

# EVALUATION ORTHODONTIC TREATMENT OF IMPACTED TEETH, REVIEW ARTICLE

Mohammed Mady<sup>1</sup>, Sereen Omar Alyahya<sup>2\*</sup>, Nasser Ibrahim Alreshoodi<sup>3</sup>, Abdullah Mohammed Alhussain<sup>3</sup>, Mohammed Khalid Alrubayan<sup>3</sup>, Alwaleed Obaid Alshammari<sup>3</sup>, Atheer Ali Alhassan<sup>4</sup>, Muadh Mohammed Alasmari<sup>4</sup>, Zahra Jaafar Akwaid<sup>5</sup>, Refdan Obeid Alqahtani<sup>6</sup>, Mohammad Abdulaziz Bukhari<sup>7</sup>, Nada Ahmed Albuolayan<sup>8</sup>

<sup>1</sup>Faculty of Dentistry Medicine, Al King Khalid Hospital, Al Kharj, Saudi Arabia.

<sup>2</sup>Faculty of Dentistry, Qassim University, Qassim, Saudi Arabia. Serenalyahya@gmail.com

<sup>3</sup>Faculty of Dentistry, King Saud Bin Abdulaziz University, Riyadh, Saudi Arabia.

<sup>4</sup>Faculty of Dentistry, King Khalid University, Abha, Saudi Arabia.

<sup>5</sup>Faculty of Dentistry, Cairo University, Cairo, Egypt.

<sup>6</sup>Faculty of Dentistry, Prince Sattam Bin Abdulaziz University, Alkharj, Saudi Arabia.

<sup>7</sup>Faculty of Dentistry, King Fahd Hospital, Jeddah, Saudi Arabia.

<sup>8</sup>Faculty of Dentistry, Presidency of State Security, Riyadh, Saudi Arabia.

## ABSTRACT

Patients with impacted teeth often require collaboration between orthodontists and oral and maxillofacial surgeons for effective management. Prompt diagnosis and a comprehensive orthodontic treatment plan, which may involve closed or open exposure procedures performed by the surgeon, are crucial for optimal outcomes. Neglecting proper consideration of orthodontic principles and surgical techniques can produce less favorable results. Clear communication between specialists is vital, and educating the patient in the decision-making process is essential before initiating any treatment. The Medline, Pubmed, Embase, NCBI, and Cochrane databases were searched for studies of patients with non-alcoholic fatty liver disease. Incidence, etiology, and management options were analyzed. Effective management of impacted teeth demands a personalized approach based on the patient's dental health and preferences. Collaboration between specialists, clear communication, and continuous monitoring are vital for optimal outcomes.

**Key words:** Tooth impactions, Orthodontist, Oral and maxillofacial surgeon, Incisor, Maxillary, Impacted.

## Introduction

An impacted tooth refers to a tooth that does not emerge through the gum line at the expected age, even after the contralateral tooth has fully erupted for at least six months with a developed root. Effectively managing impacted teeth requires a comprehensive understanding of the patient's dental and overall health, as well as their treatment preferences. Each available treatment option presents its own set of advantages and challenges [1]. The decision-making process is influenced by various factors, such as the patient's age, the condition of both impacted and adjacent teeth, and the availability of adequate space in the oral cavity. Adopting a customized approach that takes into account the unique characteristics of each case is pivotal in achieving optimal outcomes while minimizing complications. Regular monitoring and close collaboration between oral and maxillofacial surgeons and orthodontists are vital components of successful impacted teeth management [2]. By working together, these professionals can ensure the most effective strategies are employed, tailored specifically to the patient's needs. In the realm of pediatric dentistry, true impaction of primary teeth is rare. Instead, unerupted primary teeth often indicate absent successor permanent teeth, frequently associated with syndromes rather than local factors such as insufficient arch length. Syndromes like cleidocranial dysplasia, Down

syndrome, and Gardner syndrome are known to cause multiple impacted teeth, emphasizing the importance of systemic considerations in such cases. Pediatric dentists should be alert to potential systemic issues when dealing with multiple impacted primary teeth. This article emphasizes the significance of classification schemes for effective communication, the pivotal role of imaging in determining treatment options, the appropriate timing for interventions, and the criteria for extractions, including indications and contraindications [3]. By enhancing their understanding, pediatric dentists can anticipate challenging cases more effectively. It's essential to base treatment decisions on thoroughly reviewed literature and evidence rather than relying solely on personal experiences. Furthermore, this discussion highlights specific aspects related to third molar extractions, focusing on essential techniques, potential complications, and the expected postoperative course. By addressing these aspects with precision and care, dental professionals can navigate the complexities of impacted teeth management, providing patients with optimal outcomes and ensuring their overall oral health and well-being [4].

## Epidemiology

Managing impacted teeth presents a significant challenge for orthodontists, given their prevalence ranging from 1% to 3.5% in the general population, with occasional peaks at

23% [5]. Among the impacted teeth, mandibular third molars are the most common, followed by maxillary third molars, maxillary canines, mandibular premolars, and maxillary incisors. Notably, the prevalence of impacted maxillary canines ranges from 0.8% to 2% in the general population, with a striking 85% being impacted on the palatal side. This condition is more prevalent in females, constituting 70% of cases. Furthermore, there are noticeable racial and ethnic disparities in impacted teeth occurrence. Asians and blacks exhibit the lowest prevalence, while individuals in Greece and Turkey experience the highest rates of impacted teeth [5]. Addressing this issue requires a deep understanding of the various factors contributing to impaction, including genetics, local environment, and oral health.

Moreover, identifying the specific type and location of the impacted tooth is essential for developing effective treatment strategies [6]. Orthodontists play a crucial role in diagnosing and planning the management of impacted teeth, often collaborating closely with oral and maxillofacial surgeons to achieve optimal outcomes. The variation in prevalence rates across different ethnic groups and regions underscores the importance of considering genetic and environmental factors in impaction studies. As research continues to explore the complexities of impacted teeth, orthodontists must remain vigilant in their assessments and treatment approaches, tailoring their methods to the unique characteristics of each patient to provide the best possible care [6].

#### *Etiology*

Impacted teeth have been linked to a diverse range of systemic and local factors. Systemic factors include endocrine deficiencies like hypothyroidism, as well as syndromes such as cleidocranial dysplasia and craniofacial dysostosis [7]. Local factors encompass significant differences in teeth size and arch length, insufficient root resorption of primary teeth, early loss of primary teeth resulting in space loss, the presence of supernumerary teeth, and dental trauma [8]. Two prominent theories aim to explain the causative factors: genetic and guidance theories. Supporters of the genetic theory point to familial patterns (occurrence of impacted teeth in siblings and parents) and the presence of associated dental anomalies (such as congenitally missing teeth, peg-shaped maxillary lateral incisors, and enamel hypoplasia), suggesting a complex polygenic inheritance [9]. Advocates of the guidance theory propose that local environmental factors, like improper contact between the erupting maxillary canine and the root of the lateral incisor, lead to the impaction of maxillary canines. However, there is no conclusive evidence supporting either theory. Hence, impacted teeth likely result from a combination of genetic and local environmental factors [10].

#### *Management*

The collaborative management of impacted teeth involves crucial coordination between oral and maxillofacial surgeons and orthodontists [11]. Typically, patients needing

surgery to expose an impacted tooth are referred by orthodontists. The orthodontist primarily handles the diagnostic work, relying on their training and experience to make treatment decisions. However, there's often a disconnect between the orthodontist's diagnostic work and the surgical planning, potentially leading to inappropriate treatments. Surgeons, on the other hand, generally follow a standard surgical approach for orthodontically managed impactions, lacking a comprehensive understanding of diagnosis and treatment planning [12]. Additionally, the intricacies of orthodontic mechanics are poorly understood by surgeons, putting them at a disadvantage when tailoring surgical plans for their co-managed patients. While this division of labor is important, it can impact the speed and success of postoperative orthodontic treatments [13].

#### *Treatment*

Managing impacted teeth is a complex process that involves careful evaluation and selection of appropriate treatment options. There are four main approaches: observation, intervention, relocation, and extraction, each with its unique considerations and potential complications. Observation involves monitoring the dentition without active treatment during both pre-impaction and postimpaction periods [14]. Dental professionals use clinical and radiographic assessments to predict tooth impaction or anticipate related issues. If the deciduous dentition has erupted without problems, the pre-impaction observation period begins around the age of 6 with the eruption of the first permanent molars. The intervention aims to facilitate natural eruption, promoting physiologic tooth movement while favoring the development of proper gingival bands. Attempts to regain space lost from ectopically erupting molars might involve separators, but this approach is contraindicated in certain cases, such as when there is a congenitally missing tooth or severe arch-length deficiency [15]. Serial extraction, involving the timed removal of primary and permanent teeth, can help in cases of anterior arch-length discrepancies. However, this method must be carefully managed to prevent subsequent impactions. Relocation methods are employed when interceptive treatment fails or when teeth remain impacted. Surgical repositioning (autotransplantation) is an option, especially for adult patients who cannot undergo extended orthodontic care. This approach requires consideration of the patient's age, oral health, available space, and the impacted tooth's condition. Complications such as devitalization and root resorption are possible [16]. Orthodontic relocation, involving surgical exposure and orthodontic eruption of an impacted tooth, is another viable option. The success of this method depends on factors like tooth position, patient age, cooperation, available space, and gingival tissue quality. Extraction becomes necessary when repositioning the impacted tooth within the alveolus is not possible or practical [17]. Several factors, including the patient's age, the dental status of adjacent and impacted teeth, occlusal relationship, and arch length, influence the decision to extract an impacted tooth [18]. The goal is to minimize injury to the dentition and periodontium. Complications associated with surgical removal include

damage to adjacent teeth, root fractures, neuropathy, sinus involvement, and osseous defects. Periodontal concerns related to impacted teeth often revolve around the presence of adequate keratinized gingival, which is vital for maintaining periodontal health. Surgical techniques and eruption paths are designed to preserve or ensure the presence of sufficient keratinized gingival tissue. However, clinicians must weigh the possibility of creating periodontal problems involving an impacted tooth when deciding on the appropriate treatment method [19].

## Results and Discussion

Impacted teeth are a common issue that demands collaboration between orthodontists and oral and maxillofacial surgeons. To achieve the best outcomes, it's crucial to promptly diagnose impacted teeth and devise an effective treatment plan [20]. This plan may involve closed or open exposure procedures performed by the oral and maxillofacial surgeon. Neglecting orthodontic principles and using incorrect surgical techniques can lead to less-than-optimal results. Therefore, communication between orthodontists and oral and maxillofacial surgeons is vital for success. Additionally, educating the patient and involving them in decision-making is mandatory before starting any treatment [21].

## Conclusion

Managing impacted teeth requires thoroughly understanding the patient's dental status, overall health, and treatment preferences. Each treatment option has its advantages and challenges, and the choice depends on factors such as the patient's age, the condition of adjacent and impacted teeth, and the presence of adequate space. Considering each case's unique characteristics, a tailored approach is crucial to achieving optimal outcomes while minimizing complications. Regular monitoring and collaboration between oral and maxillofacial surgeons and orthodontists are essential to ensure the best possible management of impacted teeth and maintain the patient's overall oral health.

**Acknowledgments:** None

**Conflict of interest:** None

**Financial support:** None

**Ethics statement:** None

## References

- Grover PS, Lorton L. The incidence of unerupted permanent teeth and related clinical cases. *Oral Surg, Oral Med, Oral Pathol.* 1985;59(4):420-5.
- Tan C, Ekambaram M, Yiu CK. Prevalence, characteristic features, and complications associated with the occurrence of unerupted permanent incisors. *PLoS One.* 2018;13(6):e0199501.
- Pavoni C, Franchi L, Laganà G, Baccetti T, Cozza P. Management of impacted incisors following surgery to remove obstacles to eruption: a prospective clinical trial. *Pediatr Dent.* 2013;35(4):364-8.
- Foley J. Surgical removal of supernumerary teeth and the fate of incisor eruption. *Eur J Paediatr Dent.* 2004;5:35-40.
- Ferguson JW, Pitt SK. Management of unerupted maxillary canines where no orthodontic treatment is planned; a survey of UK consultant opinion. *J Orthod.* 2004;31(1):28-33.
- Bishara SE, Ortho D. Impacted maxillary canines: a review. *Am J Orthod Dentofacial Orthop.* 1992;101(2):159-71.
- Becker A. *Orthodontic treatment of impacted teeth.* 3rd edition. New Jersey: Wiley-Blackwell; 2012.
- Becker A, Chaushu S. Etiology of maxillary canine impaction: a review. *Am J Orthod Dentofacial Orthop.* 2015;148(4):557-67.
- Peck S, Peck L, Kataja M. The palatally displaced canine is a dental anomaly of genetic origin. *Angle Orthod.* 1994;64(4):249-56.
- Leonardi R, Peck S, Caltabiano M, Barbato E. Palatally displaced canine anomaly in monozygotic twins. *Angle Orthod.* 2003;73(4):466-70.
- Becker A, Brin I, Ben-Bassat Y, Zilberman Y, Chaushu S. Closed-eruption surgical technique for impacted maxillary incisors: a postorthodontic periodontal evaluation. *Am J Orthod Dentofac Orthop.* 2002;122(1):9-14.
- McSherry PF. The assessment of and treatment options for the buried maxillary canine. *Dent Update.* 1996;23(1):7-10.
- Shafer WG, Hine MK, Levy BM. *Textbook of oral pathology.* St. Louis, MO: W.B Saunders Company; 1974
- Kennedy DB, Turley PK. The clinical management of ectopically erupting first permanent molars. *Am J Orthod Dentofacial Orthop.* 1987;92(4):336-45.
- Vanarsdall RL, Corn H. Soft-tissue management of labially positioned unerupted teeth. *Am J Orthod.* 1977;72(1):53-64.
- Luten JR. The prevalence of supernumerary teeth in primary and mixed dentitions. *J Dent Child* 1967;34:346-53.
- Thilander B, Jakobsson SO. Local factors in impaction of maxillary canines. *Acta Odontol Scand.* 1968;26(1-2):145-68.
- Di Salvo NA. Evaluation of Unerupted Teeth: Orthodontic Viewpoint. *J Am Dent Assoc.* 1971;82(4):829-35.
- Gwinnett AJ, Ceen RF. Plaque distribution on bonded brackets: a scanning microscope study. *Am J Orthod.* 1979;75(6):667-77.
- Moss JP. The unerupted canine. *Dent Pract.* 1972;22:241-8.

21. Oliver RG, Hardy P. Practical and theoretical aspects of a method of orthodontic traction to unerupted teeth illustrated by three cases. *Br J Orthod.* 1986;13(4):229-36.