

## Interdisciplinary Approach for the Management of Unilaterally Impacted Maxillary Canine

**Dr. Shyamal Bar<sup>1</sup>, Dr. Kasturi Mukherjee<sup>2</sup>, Dr. Prakash Banerjee<sup>3</sup>, Dr. Pinaki Roy<sup>4</sup>, Dr. Jeeshu Pal<sup>5</sup>**

<sup>1</sup>Professor, Department of Orthodontics and dentofacial Orthopaedics, Burdwan Dental College and Hospital, Govt of West Bengal

<sup>2,3,4</sup>Associate Professor, Department of Orthodontics and dentofacial Orthopaedics, Burdwan Dental College and Hospital, Govt of West Bengal

<sup>5</sup>Doctor and House Surgeon, Department of Orthodontics and dentofacial Orthopaedics, Burdwan Dental College and Hospital, Govt of West Bengal

**Email:** drkats.mukherjee@gmail.com, orthobar@gmail.com, drprakashbanerjee@gmail.com, pinakiroy1974@gmail.com, paljeeshu@gmail.com

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### ABSTRACT:

Interdisciplinary approach for the management of malocclusion provides a holistic approach of patient management. Sensible and careful treatment planning is necessary to achieve the various treatment goals. This case report describes the orthodontic management of a 18-year-old adolescent male patient with unilateral highly impacted maxillary canine. The problems associated with impacted maxillary canine and the biomechanical interventions used for this patient are discussed. The treatment protocol involved surgical intervention, followed by sequential traction of the impacted tooth. An interdisciplinary approach to treatment with different mechanical strategies led to the achievement of the desired esthetic, functional, and occlusal treatment goals.

**KEYWORDS:** Flap designs, impacted canine, interdisciplinary, orthodontic intervention, sequential traction.

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**INTRODUCTION:** Impaction is the total or partial lack of eruption of a tooth well after the normal age of eruption. Treatment of impacted teeth is very complex and requires careful multidisciplinary planning. Not every impacted tooth can be maintained to get an ideal occlusion. In some scenarios, the impacted tooth must be sacrificed for various reasons. Comprehensive data collection and careful analysis must be performed to correctly plan the treatment of impacted dentition cases. Impacted teeth or delayed tooth eruption is the eruption time of the teeth that radically differs from the normal time for every race, ethnicity, and gender. The prevalence of canine impaction rates is between 1%-3%, and it is the second most common impaction after third molars impaction [1-6]. Canine impaction is twice as common in females than in males [7]. Palatal

impaction (about 2/3) is more common than labial impaction (about 1/3), and maxillary impaction is more common than mandibular impaction [8]. The main etiology for canine impaction is unknown and could be caused by multiple factors, such as arch length discrepancy, failure of primary canine resorption, prolonged retention of the primary canine, dilaceration of the roots, and many more [6-9]. Between 25% and 50% of the general population are affected by impacted teeth, with the incidence of upper canine impaction reportedly ranging from 0.92% to 4.3%, respectively. Maxillary canine impactions are twice more common in females (1.17%) than in males (0.51%).

Impaction of a maxillary canine is a common problem because it has the longest period of development, the

deepest area of development and the long eruption path of all the teeth.

They are also the teeth that frequently require surgical and orthodontic intervention for their eruption. According to Kokich and Mathews the cause of labial impaction of the canines probably is related to either a retained deciduous tooth, diversion of the canine tooth bud, or idiopathic failure of eruption of unknown origin.

This case report describes the sequential management of unilateral labial canine impaction in the maxillary arch. The treatment success was the result of multidisciplinary treatment approach.

**CASE REPORT:** A 18-year-old male came for orthodontic treatment with the chief complaint of impaired facial esthetics due to irregular upper front teeth. He had a grossly symmetric external facial appearance, mesocephalic head form, euryprosopic facial form [Fig - 1a, 1b, 1c, 1d].

Intraoral examination [Fig - 2a, 2b, 2c] showed unilaterally retained left maxillary deciduous canine with unerupted permanent left maxillary canine and a crowded lower arch.

In the occlusion, he had normal overbite and a 3 mm overjet. The molar relationship was Class II (end on left side). The dental midlines were concordant with each other and with the face, and no mandibular shift was detected on closure. There was no relevant history of any medical problem.

**Cephalometrically**, the patient had a Class II Skeletal relationship of maxilla and mandible with underlying skeletal base (SNA angle - 83°, SNB angle - 79° and ANB angle - 4°) [Table - 1]. The maxillary and mandibular incisors were mildly proclined (maxillary incisor to NA linear distance- 1mm and angulation 15°, mandibular incisor NB linear distance - 4mm and angulation 25°, Frankfort Mandibular plane angle - 27° and Incisor Mandibular plane angle - 103° [Fig - 3a, 3b].

The panoramic radiograph showed all permanent teeth, including the maxillary and mandibular third molars. Both maxillary canines had well-developed roots, were impacted and were mesially angulated and did not cross the roots of the maxillary lateral incisors. The maxillary left canine was positioned higher and impacted [Fig - 3c].



Fig - 1a Fig - 1b Fig - 1c Fig - 1d



Fig - 2a Fig - 2b Fig - 2c



Fig - 3a



Fig - 3b

| Cephalometric Parameters            | Values |
|-------------------------------------|--------|
| SNA                                 | 83°    |
| SNB                                 | 79°    |
| ANB                                 | 4°     |
| FMA                                 | 27°    |
| IMPA                                | 103°   |
| Maxillary incisor to NA Linear      | 1 mm   |
| Maxillary incisor to NA Angulation  | 15°    |
| Mandibular incisor to NB Linear     | 4 mm   |
| Mandibular incisor to NB Angulation | 25°    |



Fig - 3c

**Treatment Objectives And Plan:** The objectives of orthodontic treatment for the patient were to erupt the labially impacted left maxillary canine, level, and align the arches, obtain normal overjet, and overbite, and achieve a well-intercuspatated bilateral Class I canine and molar relationship. Based on the patient's overall analysis and soft tissue profile, it was determined that a non-extraction orthodontic treatment plan would be the best approach. It was decided to expose the canine surgically and bond attachments to aid their eruption with light forces. Along with the upper arch, the lower arch would be bonded, leveled and interarch finishing achieved with minimal impact on the soft tissue profile.



Fig - 4a

Fig - 4b

Fig - 4c



Fig - 5a

Fig - 5b

Fig - 5c

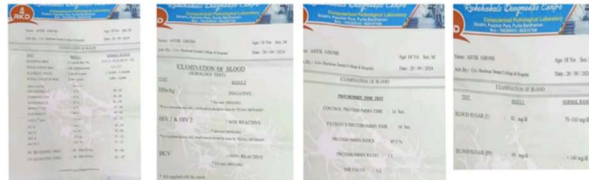


Fig - 6a

Fig - 6b

Fig - 6c

Fig - 6d

**Treatment Progress:** After completing the oral prophylaxis, preadjusted edgewise appliance attachments (0.022-inch slot, MBT prescription) were placed on the maxillary dentition. First leveling and alignment of the maxillary arch was done sequentially with 0.014" NiTi, 0.016" NiTi, 0.018" SS except the impacted maxillary canine [Fig - 4a, 4b, 4c]. After alignment of the maxillary arch the labially impacted left maxillary canine was surgically exposed with a wide mucoperiosteal flap, similar to that described in the closed-eruption technique. Bondable bracket was bonded to it, and 0.010-inch stainless steel ligature wires were braided from the bracket [Fig - 5a, 5b, 5c]. The surgical flap closure was carefully done to avoid a poor periodontal mucosal attachment. Routine hemogram, serology, blood sugar and PT/INR tests were also done for the patient [Fig - 6a, 6b, 6c, 6d].

1 week post surgery, traction was started using a "Ballista Spring" made by 0.020" SS wire [Fig - 7a, 7b, 7c]. After the crown of canine moved buccally, vertical eruption of canine was planned. When the canines sufficiently moved vertically then canine was bonded (0.022inch slot), and continuous 0.014 inch nickel-titanium archwire was placed for alignment, which was later replaced by 0.016 inch and 0.016 × 0.022 inch nickel-titanium archwire [Fig - 7d, 7e, 7f]. Then preadjusted edgewise appliance attachments (0.022inch slot, MBT prescription) was placed on the mandibular dentition. First leveling and alignment of the mandibular arch was done sequentially with 0.014"

NiTi, 0.016" NiTi [Fig -7g, 7h, 7i]. After that proper alignment and leveling, finishing, and detailing was done with 0.016 × 0.022inch stainless steel arch wire and individualized torquing for left maxillary canine using a **torquing auxiliary** [Fig - 7h]. After finishing arch wires, the occlusion was allowed to settle. Total active treatment time was 12 months.

**Treatment Result:** The impacted tooth was positioned into proper alignment with the assistance of direct traction, producing a complete anterior dentition with good alignment of the gingival margins and the improved smile. Bilateral Class I canine relationships and ideal overjet and overbite were obtained. Periodontal health was not compromised. In maxillary arch removable appliance and in mandibular arch fixed bonded retainer was given for retention [Fig - 8a, 8b, 8c, 8d, 8e, 8f].



Fig - 7a

Fig - 7b

Fig - 7c



Fig - 7d

Fig - 7e

Fig - 7f



Fig - 7g

Fig - 7h

Fig - 7i



Fig - 8a

Fig - 8b

Fig - 8c

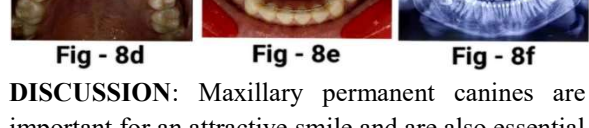


Fig - 8d

Fig - 8e

Fig - 8f

**DISCUSSION:** Maxillary permanent canines are important for an attractive smile and are also essential for a functional occlusion. Therefore, extraction of the labially impacted canine is generally contraindicated because it can complicate and compromise the orthodontic result and limit the possibility of providing the patient with a functional occlusion. Impacted maxillary canines most commonly require surgical

exposure and orthodontic guidance during eruption.[10] **The advantage of performing traction is that the treatment will be finished post-orthodontic management without the need for any additional treatment, such as permanent restoration, which will also save cost and time.** However, bringing an unerupted or impacted maxillary canine into the occlusion should not be the only goal in managing these teeth. The aim should be to attain proper occlusion, a healthy zone of attached gingiva, and ideal alveolar bone height. In the surgical management of the impacted maxillary canine, the choice of gap was either closed-eruption or an apically positioned ap to expose the tooth. Closed-eruption is the surgical method of choice for very high, labially placed maxillary canines. Labially impacted maxillary teeth uncovered with an apically positioned flap technique have more unesthetic sequelae, such as increased clinical crown length, decreased width of attached tissue, gingival scarring, and intrusive relapse than those uncovered with the closed-eruption technique.[11] The closed-eruption technique used in this patient seemed to be a good surgical choice.

**CONCLUSION:** Understanding the biologic principles and proper application of the biomechanics enable us to carry out challenging tooth movements. Any treatment dealing with tooth impaction needs to be handled very carefully. In the majority of situations, appropriate surgical procedures and the timing for exposure of the impacted canine need to be determined by considering several criteria. Successful results require teamwork and an interdisciplinary approach that includes a team of orthodontists, periodontists, and oral surgeons. A closed-eruption technique and the sequential traction of the impacted teeth with light orthodontic forces were effective approaches to successfully bring the teeth into occlusion. The patient and parents need to be informed regarding the procedure's difficulty and time frame.

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