

INTERDISCIPLINARY APPROACH FACILITATING THE ERUPTION OF IMPACTED TEETH: A CASE SERIES.

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ABSTRACT.

This case series presents an interdisciplinary approach to managing impacted teeth in three patients. Clinical examinations and radiographic assessments, including Orthopantomogram (OPG), guided the diagnosis of impacted teeth and treatment planning. Orthodontic interventions involved space gaining, occlusal guidance, and alignment using the MBT Prescription with a 0.022" slot, while surgical procedures included exposure of impacted teeth and attachment bonding. Patients were closely monitored throughout the treatment period, with the effectiveness of the interdisciplinary approach evaluated based on successful tooth eruption and alignment.

Keywords: Arch length discrepancy, impacted teeth, orthodontic management, retained deciduous teeth.

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INTRODUCTION.

An impacted tooth can be described as a tooth that has failed to erupt into the oral cavity within the physiological eruption timing. This could be due to various reasons like a deficiency in the arch length, any obstruction like retained deciduous tooth, or odontome-like conditions. As per the data available third molars are the most impacted tooth, but there are instances wherein the other tooth might also be seen impacted. Clinical examination followed by diagnostic tools like radiographs provide us with data regarding the position of the impacted tooth and its surrounding structures and help us in planning the management by predicting the favorability during the treatment course. Having a sound knowledge of dental morphology and eruption timings helps us in proper diagnosis and efficient management. This case series focuses on managing impacted teeth with an interdisciplinary approach.

underwent comprehensive clinical examinations and radiographic assessments, including Orthopantomogram (OPG) and intraoral photographs. Informed consent was obtained from all participating patients. Diagnosis was based on the identification of impacted teeth and an evaluation of their positions relative to adjacent structures. The treatment plans incorporated orthodontic and surgical interventions tailored to each case's unique requirements. Orthodontic procedures included space gaining through fixed orthodontic therapy, occlusal guidance, and alignment using the MBT Prescription with a 0.022" slot. Surgical interventions encompassed exposure of impacted teeth, attachment bonding, and other procedures facilitating proper alignment. Throughout the treatment period, patients were closely monitored, and the effectiveness of the interdisciplinary approach was assessed based on the successful eruption and alignment of impacted teeth.

METHODOLOGY.

The study comprises a retrospective analysis of three cases involving impacted. Patients presenting with chief complaints related to missing or irregularly placed teeth

CASES.

Case presentation 1.

An 11-year-old female patient accompanied by their parent, reported a chief complaint of a missing tooth in the front teeth region of the upper jaw. Clinical examination revealed a palpable hard mass over the gingiva in the 11 regions. A radiological examination (OPG) confirmed the presence of an impacted central incisor.

The patient was treated with MBT Prescription with a 0.022" slot. Bonding of the teeth was done sequentially, with molars bonded using bondable buccal tubes. Leveling and aligning commenced with round wires, and an open coil spring was incorporated into the rectangular wire between 12 and 21 to create sufficient space for the impacted incisor. Surgical exposure created a window for bonding the bracket onto the tooth surface.

Following proper hemostasis, the tooth was isolated, and the bracket was bonded. A ligature wire was tied between the elastic module placed on the bracket and the rectangular wire, providing an initial force of < 50 grams to guide the impacted tooth slowly into occlusion. Subsequently, a 0.012 NiTi continuous wire was placed for final realignment after repositioning the bracket. The patient was closely observed throughout the 12-month treatment period (Figures 1 and 2).

Case presentation 2.

A 19-year-old female patient reported a chief complaint of irregularly placed teeth in both the upper and lower jaw. Clinical examination revealed retained deciduous canines (53, 63), an impacted canine (23), palatally placed 13, and lower arch crowding. An increase in overjet and a retrognathic mandible were observed. Radiological examination indicated the favorable position of the impacted canine (23) for orthodontic guidance (Figure 3).

The treatment involved the extraction of deciduous canines (53, 63) and initial bonding in both arches using the MBT Prescription with a 0.022" slot. The leveling and aligning phase began with a 0.012 NiTi wire. Once the upper archwire reached the 17*25 NiTi stage, an open coil spring was strategically placed between 22 and 24 to create space for the erupting 23.

Surgical exposure of the 23 was performed, and an attachment was bonded. A 0.012 NiTi piggyback wire was then placed to facilitate the buccal movement of the canine, followed using a continuous NiTi wire to guide the tooth into the arch. Torque correction was achieved using a TMA rectangular wire (Figure 4).

Case presentation 3

A 15-year-old female patient reported a chief complaint of a missing tooth on the left side of the upper jaw. Clinical examination revealed a missing canine (23) and a labially tipped lateral incisor (22), creating a misperception of the canine's buccal placement. Palpation identified a clinically evident bulge in the cervical and middle 1/3rd region of the lateral incisor root. An OPG was taken to confirm its favorable position in the clinically anticipated location (Figure 5).

The patient was bonded in the maxillary arch using the MBT Prescription with a 0.022" slot. An initial round wire was placed with molar bands to initiate the leveling and aligning process. After the surgical exposure of the impacted canine, an attachment was meticulously bonded to the exposed canine using isolation techniques.

A ligature was tied from the elastic module attached to the bracket on 23 to 24 brackets, facilitating occlusal and distal guidance for the impacted canine. After achieving a favorable position, vertical traction was applied to guide 23 into occlusion, and over the next three months, light forces (<60 grams) were consistently maintained. The canine initially tipped into the available space, and upon repositioning the bracket, the tooth was aligned into the occlusion. Settling elastics were subsequently applied to ensure stability (Figure 6).

DISCUSSION.

Identifying an impacted tooth in the oral cavity presents a significant challenge for clinicians in devising treatment plans. The critical step in determining the orthodontic treatment plan for the impacted tooth relies on clinical and radiographic diagnosis. Once the clinical presence of a tooth is confirmed, a radiological examination is essential to verify the tooth's position and understand the surrounding anatomical structures. Diagnostic aids typically include an Intraoral Periapical Radiograph (IOPA) or OPG, considered essential. In certain cases, Cone-Beam Computed Tomography (CBCT) may provide greater accuracy in determining the tooth's position in the bone.

The orthodontic approach to impacted canines depends on various factors, including the impacted canine's location in the dental arch concerning adjacent incisors, its distance from the occlusal plane, canine crown overlaps, angulations, and the potential presence of ankylosis, root resorption, or dilaceration. [1] Generally, managing horizontally impacted or ankylosed canines poses significant challenges and carries a poor prognosis. [2] In certain cases, extraction of these teeth may be necessary. These variables concurrently serve as predictors for the duration of orthodontic treatment. [1]

Various variables assist in formulating the treatment plan for the unerupted canine, including the Alpha angle, D-distance,

and S-sector. The sector classification, initially introduced by Ericson et al. [3] with five sectors, [4] has undergone further modifications by several authors, enhancing its applicability. Additionally, Warford et al. [5] devised an angle by forming it with the long axis of the unerupted canine and a horizontal line connecting the superior most points of the condyle (bicondylar line) in a panoramic radiograph. Upon identifying the presence of an impacted tooth in the radiograph, clinicians evaluate the favorability of the tooth's position using the methods, subsequently formulating the treatment plan.

Various surgical techniques have been employed to manage impacted maxillary canines, including gingivectomy, apically positioned flap, closed eruption, closed flap, open eruption, open window eruption, and tunnel traction. Similarly, numerous orthodontic techniques have been utilized to facilitate the movement of impacted teeth into occlusion. These include the cantilever system, temporary anchorage devices for providing absolute anchorage, double-archwire mechanics to minimize root resorption, the easy-way-coil system, auxiliary arm from trans palatal arch, auxiliary spring, and K-9 spring, among others.[6]

Ajith et al. reported a case of a 13-year-old female patient presenting with multiple impacted maxillary anterior teeth. The case underlines the importance of precise diagnosis and meticulous treatment planning, emphasizing the utilization of forced eruption with gentle forces to attain favorable long-term results. Additionally, the report outlines the application of a guided eruption technique to enhance the bone morphology surrounding the impacted teeth, ultimately enhancing the prognosis of the treatment. [6]

A 13-year-old male patient exhibited a Class II, division 2, left subdivision malocclusion, with a deep bite and prolonged retention of a primary upper canine due to impaction of the permanent tooth. Corrective orthodontic therapy incorporated rapid maxillary expansion and the use of high-pull headgear. Orthodontic traction was employed to relocate the impacted canine within the dental arch. This integrated approach proved effective in addressing both functional and aesthetic concerns.[7]

CONCLUSION.

Impacted teeth pose challenges in diagnosis and treatment planning, necessitating a comprehensive interdisciplinary approach. This case series demonstrates the successful management of impacted teeth through a combination of orthodontic and surgical interventions tailored to each patient's unique requirements. By employing techniques such as forced eruption and guided eruption, favorable long-term outcomes in terms of functional and aesthetic improvements were achieved. These findings underscore the importance of precise diagnosis, meticulous treatment planning, and interdisciplinary collaboration in effectively managing impacted teeth and optimizing patient outcomes.

KEY LESSONS.

- Impacted teeth present challenges in diagnosis and treatment planning, requiring a comprehensive interdisciplinary approach that combines orthodontic and surgical interventions tailored to each patient's specific needs.
- Techniques such as forced eruptions and guided eruptions play crucial roles in achieving favorable long-term outcomes.
- Precise diagnosis and meticulous treatment planning are essential for the successful management of impacted teeth, emphasizing the importance of interdisciplinary collaboration among dental professionals.
- Clinicians must consider both functional and aesthetic perspectives when managing impacted canines, selecting treatment plans that best meet the patient's needs and interests.
- Orthodontic therapy for impacted teeth should involve applying ideal traction forces in the most favorable direction to avoid further injuries to adjacent teeth and optimize treatment outcomes.
- Early detection of tooth impaction is crucial to prevent potential complications, highlighting the importance of regular dental examinations and timely referral to orthodontic specialists when necessary.

ETHICAL APPROVAL.

This case series is exempt from the need for ethical clearance as per our institution's research ethics committee. The committee has confirmed that the report aligns with established clinical practices and does not entail experimental interventions or necessitate further data collection.

REGISTRATION NUMBER.

As this manuscript constitutes a case report without introducing new medical devices or surgical techniques, no prior registration is necessary.

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CONFLICT OF INTEREST.

No conflicts of interest in this work.

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Availability of data and materials.



Figure 1: Stage-wise Intraoral photographs (From top to Bottom): A. Pretreatment Intraoral; B. Surgical exposure of Incisor (11) after space creation; C. After leveling and aligning; D. Post-treatment Intraoral.

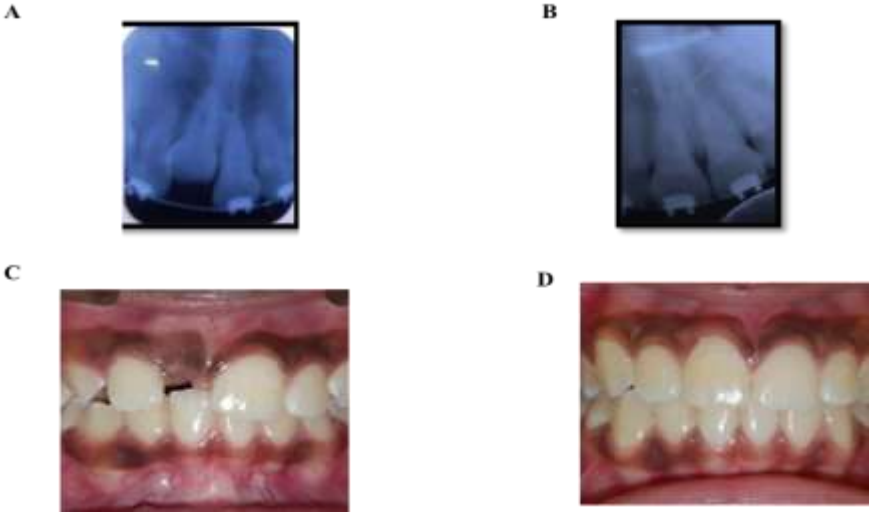


Figure 2: A. IOPA before exposure; B. IOPA after eruption; Pretreatment; D. Post-treatment.



Figure 3: Pretreatment intraoral photographs and OPG

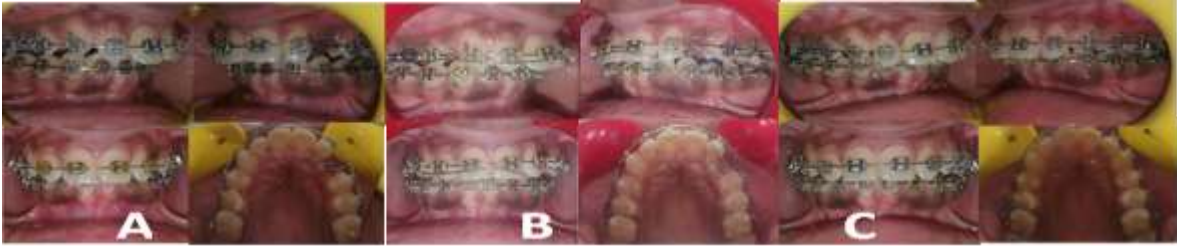


Figure 4: Treatment Phase. A. Surgical exposure; B. Traction using 0.012 Niti Wire; C. Levelling and aligning.



Figure 5: Impacted Canine about 23



Figure 6: Canine 23 brought into occlusion

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