

Forced Orthodontic Eruption of Impacted Maxillary Canine: A Case Report

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ABSTRACT

Maxillary canines affect the smile and facial esthetics providing upper lip and alar base support. This article presents the case report of skeletal class I malocclusion with Angle's class III (Right) subdivision and impacted left maxillary canine of poor prognosis for traction which was managed successfully with a combined surgical and orthodontic approach. The diagnosis of the impaction was done through the Orthopantomogram, intra-oral periapical, and occlusal radiographs and was localized buccally through clinical examination and Clark's technique. The impacted canine was brought into the arch which improved the smile and self-esteem of the patient.

Keywords: Canine impaction; clark's technique; orthodontic traction.

INTRODUCTION

Maxillary canines play an important role in the smile and facial esthetics as they provide support to the upper lip and alar base, also they have a great functional impact as they provide canine guidance during the excursive movements of mandible.¹ Maxillary canines are the most commonly impacted teeth after the third molars with prevalence of around 2.5%.² The causes of canine impactions include generalized or localized although most common causes are usually localized.³ This case report is unique as it reports the successful orthodontic management of impacted canine with poor prognosis.

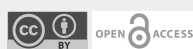
CASE REPORT

A sixteen-year male patient came to the department of Orthodontics with the chief complaint of spacing in the left upper front region of the jaw. He had

history of extraction of deciduous tooth in the left upper tooth region of the jaw 1 month back. Medical history, personal history, and family history were not significant. On clinical examination, built was mesomorphic; head brachycephalic (Cephalic index = 90.9%), face leptoprosopic (Facial index = 93.1%), facial form square tapering, and tip of nose was slightly deviated to right side. Profile of the patient was convex, facial divergence was posterior, nasolabial angle normal, lips competent and mentolabial sulcus normal. On functional examination, respiration was oro-nasal, mastication normal, deglutition normal, speech normal, temporomandibular joint normal, and path of closure was normal. On intra-oral examination, staining of teeth in palatal surfaces of upper incisors, lingual surfaces of lower incisors, brushing with non-fluoridated toothpaste. Frenal attachment mucosal, tongue-tie was present, tongue size, shape was normal, movement reduced, high palatal arch, gingival and periodontal status normal. On hard tissue examination, number of teeth present clinically was 27. Number of teeth unerupted were 18, 28, 38, and 48. There was missing 23 (Figure 1). On palpation, there was bulge over the apex of the 22 on buccal aspect. The diagnosis of impaction of 23 was confirmed on Orthopantomogram (OPG) shown in figure 2, intra-oral periapical (IOPA), and

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Figure 1: Pre-treatment left lateral intra-oral photograph.



Figure 2: Pre-treatment Orthopantomogram.

maxillary occlusal radiographs. The shape, size, and form of teeth were normal. Maxillary arch was oval, asymmetrical with missing 23. Mandibular arch was oval, apparently asymmetrical, presence of crowding, mesiobuccal rotation of 33, 43, and lingually placed 42. Maximum opening of the mouth was 45 mm, freeway space 1.5 mm and curve of spee 2.5 mm. Molar relation was super class I on right side and class I on left side. Canine relation was class I on right side and was not possible to assess on left side. Incisor relation was class I with overjet 1.5 mm and overbite 2.5 mm which was 31% of the lower incisors. Facial midline was coincident with upper and lower dental midline.

On smile analysis lip line was suggestive of average lip line, smile arc non-consonant, upper lip curvature straight, smile style complex, buccal corridor present, symmetrical, zenith of 11 was gingivally located than 21, Zenith of 22 was more gingivally located than 21 and squarer appearance of upper central incisor with golden standard of 85%. On OPG there was impacted 23 and Clark rule showed buccal position of 23.³ On lateral cephalogram patient was on Cervical Vertebrae Maturation (CVM) CS stage 4. On cephalometric analysis, ANB angle was 2° with SNA = 86° and SNB = 84° suggestive of

skeletal class I malocclusion, and SN-GoGn angle was 31° suggestive of horizontal growth pattern. Upper and lower lips were placed 3 mm and 0.5 mm behind Steiner’s S line suggestive of retrusive upper and lower lips. Dental diagnosis was Angle’s class III (Right) subdivision. Assessment of the prognosis for the favorability of traction was done which was suggestive of poor prognosis (Table 1).⁴

Since the patient had skeletal class I malocclusion; corrective orthodontics was planned. The patient was explained about the prognosis of traction of the impacted 23. With proper counseling of the patient, bonding of MBT 0.022” slot brackets in the upper and lower arch was done according to MBT individualized bracket positioning chart. 22 was not bonded initially to prevent the inadvertent collision of 23 crown with root of 22. Transpalatal arch (TPA) was placed to reinforce anchorage in maxilla for traction of 23. Closed eruption technique was used for eruption guidance of 23. 0.014” Nickel Titanium (NiTi) then 0.016” NiTi and finally 0.018” NiTi was used in both upper and lower arch. After alignment and leveling 0.018” Stainless Steel (SS) archwire was placed. Open coil spring was placed between 22 and 24 to open space for impacted 23. After enough space was created preparation for surgical exposure

Table 1: Assessment of impacted maxillary canine

Category	Position	Prognosis
Horizontal Overlap of incisor	Complete overlap of lateral incisor	Poor
Vertical overlap	More than half to full root length of lateral incisor	Average
Angulation	75°	Poor
Position of apex	Above second premolar	Poor

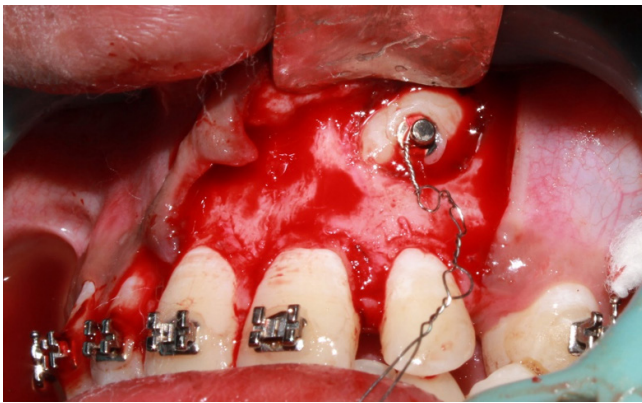


Figure 3: Surgical exposure and placement of orthodontic attachment.

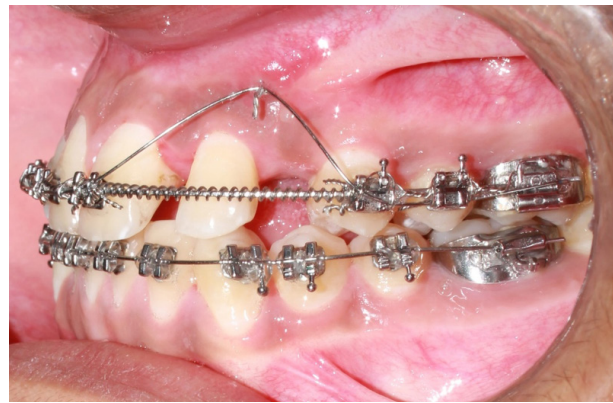


Figure 4: Orthodontic traction of 23.

was done. Full-thickness flap was raised and lingual button was attached over crown portion of the 23 (Figure 3). Ligature wire was tied in the lingual button and flap was repositioned. After 21 days, traction was started through the 0.012" NiTi piggyback archwire over 0.019" x 0.025" SS base archwire (Figure 4). To reinforce anchorage all the teeth were consolidated. After 23 was in the arch, alignment and leveling was done through 0.014" and 0.016" NiTi archwire. In the end, 0.016" SS archwire was used for settling of posterior teeth. Lingual bonded retainer was placed as a retainer in both upper and lower arch. The total treatment duration was 32 months which falls within the average treatment duration of 12-36 months.⁵

DISCUSSION

Most common cause of buccal canine impaction is crowding in the arch.¹ However in this case there was spacing in the arch. Only 17% of labially impacted upper canines have enough eruption space.¹ Thus the prolonged retention of deciduous canine upto 16 years could be the cause of impaction of permanent canine in this case.³ The extraction of deciduous canine as early as 8 or 9 years of age could be used as an interceptive approach in uncrowded cases.³ The diagnosis of buccal canine impaction was done through the clinical palpation and Clark technique. Of all upper canine impactions, two-thirds are palatally located while only one-third are buccally located.¹ When two periapical films with the change in horizontal angulation is taken and the object moves in the same direction as the cone, it is lingually positioned and if the object moves in the opposite direction, it is buccally located.³ With the

use of periapical films the clinician is able to evaluate the position of the canine with sufficient accuracy in 92% of the cases.³ Treatment options for the impacted canine include no treatment if the patient doesn't desire, autotransplantation of the canine, extraction of the impacted canine and movement of the first premolar in its place, extraction of the canine and posterior segmental osteotomy to close the canine space, prosthetic replacement of the canine, surgical exposure of the canine and orthodontic treatment to bring the tooth into the dental arch.³ Among all the treatment options given to the patient and also clinical and radiographical examination, surgical exposure and orthodontic treatment to bring the tooth into the line of occlusion was the desirable treatment approach for this patient. Grisar et al managed the impacted canine through autotransplantation which was different from the present case.⁶ This patient came for treatment when the apex of the impacted tooth was already closed, whereas autotransplantation is reported to be successful when the donor tooth is in developing stage.⁷ The study by Albert et al performed the treatment of impacted maxillary canine by its surgical removal. This method was chosen for its management as it was in an inverted unfavorable position.⁸ The common surgical methods for labially impacted canine include apically positioned flap, excisional gingivectomy, and closed eruption technique.⁹ The closed eruption technique was followed for this case as crown was deeper in the alveolus and crown was significantly apical to mucogingival junction.¹⁰ Mohammad SA used temporary anchorage device for the forced eruption of upper labially impacted



Figure 4: Orthodontic traction of 23.

canine.¹⁰ However, TPA was used in this case to reinforce anchorage along with consolidation of remaining teeth in the arch. The stiffer SS archwire was used as the base archwire and lighter NiTi archwire was used to apply the traction force.

At the end of treatment, 23 was brought into the arch (Figure 5). The smile of the patient improved from non-consonant to consonant smile. The complication encountered during this treatment was the slight amount of gingival recession with respect to 23. This may be due to more buccal root torque in the tooth. This could be prevented with the proper torque of the tooth in the future.¹⁰ Thus, the finishing of the case could be achieved better in the future with the proper torque in the impacted tooth and no gingival recession. The lost torque was not regained in this case as the patient was already tired of the long treatment duration. Also, a recent technique like miniscrew or temporary anchorage device could be used in the future for better anchorage control and

better result.¹⁰ An increased incidence of ankylosis is also associated during the orthodontic treatment of impacted teeth.³ However, this complication was not found in this case.

SUMMARY

The management of severely impacted canine is complex which requires the good communication between oral surgeon and orthodontist. The orthodontic traction of impacted left maxillary canine was successfully carried out which improved the smile and self-esteem of the patient.

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Conflict of interest: None

NJHS

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