

GUIDED ORTHODONTIC TRACTION OF IMPACTED MAXILLARY ANTERIOR TEETH: A CASE REPORT

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Abstract

Impacted teeth present a significant challenge in orthodontic treatment, particularly when they involve maxillary incisors and canines due to their essential role in aesthetics and function. This case report details the diagnosis, treatment planning, and management of a patient with an impacted maxillary right central incisor and canine using orthodontic traction. A multidisciplinary approach involving surgical exposure and orthodontic mechanics was employed to achieve successful alignment.

Key words : Impacted tooth, maxillary incisor, maxillary canine, orthodontic traction, surgical exposure, orthodontic biomechanics.

Introduction

Impaction of maxillary anterior teeth, including central incisors, lateral incisors, and canines, can significantly impact dental function and appearance. The frequency of impacted maxillary central incisors is relatively rare, occurring in approximately 0.03% to 2.1% of cases¹. However, maxillary canines are more commonly affected, with an impaction rate ranging from 1% to 5%, making them the second most frequently impacted teeth after third molars.

The causes of tooth impaction are varied and usually stem from a combination of genetic and environmental influences. Maxillary central incisors may become impacted due to supernumerary teeth, odontomas, or previous dental trauma, all of which can obstruct the natural eruption path. Canine impaction, on the other hand, has been associated with anomalies in the lateral incisors, such as peg-shaped teeth or congenital absence, which can interfere with the proper eruption of the canine².

Impacted maxillary canines pose a significant threat to adjacent lateral incisors, particularly in terms of root resorption. Research has shown that nearly 50% of impacted canines lead to root resorption in adjacent lateral incisors³. This process often begins around the ages of 11 to 12 years, though it can occur earlier³. The extent of resorption varies, with minor cases allowing the affected tooth to remain functional, while severe resorption may result in serious dental complications.

Accurate diagnosis of impacted teeth is crucial for effective treatment. Cone beam computed tomography (CBCT) is widely recognized as an

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advanced imaging technique that provides detailed three-dimensional assessments of tooth position and root structure⁴. CBCT is particularly useful in detecting root resorption caused by impacted canines, offering more precise imaging compared to conventional two-dimensional radiographs.

Early diagnosis and intervention play a key role in managing impacted maxillary anterior teeth. Preventive measures, such as extracting primary canines at the right time, have been shown to encourage the proper eruption of permanent canines. Orthodontic evaluation and timely treatment can help avoid complex surgical procedures, leading to better functional and aesthetic results⁵.

Case Report

A 16-year-old female patient presented with a concern regarding missing upper front teeth. A clinical examination confirmed the absence of the maxillary left central and lateral incisors and canine. Radiographic evaluation, including panoramic imaging and cone-beam computed tomography (CBCT), revealed that the teeth were impacted. The central and lateral incisors was impacted buccally, while the canine was located high in the alveolar bone. No significant resorption of adjacent tooth roots was observed.

Pretreatment Assessment

Clinical Examination

On intra oral examination patient had missing 21,22,23 with end on molar right side and class I on left side presented with deep bite. (Fig 1).



Fig. 1: Pre-Treatment Intra Oral Photograph

Diagnosis

- ❖ Angle's Class II Division 1 malocclusion with an underlying skeletal Class II base
- ❖ Impacted 21,22,23 tooth.
- ❖ Deep bite with a horizontal growth pattern.

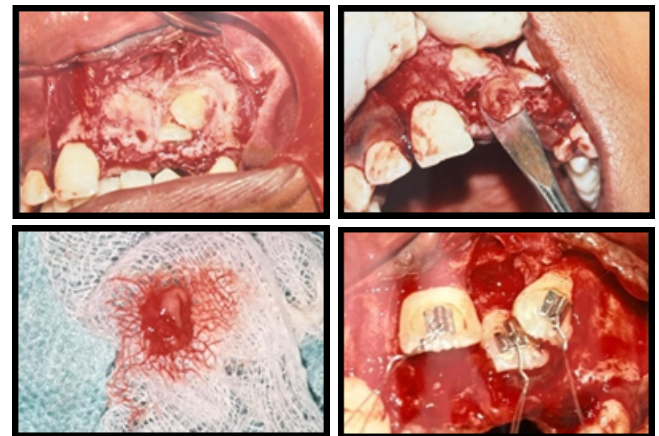


Fig. 2: Surgical Exposure and Attachment Bonding

Treatment Plan

1. **Initial Phase:** Fixed orthodontic appliances (0.022-inch slot MBT bracket system) were placed to align the dentition and create sufficient space for the impacted teeth.
2. **Surgical Exposure:** A closed-eruption technique was performed under local anesthesia. A surgical flap was raised, and orthodontic buttons with gold chains were bonded to the impacted teeth to facilitate traction. (fig 2)

3. **Orthodontic Traction:** Gradual elastomeric traction was applied using light continuous forces to guide the impacted teeth into the dental arch over eight months. (Fig 3) A force of approximately 50 grams was applied initially to avoid root resorption (Papadopoulou et al., 2020).
4. **Alignment and Finishing:** Once the impacted teeth erupted, sequential archwires, including nickel-titanium and stainless-steel wires, were used to align them within the arch, followed by detailing and finishing with rectangular archwires for optimal occlusion.
5. **Retention:** A removable Hawley retainer was provided to maintain the post-treatment results, ensuring stability over a long-term follow-up.

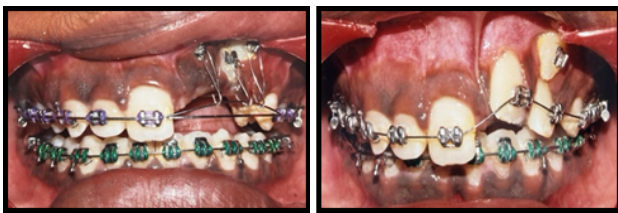


Fig. 3: Orthodontic Traction



Fig. 4: Post Disimpaction

Results

Successful alignment of the impacted maxillary incisor and canine was achieved with stable occlusion and good periodontal health. The patient showed significant aesthetic and functional improvements, with no signs of relapse after 12 months of follow-up. Clinical assessment indicated a healthy gingival attachment with no evidence of mobility or inflammation.

Discussion

Impacted maxillary anterior teeth, such as central

incisors, lateral incisors, and canines, present significant challenges in orthodontic treatment due to their essential roles in aesthetics and function. The aetiology of these impactions is multifactorial, often involving factors like supernumerary teeth, odontomas, trauma, or space deficiencies. Early diagnosis is crucial to prevent complications such as root resorption, cyst formation, or deviation of adjacent teeth. For instance, Datana et al. (2015) reported a case involving a horizontally impacted maxillary central incisor, highlighting the importance of timely identification and intervention to facilitate successful treatment outcomes⁶.

Orthodontic management of impacted maxillary anterior teeth typically necessitates a multidisciplinary approach, combining surgical exposure with orthodontic traction. The surgical technique—whether open or closed eruption—is selected based on the tooth's position and the specific clinical scenario. Tantayyanon (2020) detailed the successful alignment of an impacted maxillary central incisor using a combined surgical-orthodontic approach, emphasizing the significance of individualized treatment planning⁷.

The prognosis of orthodontic treatment for impacted maxillary anterior teeth largely depends on factors such as the tooth's position, the presence of adequate space in the dental arch, and patient cooperation. Early intervention can significantly improve outcomes and reduce the risk of complications. Tantayyanon (2020) discussed the management of an impacted maxillary central incisor, emphasizing the importance of timely diagnosis and a multidisciplinary approach to treatment⁸.

Long-term retention strategies, including the use of fixed or removable retainers, are necessary to maintain the achieved results and prevent relapse. Additionally, periodic radiographic assessments

are recommended to monitor the stability of the treated teeth and the health of the surrounding periodontal structures. A comprehensive retention plan ensures the longevity of the treatment outcomes⁹.

The successful management of impacted maxillary central incisors, lateral incisors, and canines relies on early detection, precise diagnosis, and a tailored interdisciplinary treatment approach. By integrating surgical and orthodontic techniques, dental professionals can effectively address these impactions, thereby enhancing both the functional and aesthetic outcomes for patients¹⁰.

Conclusion

The management of impacted maxillary anterior teeth, including central incisors, lateral incisors, and canines, is both challenging and achievable through early diagnosis, appropriate intervention, and a multidisciplinary approach. Since these teeth are crucial for aesthetics, function, and speech, their impaction can significantly impact a patient's oral health and confidence. Orthodontic treatment typically involves space creation, surgical exposure, and mechanical traction to guide the impacted tooth into alignment. Patient compliance, proper biomechanics, and careful case selection are essential for successful outcomes, minimizing risks like root resorption and periodontal damage. With a well-coordinated approach involving orthodontists, oral surgeons, and periodontists, impacted maxillary anterior teeth can be effectively managed, ensuring long-term stability and optimal functional and aesthetic results.

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