERAL MAXILLARY CANINE IMPACTION: A CASE REPORT

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ABSTRACT

Management of impacted maxillary canines is considered to be complex and challenging task by orthodontists & oral surgeons due to the varied biomechanical considerations involved. Maxillary canine is an essential part of teeth for smile esthetic and function. Orthodontic treatment for patient with impacted maxillary canine is considered to be more complex and require good biomechanical control during traction. This case report describes an orthodontic treatment of a 18-year old male patient, presented with unilateral maxillary canine impaction on the Right side. Upper and lower arches were aligned and space was created for tooth number 13, as well as spacing between 11, 21 is closed. The impacted canines were surgically exposed, and guided traction was employed to place it in its ideal position. A class I canine and premolar, molar relation was established. The smile aesthetics were also improved. The orthodontic treatment had been completed within 19 months and successfully obtained with stable occlusion. The result remained stable 6 months after the end of treatment.

KEY WORDS

Impacted canines, de-impaction of canines, arch development, guided eruption

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INTRODUCTION

Tooth impaction has been defined as the infraosseous position of a tooth after the expected time of eruption,¹ or it can be said that the tooth in question has not erupted into the oral cavity beyond its normal time of eruption. Being the last tooth to be developed through the longest path of eruption, the maxillary canine has the highest incidence of impaction after third molar.² The incidence has been reported to have range between 0.92-2.2%.^{3,4} Furthermore, impacted maxillary canine have gender predilection as maxillary canine impaction is twice as common in females as compared to men.⁴ The frequency of canine impactions in the maxilla is more than twice that of those observed in the mandible.⁴ Reports stated that majority of maxillary canine impaction occurs unilaterally.² The maxillary tooth impaction can be either labial or palatal with respect to the position from the dental arch. About one-third of all impacted maxillary canines are labially impacted, while two-thirds are palatal in location.^{5,6}

Ericson and Kurol suggested that (1) asymmetry on canine bud palpation between 2 sides, (2) inability to palpate the canine, and (3) late eruption of the maxillary lateral incisor or pronounced buccal or labial displacement are clinical signs of maxillary canine eruption disturbance. In the panoramic radiograph, the superimposition of the cusp tip of maxillary canine buds with the roots of the lateral or central incisors is a sensible method to predict canine impaction. This method can identify almost 80% of the canines likely to become impacted.⁷

The aetiology of impacted canine is believed to be multifactorial and having idiopathic origins.⁸ However, there are several theories proposed as potential etiological factors; for example, prolonged retention or early loss of deciduous canine, absence or anomaly of upper lateral incisors, local obstruction, pathology, and genetic factor.^{2,9}

Early diagnosis and timely interception provide better prognosis to manage the impacted canines.

Various imaging modalities, such as intraoral periapical radiographs, occlusal radiographs orthopantomograms (OPGs), cone-beam computed tomography, etc, have been suggested in the

identification, diagnosis, and localization of the impacted canine.

In this case report, we present a case of labially impacted canine in an 18-year-old male patient and was treated using a preadjusted edgewise system.

CASE REPORT

An 18-year-old male patient came to the Department of Orthodontics & Dentofacial Orthopaedics with a chief complaint of missing teeth on upper right side and irregularly arranged teeth with a wide gap between anterior two front teeth. There was no contributory medical or dental history.

Extra Oral examination, revealed straight facial profile with a euryprosopic facial type. Lips were competent with an inter-labial distance of 0 mm. Face was apparently symmetrical with a normal chin and mento-labial sulcus. He had no pain or crepitus on temporomandibular joint examination. Upon further

clinical examination, no deviation on opening and closing of mandible was observed. (Fig 1A-C)

Intra-oral examination, revealed the presence of all erupted permanent teeth until the second molars, with the absence of right permanent maxillary canines and presence of spacing in between 12, 14 with wide Diastema between 11, 21 & rotations in 11, 21 teeth. He also had Class I molar relationship and class I canine relationship on left side with no canine relation on right side, with 3.5 mm of overjet and 2.5 mm of over bite was observed. The maxillary incisors were having mild retroclination, with mild proclination of lower incisors. The maxillary dental midline was coincident with the facial midline, with lower arch midline shifted towards right by 0.5 mm to the upper arch dental midline. (Fig 2A-E.) The arch forms were ovoid for both the maxilla and mandible. The gingiva appeared normal. The size and shape of tongue were normal too.

On Radiographic examination, the panoramic radiograph, CBCT showed a complete permanent dentition with impacted upper right maxillary canine



Figure1(A-C):Extra-oral photographs before treatment



Figure2(A-E):Intra-oral photographs before treatment

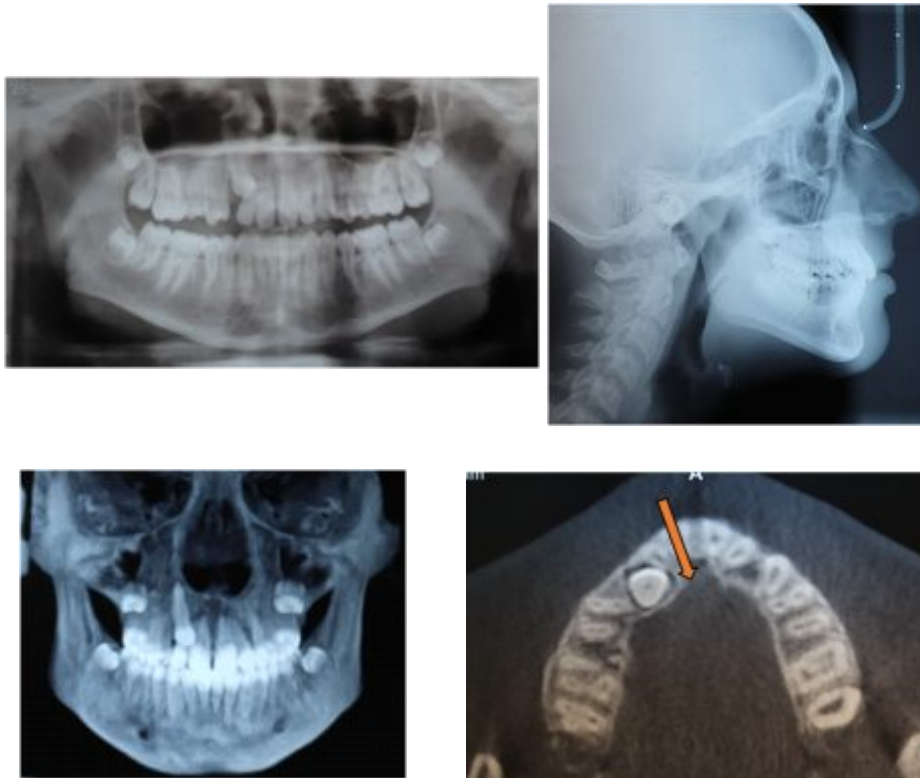


Figure2(A-D) Pre-Treatment Radiographic examination



Fig.3. Surgical exposure of Impacted right maxillary canine



Fig.4[A-C] Mid-Treatment photographs

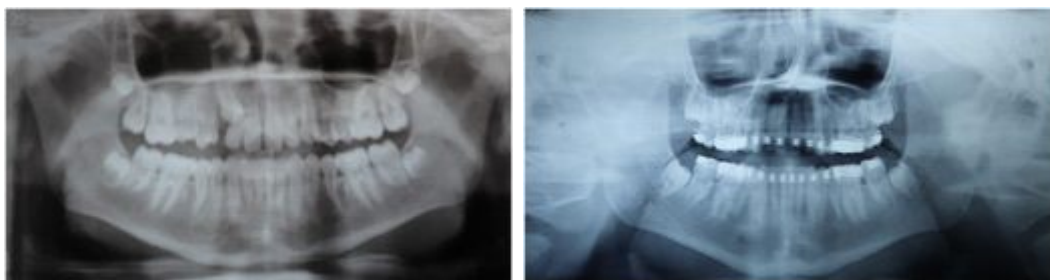


Figure 5:Pre &Post treatment Orthopantomogram

which is closer to labial cortical bone. Maxillary and mandibular third molars unerupting stage (Fig.4).The bony borders of the mandible and maxilla were normal. The temporomandibular joint appeared normal, with a normal size and shape of the condylar head and glenoid fossa The lateral cephalogram confirmed the Class II skeletal base with average growth pattern (Fig.3A-D) and (Table1).

Upon assessing the impacted cuspids for severity using sector classification,10,11 it was seen that tooth number 13 was present in sector I and had an angulation of 27° suggestive of favourable prognosis.

DIAGNOSIS:

A18 year old male patient with Angle's class I malocclusion on class II skeletal bases with average growth pattern. Impacted 13, rotated upper anteriors, with 3.5 mm of overjet.

PROBLEMLIST

Skeletal problems:

1. Class II skeletal base.

Cephalometric values	PRE	POST
SNA(Degree)	81°	81°
SNB(Degree)	77°	77°
ANB(Degree)	4°	4°
WITS	+1mm	0.5mm
UI-NA (angular)	20°	18°
UI-SN	100°	97°
IMPA(Degree)	92°	92°
NA per-pt. A	+2mm	+2mm
NA per-pog	0mm	-1mm
FMA	27°	28°
LAFH	57°	58°
Interincisal angle	130°	134°
Y-Axis	61°	62°
Nasolabial Angle	106°	110°

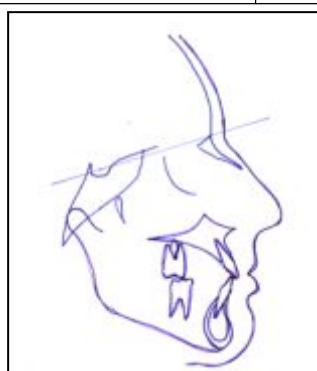


Fig.7 : Superimposition of final tracings on SN, centered on S. (Blue: -Pre-Treatment and Black: -Present-Treatment)

Dental problems:

1. Impacted 13
2. Diastema 11 & 21
3. Spacing 11,12,21
4. Disto-palatally rotated 11,21
5. overjet – 3.5mm
6. Crowding 31,32,41,42

TREATMENT OBJECTIVES

1. Gain space for maxillary permanent canines (tooth number 13) and guide them to their proper position.
2. Relieve crowding in mandibular anterior teeth
3. Close spacing in maxillary anterior region.
4. Achieve normal axial inclinations.
5. Achieve a functional occlusion (class I canine relationship) and a canine-guided occlusion.
6. Preserve lip competency.
7. Preserve class I molar occlusion.
8. Preserve straight profile.



Figure 6:Pre andPost-treatment Cephalogram



Fig.8:Post Treatment Extraoral and Intraoral photographs

Proposed Treatment Plan

A pre-adjusted edgewise appliance 0.022 in \times 0.028 in slot of MBT prescription was employed.

Steps:

1. Level and align the arches.
2. Alleviate crowding between dental units.
3. Create space for maxillary permanent canines (3).
4. Initiate minor surgical procedures to uncover 13 bond orthodontic attachments, and apply traction (a, full thickness flap raised for surgical exposure of tooth number 13
5. Perform guided eruption with tooth numbers
6. Finish and detail the occlusion.

Proposed retention strategy: bonded lingual retainers with tooth numbers 11,12,13,21,22,23 and 31,32,33,41,42,43

TREATMENT PROGRESS

The treatment was commenced with a pre-adjusted edgewise appliance 0.022 in \times 0.028 in slot of MBT prescription. The initial alignment was done using 0.012 in, 0.014 in nickel-titanium wires. The teeth were allowed to unravel, and arch development was continued till placement of 0.017 in \times 0.025 in nickel-titanium archwires in both arches. After 6 months of treatment, consolidation of upper arch was done, followed by placing an open coil spring in 0.017 in \times 0.025 in stainless steel between right premolar and lateral incisor in order to give space for the impacted canine. Once an adequate space had been achieved, a full thickness mucoperiosteal flap was raised for surgical exposure of tooth number 13, attachment was bonded on the canine surface, and traction with stainless steel spiral ligature archwire was conducted. After 9 months, the upper left canine was bonded, and both releveling and realignment phases were performed. [Fig.3A-C] Finishing and detailing was carried out with bending and settling elastics. The active treatment had successfully been



Fig.9 : Post Retention Intraoral photographs

completed within 21 months. On the day of debonding, upper & lower fixed retainer was given. Patient was asked to come for regular checkups every 6 weeks.

TREATMENT RESULT

The labially impacted canine was properly aligned in the maxillary arch by orthodontic traction.

Ideal overjet and overbite were also achieved. Class I canine and molar relationship with a functional occlusion were established. The panoramic film demonstrated root parallelism was achieved. The cephalometric radiograph analysis and superimposition have shown no significant change in skeletal and dental parameter. The treatment goals and objectives were accomplished, and the patient and her parents were pleased with the final result.

DISCUSSION

Labial impaction of a maxillary canine is due either to ectopic migration of the canine crown over the root of the lateral incisor or shifting of the maxillary dental midline, causing insufficient space for the canine to erupt.¹²

There are three diagnostic methods for impacted canine: inspection, palpation, and radiography.¹³

Whether it locates buccally or Palatally, the canine bulge should be seen between the lateral incisor and first premolar. Abnormalities or agenesis of lateral incisor could also indicate a higher risk of canine impaction. In addition, the deciduous canine mobility should be observed to prevent any prolonged retention of the tooth. Clinical palpation of the canine bulge from age of 8 years old is recommended by previous study as it was proven to,

bring significant benefit for determining canine position.¹⁴

While evaluating the position of the impacted canine, the orthodontist must assess radiographs to determine the accurate position of the crown. The orthodontist must rely on the cbct, to identify the exact labiolingual position of the crown. 3D CT images clearly showed the impacted teeth, including crown, root neck, and root bifurcation; the labial or palatal location; and the eruption orientation and relationship to the dentition. 3D CT images obtained with 3D surface reconstruction of spiral CT images is accurate and effective for examining impacted teeth before orthodontic treatment.¹⁵ The other method is, buccal object rule, which states that when viewing 2 adjacent periapical radiographs of the impacted tooth taken at slightly different horizontal angles, the buccal object will move in the opposite direction of the x-ray beam. If the impacted canine were located labially, the crown of the tooth would move in the opposite direction to the x-ray beam. A mnemonic method for remembering this principle is the S.L.O.B. rule (same lingual opposite buccal).¹⁶

Olive¹⁷ suggested that opening space for the canine crown with routine orthodontic mechanics might allow for spontaneous eruption of an impacted canine. However, in some situations, even these techniques do not work, and the orthodontist must refer the patient to have the labial impaction uncovered surgically. The mechanics to erupt a labially impacted tooth should mimic the normal eruptive process. If the canine crown were uncovered with a closed-eruption technique, the orthodontist should select mechanics that erupt the tooth into the center of the alveolar ridge. This method would produce normal labial gingival relationships over the erupted tooth. The orthodontist should avoid mechanics that draw the tooth labially, which could produce a bony dehiscence and accelerated migration

of the labial gingival margin, resulting in labial recession.¹²

Both anchorage planning and biomechanics during orthodontic treatment hold an important role in treating impaction cases. In this case, the labially impacted canine was ligated with stainless steel ligature wire on a 019 x.025-inch SS arch wire. The force should be light, less than 2 oz. The orthodontic treatment was completed in 19 month and successfully obtained favourable esthetic and stable occlusion.

CONCLUSION

Maxillary canine impaction is a common case in orthodontics. Through a combination of clinical and radiographic diagnosis and careful planning of orthodontic biomechanics, the labially impacted canine treatment will give an esthetic and functionally stable results.

Patient Consent:

Provided.

Conflict of Interest Statement

The authors declare no conflicts of interest

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