

Management of Multiple Impacted Teeth: A Case Report and Review

Sreedevi D Ajith¹, Smitha Shetty², Huma Hussain³, Tejavathy Nagaraj⁴, M Srinath⁵

Contributors:

¹Professor & Head, Department of Orthodontics and Dentofacial Orthopedics, Sri Rajiv Gandhi College of Dental Sciences and Hospital, Bangalore, Karnataka, India; ²Senior Lecturer, Department of Orthodontics and Dentofacial Orthopedics, Sri Rajiv Gandhi College of Dental Sciences and Hospital, Bangalore, Karnataka, India; ³Post Graduate Student, Department of Orthodontics and Dentofacial Orthopedics, Sri Rajiv Gandhi College of Dental Sciences and Hospital, Bangalore, Karnataka, India; ⁴Professor & Head, Department of Oral Medicine and Radiology, Sri Rajiv Gandhi College of Dental Sciences and Hospital, Bangalore, Karnataka, India; ⁵Professor, Department of Orthodontics and Dentofacial Orthopedics, Narayana Dental College, Nellore, Andhra Pradesh, India.

Correspondence:

Dr. Sreedevi D Ajith. Department of Orthodontics and Dentofacial Orthopedics, Sri Rajiv Gandhi College of Dental Sciences and Hospital, Bangalore, Karnataka, India. Phone: +91-9449649496. Email: sdakaraju@gmail.com

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Abstract:

Interdisciplinary care for the management of impacted teeth provides a holistic method of treating patients. Careful planning is necessary to reach the desired treatment goals. This article attempts to highlight the importance of diagnosis and adequate treatment planning for successful eruption of impacted teeth. The concept of forced eruption to improve the bone morphology of the impacted teeth has been used to treat a case of multiple impacted teeth. This paper reviews the diagnosis and management of impacted teeth. A case report of multiple impacted maxillary anterior teeth of a 13-year-old female patient has been presented.

Key Words: Bone morphology, forced eruption, multiple impacted teeth

Introduction

Impacted teeth are those that will not erupt completely. This is based on clinical and radiographic assessment. Abnormal eruption paths within the dentoalveolar process may result in impactions and serious clinical ramifications.¹⁻³ Orthodontic intervention to bring these impacted teeth into the line of occlusion is important for long-term function and stability.

Incidence

The classic distribution in order of frequency of impaction of permanent teeth can be summarized as follows: Lower third molars, upper third molars, upper canines, upper and lower

premolars, upper incisors, lower canines, lower incisors, upper and lower first molars and upper and lower second molars.^{2,3}

The prevalence of maxillary permanent canine impaction is 1-2% in the general population.^{4,5} This is most likely due to an extended development period, and the long, tortuous path of eruption before the canine emerges into full occlusion.⁶⁻⁸ Failure of eruption of the mandibular canine is an unusual event. The incidence of maxillary canine impaction is in the range of 0.8-2.8% and the prevalence is 0.9-2.2%. Studies have shown increased female predilection of impaction than males.⁹⁻¹¹

Etiology

Primary reasons for impacted teeth are genetics,¹² endocrine deficiency, irradiation, palatal clefts, developmental abnormalities, dento maxillary disharmony, late or missing root development, growth disharmony between pre-maxilla and maxilla, and transverse growth deficiency of the anterior maxilla.¹³

The secondary reasons are loss of guidance of the lateral incisor (microdontia or absence),¹⁴⁻¹⁶ trauma, premature extraction causing space problems by crowding of the anterior segment, root malformation, pericorony pathology, ectopic germ position, thick fibrous tissue,¹⁷ mesiodistal dimension of the nasal fossae, unerupted canine at the borderline of a palatal cleft.¹⁸

Investigations

A thorough diagnosis is essential to detect and prevent impactions. This includes a detailed familial history, clinical inspection, and palpation between the ages of 9-10 years and also a thorough radiographic examination. Radiographic evaluation will include intra oral periapical films, tube-shift technique or Clark's same lingual opposite buccal (SLOB) rule, occlusal films, frontal and lateral cephalograms, panoramic films, computed tomography or cone beam computed tomography.

Treatment

In cases where deciduous teeth are present along with impacted teeth it should be noted that the long-term prognosis for retaining the deciduous teeth is poor, regardless of the length of the root and crown height. Because of the poor prognosis, the deciduous teeth will need to be extracted at a later date. Various treatment options for correcting impacted teeth will include the following:

1. Autotransplantation
2. Extraction and movement of the adjacent teeth in its position

3. Extraction of the impacted canine and use of segmental osteotomy to move the posterior section forward
4. Replacement of the impacted teeth if they cannot be saved
5. Surgical exposure of the impacted teeth and orthodontic traction to bring the tooth into the line of occlusion. The final option is obviously the most desirable approach.

Ingber¹⁹ showed that in the concept of forced eruption the teeth could be erupted for the purpose of lengthening the clinical crown, altering the gingival margins, and leveling the osseous defects. This concept of forced eruption and its association with bone migration has been taken advantage of to treat a patient with multiple impacted teeth.^{20,21}

The following is a description of a case report of multiple impacted teeth, which were treated by improving the 3D morphology of bone in that area and then guiding the eruption of the impacted teeth.

Case Report

A 13-year-old female patient reported to the Department of Orthodontics and Dentofacial Orthopedics at Sri Rajiv Gandhi College of Dental Sciences, with the chief complaint of missing teeth in the upper front teeth region and wanted to get it corrected. Her general physical status was normal. Her facial profile was convex with average facial height and competent lips (Figure 1). On intraoral examination, she had clinically missing 11, 12, 13 and retained 53, 65, 72, 85, 83. She also presented with lower anterior crowding and rotated 15. Her molar relation was Class I bilaterally; the canine relation on the left side was Class I with average overjet and overbite.

Radiographic examination

Panoramic radiograph revealed impacted 11, 12 and 13 the impacted lateral incisor was horizontally placed below 11 and 13 was away from the path of eruption. Incomplete root formation was seen in relation to erupted permanent canines and premolars. Occlusal radiographs and SLOB technique

were used to further confirm that the all the impacted teeth were labially placed and 12 was placed horizontally (Figure 2).

Treatment objectives

Treatment objectives included forced eruption of the impacted lateral incisor and guided eruption of the central incisor and canine, resolution of crowding in the lower anteriors, correction of deep bite, maintaining the molar relation, and to obtain a pleasing profile and smile.

Treatment progress

Both the upper and lower arches were bonded with 0.022" × 0.028" MBT fixed appliance. A modified Nance palatal arch was cemented to maxillary molars in which a Begg bracket was incorporated to apply traction forces to the impacted teeth in early stages of treatment. Soldered lower lingual arch was also cemented. Initial alignment archwires were 0.014" nickel titanium wires in both upper and lower arches (Figure 3).

Surgical exposure of the impacted teeth was done in the Department of Oral and Maxillofacial surgery, closed eruption technique was followed. Teeth 11 and 12 were exposed, and attachments were bonded on the labial aspect of the exposed teeth and the flap was sutured back (Figure 4). Ligature chains were placed on these attachments for application of tractional forces. Extrusive forces of 120 g were initially applied to 11 and 12 by using active ligature ties directly onto the Begg bracket on the Nance palatal arch. The force was measured using a Dontrix gauge. As the treatment progressed, the nickel titanium wires were replaced with 0.016 × 0.022" rectangular stainless steel wire and the ligature ties were tied to the arch wire directly. After 4 months, 11 and 12 appeared into the oral cavity (Figure 5). It was observed that the position of 12 was not favorable for eruption as it was horizontally positioned and obstructed eruption of 11 and 13. It was decided to use it initially to improve the bone morphology in that region to facilitate successful eruption of both 11 and



Figure 1: Pretreatment intraoral photographs.

13 with adequate alveolar support. Once 12 came into the oral cavity, it was extracted and 13 was bonded after second surgical exposure (Figure 6). Tractional forces were applied on 13 for guided eruption (Figure 7).

After 4 months, 11 and 13 favorably erupted into the oral cavity into the desired optimal position with adequate bone support. Space was then created between 11 and 13 using an open coil spring on 0.018" stainless steel wire for replacement of 12 (Figure 8).

Discussion

Orthodontists are frequently faced with tooth eruption anomalies during the gradual emergence of complete adult dentition, and notably disorders related to tooth impaction.



Figure 2: Pretreatment radiographs - orthopantomogram, occlusal film, intraoral periapical radiograph.



Figure 3: Modified nance palatal arch with begg bracket in the upper arch.



Figure 4: Surgical exposure and bonding of 11, 12.

An unerupted or impacted tooth will trigger some major esthetic and/or functional disorders depending on which tooth is affected; hence, the need to reposition in the arch, particularly if the impaction is located in the anterior region. With this in mind, and to achieve maximum results, and long term prognosis, treatment of tooth retention collaboration between surgeons and orthodontists is required. Consequently, the introduction of surgical-orthodontic techniques in our clinical practice has made it easier to manage dental impaction.

A rigid wire of 0.016 × 0.022 stainless steel in the upper arch and 0.017 × 0.025 stainless steel in the lower arch replaced the previous round wire (Figure 9).

The decision on when to extract an impacted tooth is very critical. It should be stressed that removing the labially erupting



Figure 5: Eruption of 11 into the oral cavity.



Figure 6: Extraction of 12, surgical exposure and bonding of 13.



Figure 7: Eruption of 13 into the oral cavity.



Figure 8: Complete eruption of 11, 13 in occlusion.

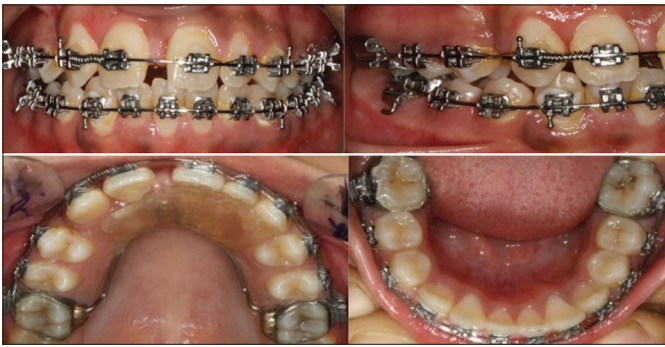


Figure 9: Archwires: Upper arch 0.016 × 0.022" stainless steel lower arch-0.017 × 0.025" stainless steel, open coil spring between 11 and 13.

and out of arch canine is not indicated, despite its poor esthetic appearance. Improvement in the short term esthetics can be achieved with such an extraction; however it may complicate and compromise the orthodontic treatment results, including the ability to provide the patient with a functional occlusion. The extraction of the impacted tooth, especially the canine, may be considered only in the following situations: (1) If it is ankylosed and cannot be transplanted, (2) if it is undergoing external or internal root resorption, (3) dilacerations of the root, (4) if the impaction is severe or unfavorably placed for example if the canine is stuck between central incisor and lateral incisor, (5) if the occlusion is acceptable, with the first premolar in the position of the canine and with an otherwise functional occlusion without crowding, (6) presence cystic formation, infection and other pathologies, (7) If the patient does not desire orthodontic treatment.³⁻⁵

Various modalities for the management of impacted canines exist. Given below are some of them.

Interceptive treatment

An impacted maxillary anterior tooth in a child is problematic because of its esthetic unacceptability. If the problem can be treated earlier, neither orthodontists nor parents want to wait for complete eruption of the permanent dentition before starting comprehensive orthodontic treatment. Nevertheless, both parents and patient should be informed of the possibility of failure before extensive measures are undertaken to save a severely impacted tooth.²

Best long-term results are gained by preventing upper canine impaction. This entails selectively extracting the deciduous teeth by ages 8 or 9. Williams used this interceptive approach when treating in Class I uncrowded cases with canine impaction. In almost 91% of cases, removing the deciduous canine if done before 11 years of age will allow the canine to erupt into its correct position¹⁵ 64% success rate is shown when the canine is impacted is mesial to the midline of the lateral incisor.^{13,14}

Corrective treatment

Early diagnosis and interception of the probable impaction is the best approach in its management. Orthodontic treatment followed by surgical exposure of the canine to bring it into its correct position in the arch should be given importance. Following are the procedures for the management of impacted canines:

1. Open orthodontic eruption
2. Closed orthodontic eruption
3. Extraction of impacted tooth or teeth.

Some of the surgical techniques used to manage impacted maxillary canines are gingivectomy,¹⁰ apically positioned flap,¹⁰ closed eruption,¹¹ closed flap,²² open eruption,⁵ open window eruption,²² and tunnel traction.²³

Many techniques have been used to move impacted teeth into occlusion orthodontically. Some of the techniques are cantilever system²⁴ which requires less frequent activation, temporary anchorage devices²⁵ which provide absolute anchorage for tooth movement, double-archwire mechanics²⁶ has the advantage of minimizing root resorption, easy-way-coil system,²⁷ auxiliary arm from transpalatal arch.²⁸ Auxiliary spring²⁹ and K-9 spring³⁰ to name a few.

Orthodontists suggest that adequate space be created in the dental arch to allow for proper alignment of impacted teeth and later expose the tooth surgically so that a mechanical traction force can be applied to help erupt the tooth. It has been shown that many methods can efficiently create space for impacted teeth, but the easiest would be to use closed-coil springs and eyelets, provided noting is obstructing the path of the impacted tooth.

We should first determine whether the impacted tooth could be successfully aligned in its proper position on the basis of its position and orientation and the amount of root formation. It is important to plan when and how the impacted tooth will be moved to its final position, as well as the positions of adjacent teeth and the intermaxillary relationships.

Ingber has shown that to improve the clinical crown, alter gingival margins and to level the osseous defect, a tooth could be erupted orthodontically. In order to improve the 3D quality of the bone, forced eruption has been quite extensively used in the recent times. A non-surgical technique for an increasing amount of bone available for development of the site for implant and pontic placement is orthodontic extrusion. This is also called forced eruption.³¹ In this patient, we saw that the position of the lateral incisor was not favorable; however we started the forced eruption of the lateral incisor to avoid the bone loss which could have been caused due to the early extraction of the lateral incisor.^{1,2,6}

A close eruption technique was followed in this case to allow the tooth to erupt the attached gingiva with good attached gingiva and periodontal attachment and less chances of vertical relapse.

Designing and applying an ideal force system relative to the center of resistance of the tooth can be challenging. With impactions and in this case multiple impactions, applying the desired force system is complicated still further.^{1,8} In this case, we have used active ligature ties initially with Nance palatal arch as anchorage, so as to apply light eruptive forces to avoid excessive forces which can cause root resorption, but the disadvantage is that it has a high decay rate. After the permanent central incisor and canine sufficiently erupted in the mouth, these teeth were included in the aligning archwires.

Movement of an impacted central incisor could be impossible because of ankylosis and external root resorption. Furthermore, even successfully treated patients can have irregular root formation or an unaesthetic gingival margin after alignment. However, these complications did not occur in this patient.

Conclusion

Dental impaction confronts the practitioner with a serious challenge. Timely treatment for dental impaction is important. Precise diagnoses, an accurate treatment plan coupled with forced eruption using light forces are important to achieve the desired long term results. This case reports describes treatment of multiple impacted teeth, where a technique of guided eruption was used to improve the bone morphology around the impacted teeth for better prognosis.

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