



Unraveling The Mysteries of Impacted Canines: A Comprehensive Review of Case Report

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ABSTRACT

Background

Canines are the corner teeth, often known as “fangs” or “eye” teeth. In certain individuals, canine teeth may not fully emerge into a functional position, referred to as impacted canines. Impacted canines present a common yet intricate challenge in dental practice, warranting a nuanced understanding of their etiology, diagnosis and management. This abstract delves into the intricate world of impacted canines, shedding light on their diverse causal factors, ranging from genetic predispositions to environmental influences. Diagnostic strategies, including clinical assessments and imaging modalities, are crucial for the accurate identification and classification of impacted canines. The maxillary and mandibular impacted canine is a frequently encountered clinical problem and diagnosed during the routine dental examination which usually requires an interdisciplinary approach for management. Early detection, timely management, and appropriate surgical and orthodontic intervention can lead to esthetically and functionally acceptable outcomes. Depending on the difficulty and expected outcome, either surgical exposure or extraction of the impacted tooth is performed, followed by complex orthodontic treatment to align the tooth properly within the dental arch. This case report details the surgical extraction of impacted canines in situations where the prognosis is unfavorable.

Keywords: bone graft; impaction; maxillary canine; mandibular canine; surgical extraction.

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INTRODUCTION

An impacted tooth implies such a tooth which cannot erupt into its normal functioning position within the specified time. Impactions can be asymptomatic and present no obvious abnormal appearance except for maxillary incisors.¹ Canine impactions are due to unfavourable positioning inside the alveolar bone or proximity to neighboring structures that impede spontaneous eruption within the normal eruption sequence.² However, pathological complications like resorption of the root of adjacent teeth, cyst formation, loss of arch length, referred pain, malaligned tooth etc. could occur with impaction.¹ Impaction can be both unilateral and bilateral. About 8% of people have bilateral maxillary canine impactions.⁴ 85% per cent of impacted maxillary permanent cuspids are palatal impactions, and 15% are labial impactions.^[5] Females seem to be more predisposed to impacted maxillary canines. Impacted mandibular canines, estimated at 0.3% through 1.35%, are much lower than impacted maxillary canines⁷ and mandibular canine transmigration is 0.1–0.76%.¹⁷ Impacted mandibular canines are buccal than lingually; with no sex predominance.⁷ The primary causes of these conditions are crowding in the lower jaw, the presence of odontoma/cysts or retained deciduous canine.¹⁸ The most common impacted tooth in the mandibular region is the right third molar, followed by the left third molar. In the maxillary region, the right third molar is most commonly impacted, followed by the left third molar, right canine, left canine, right first premolar, and left first premolar.³ The exact etiology of canine impaction is unknown, however, the reasons for dental impaction can be categorized into four main groups: general, local, structural, and systemic. General factors encompass genetic predispositions, variations in endocrine activity, metabolic irregularities, and infectious ailments. Local influences involve issues like hindered tooth eruption, insufficient space, primary or permanent tooth fusion with bone, abnormal positioning of tooth buds, root abnormalities, soft tissue or bone abnormalities, fibrous tissue growth, and certain habits. Structural causes include underdevelopment

of the upper jaw, significant divergence in skeletal structure, open bite due to skeletal issues, and congenital abnormalities affecting the facial and jaw structures. Systemic factors encompass prenatal influences such as hereditary traits, postnatal conditions like tuberculosis, anaemia, malnutrition, and disorders affecting the thyroid or parathyroid glands.^{13,17,26}

Classification of impacted maxillary canines of Ericson and Kurol¹²⁻¹⁶

Sector 1: area distal to the line tangent to the distal heights of the contour of the lateral incisor crown and root. Sector 2: area bounded by sector 1 and the long axis of the lateral incisor. Sector 3: area bounded by sector 2 and a line tangent to the mesial heights of the contour of the lateral incisor crown and root. Sector 4: area bounded by sector 3 and the long axis of the central incisor. Sector 5: area bounded by sector 4 and the midline between the upper central incisors.

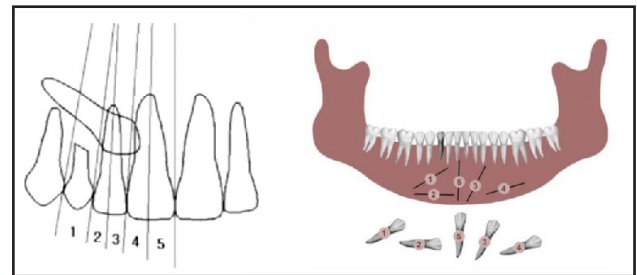


Figure 1. The mesiodistal position of the canine tip to the adjacent teeth.

Mupparapu's classification based on position and orientation of the impacted canine²⁷⁻²⁹

Type 1: The canine was positioned mesioangular across the midline within the jaw bone, labial or lingual to anterior teeth, and the crown portion of the tooth was crossing the midline. Type 2: The canine was horizontally impacted near the inferior border of the mandible below the apices of the incisors. Type 3: The canine was erupting either mesial or distal to the opposite canine. Type 4: The canine was horizontally impacted near the inferior border of the mandible below the apices of either premolars or molars on the opposite side. Type 5: The canine was positioned vertically in the midline (the long axis of the tooth crossing the midline).²⁷⁻²⁹

CASE REPORT 1

A 27-year-old female was referred to the Department of Oral and Maxillofacial Surgery for the removal of impacted canines due to an unfavorable position resulting in a poor prognosis to undergo orthodontic treatment. She had no relevant medical, or family history and no known drug allergy. Intraoral examination revealed clinically missing 13 and 23, upper anterior crowding. A bulge was present on the labial alveolar mucosa concerning the right and left incisors which was hard on palpation (Figure 2, B). On radiographic examination, an orthopantomogram unveiled horizontally impacted right and left canines (Figure 2, A). Cone beam computed tomography (CBCT) further confirmed labially impacted upper right and left canine.

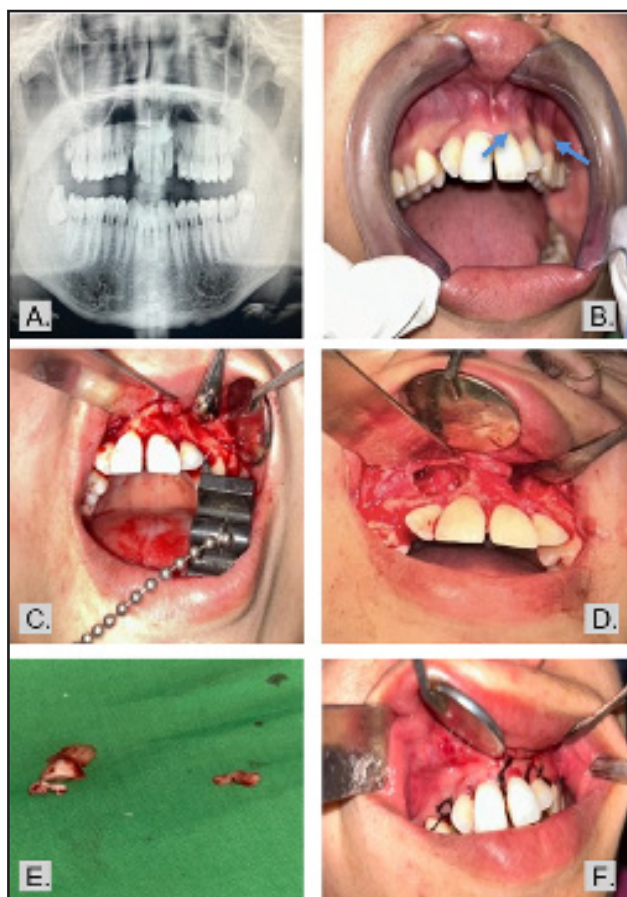


Figure 2. (A) Preoperative OPG View, (B) Preoperative clinical photograph with the presence of canine bulge, (C) Incision placement and flap reflection, (D) Immediate postoperative view (E) Extracted tooth, (F) The Flap closure is done with simple interrupted suture.

CASE REPORT 2

A 13-year-old male was reported to the Department of Oral and Maxillofacial Surgery with complaints of an unerupted tooth on the lower front teeth region. No relevant medical, family history with no known drug allergy. On intraoral examination crowding on the upper and lower anterior tooth regions, missing in relation to 33,43 and retained deciduous in relation to 73, class I molar relation bilaterally. Panoramic radiograph revealed vertical impaction with dilacerated root in relation 43 and horizontal impaction with transmigration in relation 33. CBCT was done for further confirmation. In this case, due to the aberrant position of the impacted canine and dilacerated root surgical exposure with orthodontic movement was not possible hence open extraction was performed (Figure 3).

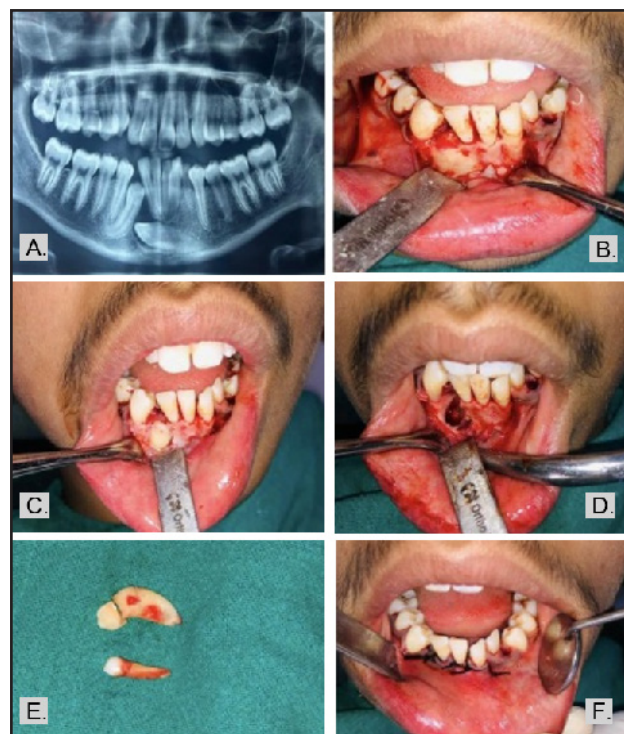


Figure 3. (A) Preoperative OPG VIEW (B) Incision placement and flap reflection (C) Exposure of impacted canine crown (D) Immediate postoperative view (E) Extracted tooth specimen (F) Flap placement in its original position.

CASE REPORT 3

A 22-year-old female undergoing orthodontic treatment was presented to the Department of Oral and Maxillofacial Surgery for removal of the

impacted right mandibular canine. The patient had no relevant medical or family history and no known drug allergy. On clinical and Radiographic examination a labially impacted right mandibular canine with an OPG revealing an approximately 6 x 7 mm round unilocular radiolucent lesion with sclerotic border present in relation to 43-46 suggestive of cystic changes. CBCT was advised for further confirmation. Following surgical extraction enucleation was performed. Histopathological examination confirms the absence of malignancy, identifying only a follicular sac. Cystic changes report loss of alveolar bone after tooth extraction. Therefore, bone grafting was carried out post-extraction (Figure 4).

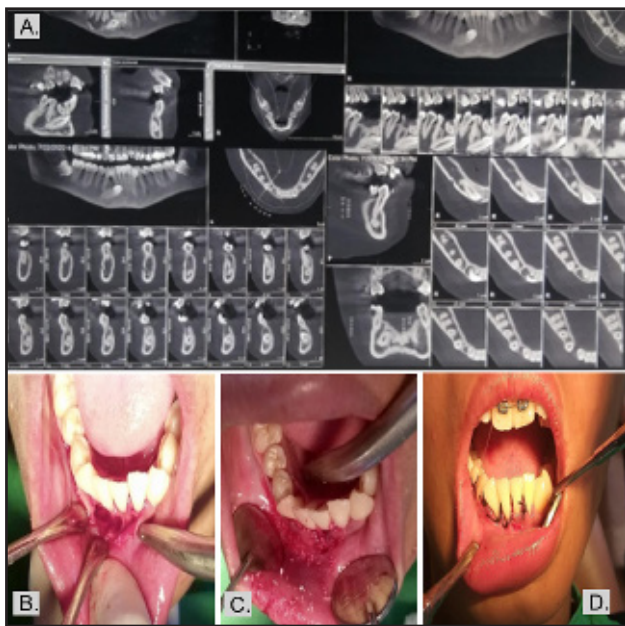


Figure 4. (A) Preoperative CBCT View, (B) Extraction socket site, (C) Bone grafting done, (D) Flap placement in its original position.

DISCUSSION

Impacted canines are important to manage in terms of aesthetics and function. A variety of treatment options considering the conditions of the patient can be formulated.⁹ The simplest interceptive procedure that can be used to prevent the impaction of permanent canines is the timely extraction of the primary canines, this allows the permanent canines to become upright and erupt properly into the dental arch. Various surgical and orthodontic techniques may be used to recover impacted permanent canines. The

proper management of these teeth, however, requires that the appropriate surgical technique be used and that the clinician be able to apply measured forces in a favourable direction.¹¹ Diagnosis of impacted maxillary and mandibular canine plays an important role in determining the right time to intervene. On clinical examination lateral incisor inclination and mobility of deciduous canine, presence of bulge on the alveolar mucosa, and crowding of the anterior teeth signify the impacted canine. Usually, OPG and occlusal radiographs are employed to find the position of the impacted canine, often assisted by IOPA using the tube shift/SLOB technique. Advanced radiographs like cone-beam computed tomography of a particular area are advocated to know the exact root position of the impacted canine concerning the surrounding structures and plan treatment accordingly without damaging the nearest vital structures.^{19,21,31} The prevalence of impacted maxillary canines is 0.9–2.2% and of impacted mandibular canines is 0.05–0.4%.⁸ Basically surgical exposure and orthodontic repositioning was the treatment of choice in most canine impaction cases where it should be clinically feasible with a predictable and successful outcome. However, when exposure and subsequent orthodontic treatment was not indicated, the impacted canine was surgically removed to prevent future problems.^{35,10}

A horizontally impacted tooth is considered tedious because of the favorability of eruption, high anchorage requirements and loss of vitality due to movement of teeth over further places.⁸ Arch space and a vertical developmental position are often associated with buccal canine impactions, they erupt vertically, buccally and higher in the alveolus due to denser palatal bone and thicker palatal mucosa. It was observed that in case 1 the positions of 13 and 23 were not favourable for eruption as they were horizontally positioned which obstructed eruption. In the horizontal position, palatally displaced cuspids rarely erupt without requiring complex orthodontic treatment. To prevent irreversible, permanent damage such as inadequate root resorption, early detection or prediction of maxillary canine impaction is important to initiate timely orthodontic treatment with or

without surgery, and also decrease the duration, complexity, and cost of treatment.⁶ Attempting to expose a labially impacted upper canine, improper surgical methods can lead to mucogingival tissues like a submerged visible portion, reduction in crown length, gum recession, and scarring. If the canine is far from its normal place, orthodontic treatment may be hindered by nearby roots or structures in the oral cavity.²³ The treatment option could be orthodontic-surgical exposure extraction with canine repositioning on its original place, which may lead to serious complications such as resorption of the lateral root and would not have a good prognosis. Thus, leading to the mobility of the tooth. Therefore, extraction was performed due to (Ericson and Kuroi sector 5 in relation to 11 and sector 4 in relation to 21).^{12-16,25}

Dilaceration is defined as a deviation of 20 degrees or more in the apical root. This may be due to mechanical injury to the developing teeth that transfer the force through the root of calcified portions of permanent teeth, or due to developmental disturbances. Treatment of a dilacerated impacted tooth through orthodontic treatment needs careful planning to avoid any ankylosis, resorption or further progression of the root dilacerations.²⁴ Successfully managing a dilacerated tooth orthodontically presents a challenge to Orthodontists due to the angulation of the crown or root. Thus, surgical extraction indicated in such a case similar to case 2. The outcome depends on factors such as the extent and location of the angulation, the vertical placement of the tooth, and the maturity of its apex. (Chew and Ong, 2004).³¹ The teeth mostly affected by transposition are canine and first premolar as well as canine and lateral incisor.³⁰

Moving an impacted tooth causes a change in tooth colour, external root resorption, and loss of alveolar bone.²² The extraction of the impacted canine is seldom considered for the functional occlusion might be compromised. Yet, it might be an alternative, only if it is ankylosed and cannot be transplanted, it is undergoing external or internal root resorption, its root is severely dilacerated, the impaction is severe, the occlusion is acceptable, with the first premolar in the position of the canine and well-aligned, there are pathologic changes, the patient does not desire for orthodontic treatment then the impacted canine is going to be extracted.¹⁰ Enucleation was performed following extraction when small cystic like changes presented with impacted teeth, not positioned favourably, poses no risk to nearby vital structures, shows no signs of recurrence, and quick healing occurs.³⁴

CONCLUSIONS

The case reports outline that management of impacted canines hinges on factors like position, bone density, and the potential for surgical exposure followed by orthodontic treatment or extraction. Typically, impacted teeth show no symptoms and are observed, but if symptoms arise, surgical extraction, surgical exposure, and fixed orthodontic treatment are recommended. Timely detection and treatment of impacted canines help to preserve these canines, surrounding tissues and dentition, contributing to better esthetics and function.

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