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A Case Report on the Surgical-Orthodontic Treatment of All Four Impacted Canines.

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KEYWORDS

Surgical-orthodontic, impacted, all four canines impacted.

ABSTRACT:

Introduction

In orthodontics, impacted canines are frequently seen. The most often impacted teeth are third molars followed by maxillary. However, canine impaction in all the quadrants is a rare phenomenon and is usually accompanied with over-retained deciduous teeth or any other irregularities in the arch. This case report illustrates atypical cases where all the four canines are impacted. All the impacted canines were surgically exposed, attachments were bonded and traction was done using steel ligature wire and were positioned in in final position using fixed orthodontic mechanotherapy.

Introduction

An impacted tooth is defined as tooth whose roots are two-third or fully developed but nevertheless expected to erupt spontaneously. Impacted teeth as defined by Shafer, Hine, and Levy as those that are blocked from erupting by a physical barrier in the eruption route such as malposition, lack of space in the arch or other impediments[(1)].

Any tooth can get impacted; however the most common ones are third molars, which are followed by maxillary canines, mandibular second premolars, maxillary premolars, or maxillary incisors [(2,3)]. The frequency of maxillary or mandibular canine impaction varies from 0.008% to 8.8%, whereas the prevalence of canine impaction alone ranges from 0.8% to 2.8%. [(4)]. Palatally impacted canines are more common than buccally affected ones. It is twice as prevalent in women as in males. Unilateral occurrences of maxillary impacted canines are more common (92%) than bilateral ones (8%) [(5)]. Impacted mandibular canines occur in between 0.10 and 0.31% of cases [(4)].

Most impactions are asymptomatic and usually show no obvious abnormalities, with the exception of maxillary incisors. Impacted teeth may develop pathological issues, including cyst development, loss of arch length,

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transferred discomfort, and resorption of neighbouring dental roots [6]. The permanent canines serve as the cornerstone of a functioning occlusion and a balanced grin[7]. A flattened top lip seems more obvious when canines are absent since they also support the cheek. Impacted canines raise the likelihood of infection and cyst development and negatively affect the long-term prognosis of nearby lateral incisors due to root resorption. Impaction of all four permanent canines is quite rare.

Bishara who summarized Moyer's etiological cause of maxillary impacted canine into primary (localized) and secondary (generalized). The localized factors responsible for maxillary canine impaction may be: (i) tooth size-arch length disparity (ii) early loss or extended retention of deciduous canines (iii) abnormal placement of the tooth germ before enamel development (iv) trauma to deciduous tooth bud (v) ankylosis (vi) cyst or neoplasm (vii) severely dilacerated roots (viii) idiopathic. The systemic factors responsible for maxillary canine impaction may be: (i) abnormal muscle pressure (ii) febrile condition (iii) endocrine disturbances (iv) vitamin D deficiency (v) irradiation [6].

The factors for mandibular canine impaction may be: (i) tooth size- arch length disparity (ii) supernumerary teeth (iii) early loss or extended retention of deciduous canines (iv) genetic factors (v) endocrine imbalance (vi) tumours or cysts (vi) trauma [8].

Impacted teeth can be treated by extraction, followed by a prosthetic replacement or implant-supported therapy. An impacted tooth's surgical release and orthodontic traction to the dental arch is the preferred technique if their location in the bone permits an orthodontic-surgical therapy. Treatment duration, surgical approach, orthodontic technique, and potential problems likely to occur in the course of treatment, mostly rely on where the impacted tooth is located [4].

Case Report

With the primary complaint of spacing in the upper and lower front tooth region, a 15-year-old girl patient came to the Department of Orthodontics and Dentofacial Orthopaedics, Government Dental College and Hospital, Ahmedabad, Gujarat. The patient's dental history included extraction of over-retained deciduous teeth irt 63 and 73, restoration irt 16, 26, 36, 46, 47, and no relevant past medical history.

Clinical Examination

Extra-oral examination shows mesoprosopic facial form, straight profile, transversely and vertically well-proportioned facial form, competent lips, average nasolabial angle and non-consonant smile arc. **(Figure 1)**

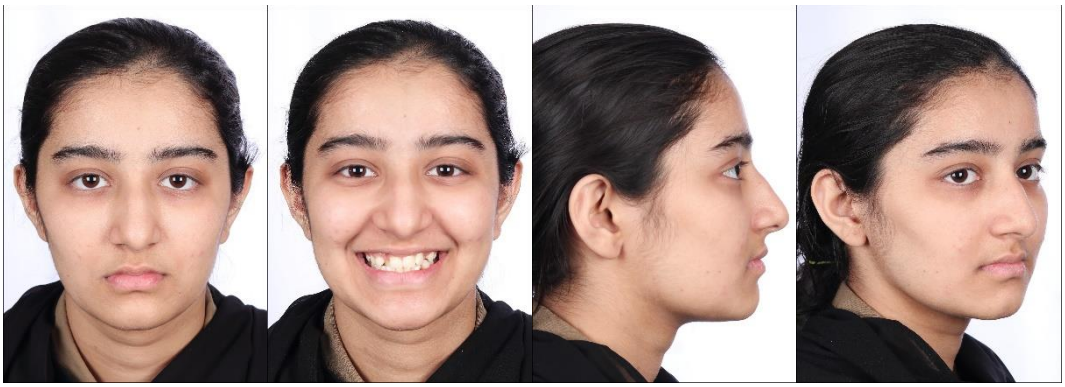

Figure 1: Pre-Treatment Extra-Oral Photos

Intra-oral examination shows Angle's Class I molar relation bilaterally, canine relation cannot be assessed bilaterally due to missing canine in all the quadrants, overjet of 2 mm and overbite of 4 mm. The right maxillary lateral incisor was in crossbite, over-retained deciduous teeth irt 53 and 83, lower dental midline shifted to left side by 1 mm, rotated teeth irt 35,45. **(Figure 2)**

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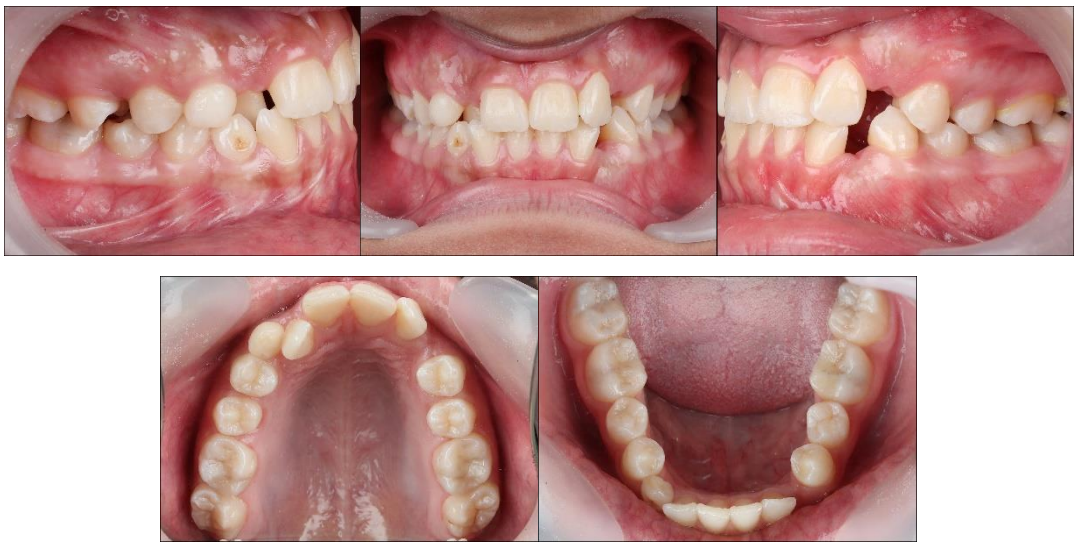

Figure 2: Pre-Treatment Intra-Oral Photos

Radiographic Examination

Orthopantomograph reveals impacted teeth irt 13, 23, 33, 43, presence of third molars irt 18, 28, 38, 48, over-retained deciduous teeth irt 53 and 83 and no periapical pathology was seen. **(Figure 3).** The impacted canine location in all quadrants of the impacted were suitable for surgical exposure and traction.

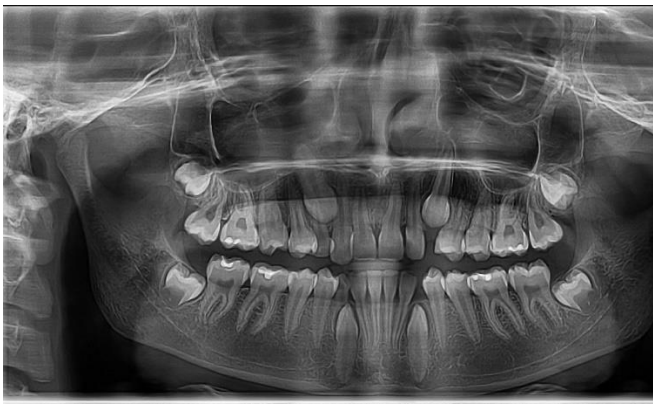

Figure 3: Pre-Treatment OPG

Lateral cephalogram reveals Class I maxilla-mandibular relation with orthognathic maxilla and mandible, low mandibular plane angle, proclined upper incisors and retroclined lower incisor. **(Figure 4) (Table 1, 2, 3)**

Figure 4: Pre-Treatment Lateral Cephalogram

Table 1: Skeletal Parameters

Parameter	Pre-Treatment	Post-Treatment
SNA	80°	80°
SNB	79°	79°

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www.jchr.org
JCHR (2025) 15(4), 3042-3049 | ISSN:2251-6727

ANB	1°	1°
N PERPENDICULAR TO POINT A	-2mm	-2mm
N PERPENDICULAR TO POINT POGONION	-6mm	-6mm
GO-GN to SN	26°	27°
ANGLE TO INCLINATION	82°	81°
LOWER ANTERIOR FACIAL HEIGHT	59mm	59mm
EFFECTIVE MAXILLARY LENGTH	79mm	79mm
EFFECTIVE MANDIBULAR LENGTH	22mm	22mm
Y AXIS ANGLE	60°	60°
FACIAL AXIS ANGLE	0°	0°
SUM OF POSTERIOR ANGLES	388°	388°
OCCLIUSAL PLANE to SN	17°	17°

Table 2: Dental Parameters

Parameter	Pre-Treatment	Post-Treatment
UPPER INCISOR TO NA (ANGULAR)	31°	28°
UPPER INCISOR TO NA (LINEAR)	5mm	5mm
UPPER INCISOR TO SN PLANE (ANGULAR)	111°	109°
LOWER INCISOR TO NB (ANGULAR)	16°	24°
LOWER INCISOR TO NB (LINEAR)	3mm	4mm
LOWER INCISOR TO A-POG LINE	1mm	3mm
INCISOR-MANDIBULAR PLANE ANGLE	83°	91°
INTER-INCISAL ANGLE	132°	128°

Table 3: Soft Tissue Parameters

Parameter	Pre-Treatment	Post-Treatment
UPPER LIP TO S-LINE	-1mm	-1mm
LOWER LIP TO S-LINE	0mm	1mm
LOWER LIP TO E-PLANE	-2mm	-2mm
NASAOLABIAL ANGLE	99°	100°

Journal of Chemical Health Risks

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JCHR (2025) 15(4), 3042-3049 | ISSN:2251-6727

Treatment Objectives

The objectives were levelling and alignment, Class I canine relation bilaterally, functional occlusion by bringing all four affected canines into canine guided occlusion, normal overjet and overbite, and a consonant smile arc

Treatment Plan and Sequence

In order to bring the maxillary and mandibular canines into occlusion, occlusally directed forces were to be used after surgical exposure. Case was started with extraction of over-retained deciduous canine irt 53 and 83. Nance palatal arch in maxillary arch and the lower arch's lingual holding arch was cemented for anchorage. The upper and lower arches were bonded using 0.022" MBT PEA brackets. (3M Gemini Twin Metal Bracket)

Prior to the canines being surgically exposed, wire progression was done to 0.019" x 0.025" stainless steel in both the upper and lower arches to stabilise the arches. Space was regained in each quadrant using an open coil spring. Cross bite correction of right maxillary lateral incisor was done using Piggy-Back mechanics.

After leveling and alignment, surgical exposure of buccally impacted canine 13, 23, 33, and 43 was done. Closed eruption techniques was used for 13, 33,and 43 **(Figure 5,7,8)**, open eruption technique was used for 23 **(Figure 6)** and Begg bracket was bonded to all the canines for traction. Steel ligature wire was used to apply vertical forces. Reactivation was done by tightening the ligation to archwire.

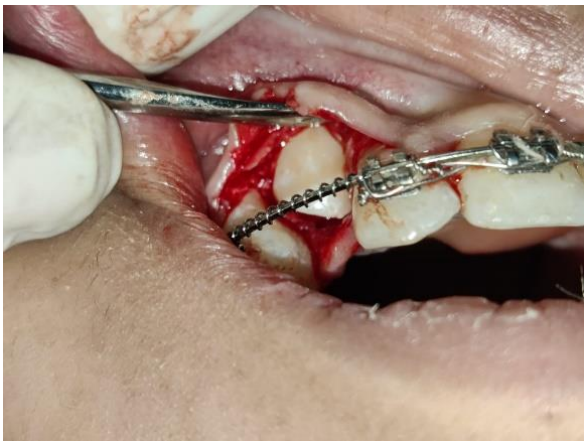
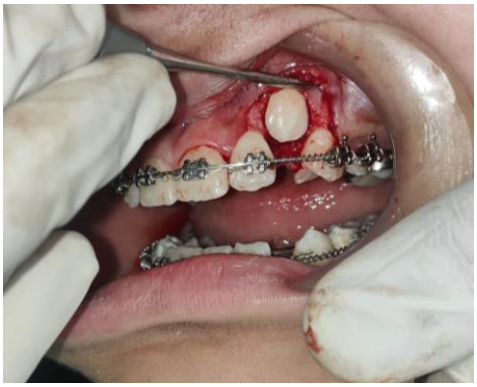


Figure 5: Surgical exposure and traction of 13.



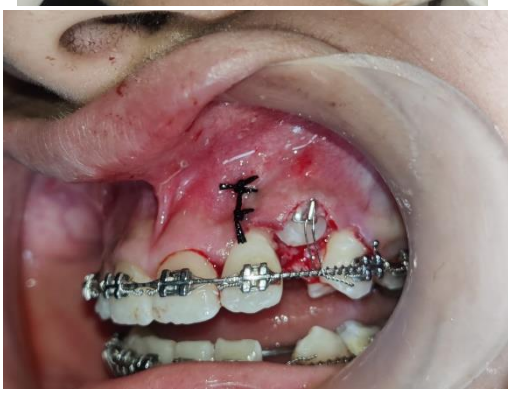


Figure 6: Surgical exposure and traction of 23.

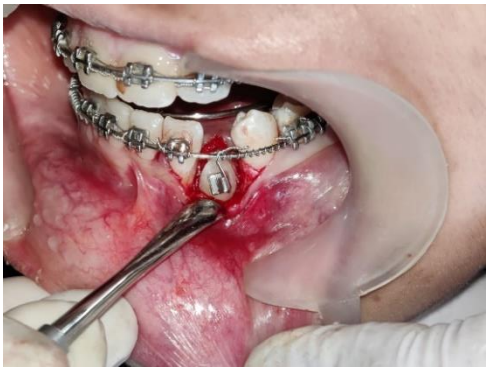


Figure 7: Surgical exposure and traction of 33.

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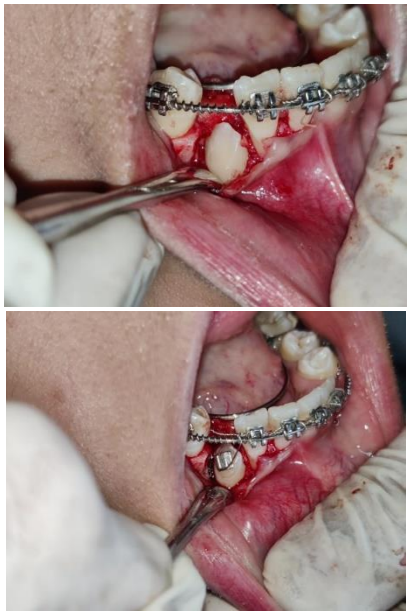
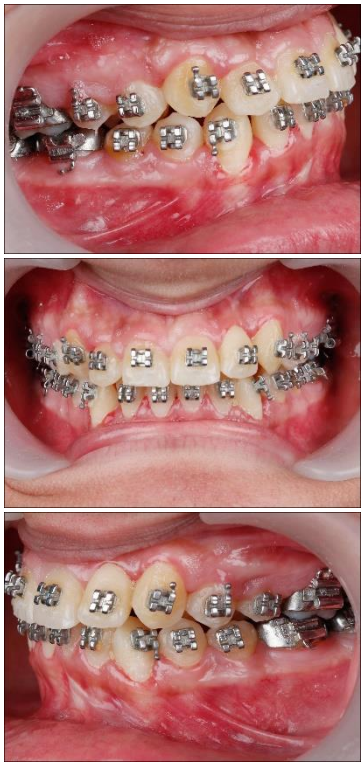


Figure 8: Surgical exposure and traction of 43.

After successful traction of impacted canines and bring them in occlusion **(Figure 9, 10)**, 0.022" MBT PEA brackets were bonded to all the canines and 0.016" Ni-Ti wire was ligated. Wire progression was done till 0.019" x 0.025" stainless-steel in both upper and lower arch. The overall treatment time was 37 months.



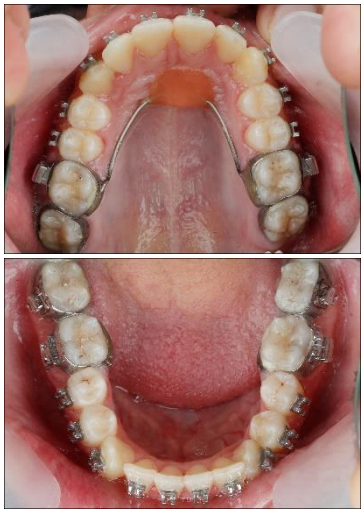


Figure 9: Intra-Oral Photos after Surgical Traction of impacted Canines.

Results

All the permanent canines were aligned in the arch and canine guided occlusion was achieved. Class I canine relation was achieved bilaterally and consonancy of smile was achieved.

Figure 10: Post Debonded Extra-Oral Photos

Journal of Chemical Health Risks

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Figure 10: Post Debonded Intra-Oral Photos

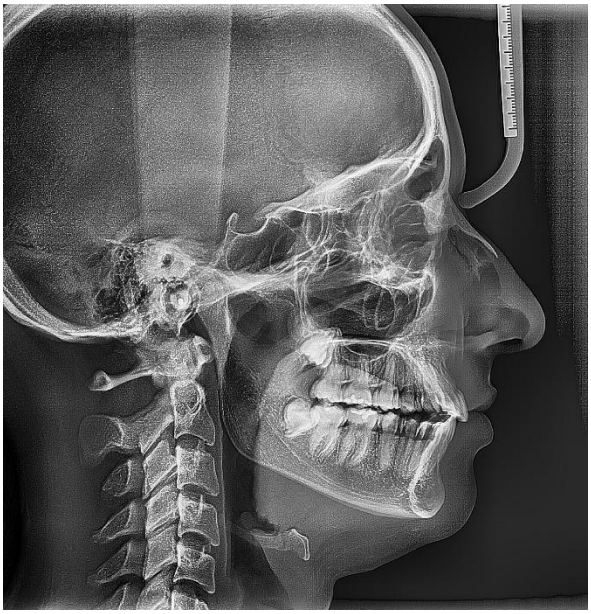

Figure 10: Post Debonded Lateral Cephalogram.

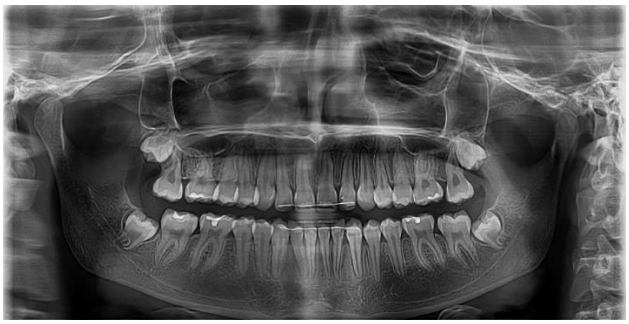

Figure 10: Post Debonded OPG

Discussion

According to MC Bridge Concept, maxillary canine forms at high in the anterior wall at antrum, below the floor of the orbit. the maxillary canines travels almost 22 mm from 5 to 15 years of age, due to its long and tortuous path of eruption, maxillary canine are most frequently impacted teeth after third molars. For every orthodontist, impaction of all four canines and achieving correct alignment within the dental arch are challenges. The location of impacted canines dictates whether surgical-orthodontic therapy is feasible, regardless of the patient's age.

This patient was diagnosed with impacted upper and lower canines at the age of 15. Up to that moment, the patient was unaware about the presence of impacted canines. All the four canines were impacted along with

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JCHR (2025) 15(4), 3042-3049 | ISSN:2251-6727

The impaction of all four canines along with over-retained deciduous canine irt 53 and 83.

According to Ericson- Kurol sector classification modified by Steven Lindauer[9], the prognosis for each maxillary canine was favourable, with the maxillary right canine falling under Sector 2 and the maxillary left canine coming under Sector 1. The apically positioned flap technique was chosen because to the vestibular location and mesial inclination of the impacted canine in the left maxillary canine. However, when compared to the closed eruption procedure, there may be some visual drawbacks to the apically positioned flap approach for treating buccally affected maxillary anterior teeth. After traction, the impacted canine's periodontal health was good, which is crucial for the surgical-orthodontic treatment of impacted canines to be successful.

Conclusion

In cases of impacted canine, the orthodontic-surgical therapy completely depends on position of canine and its importance from a functional and esthetic point of view. Gingival scarring and an increase in the clinical crown length are two possible aesthetic drawbacks of surgical treatment that may necessitate further periodontal therapy. Orthodontic-surgical traction of impacted canines and their exposure and alignment into the arch eliminates the need for prosthetic therapy and provide an pleasant smile and proper occlusion to patient.

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