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Impacted Maxillary Incisors in Children: An Eruption Guidance

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Abstract

Missing and unerupted maxillary incisors are considered to be the most unattractive deviant occlusal trait and can have a major influence on dental and facial aesthetics. In this case series, three cases of management of impacted central incisor through various orthodontic appliances are presented. Timely intervention avoided disturbance in arch integrity and meticulous management helped to produce an excellent outcome in terms of function, esthetics, and stability of occlusion.

Keywords: impaction, maxillary incisors, orthodontic appliance

Introduction

Tooth impaction is a condition when there is retardation or halt in normal eruption process. Archer (1975) defined impacted tooth as one which is completely or partially unerupted and is positioned against another tooth or bone or soft tissue so that its further eruption is unlikely. [1]

This may be attributed to multiple local factors, (i.e., dental trauma, mesiodens, or other supernumerary teeth, dilacerations, odontoma, or other atypical dental structure, dentigerous cyst, premature loss or prolonged retention of a deciduous tooth, dental crowding, dense mucoperiosteum, abnormal inclination, germ malposition, alveolar cleft) and systemic (i.e., endocrine deficiencies, radiation therapy, cleidocranial dysostosis, and amelogenesis imperfecta) that may impede the eruption of the permanent incisor. Although seen less often than canines, maxillary incisor impaction ranges from 0.06 percent to 0.2 percent in general population. [2]

Supernumerary tooth is an anomaly resulting from disturbance of odontogenesis due to continuous budding of enamel organ or from excessive proliferation of cells. It can lead to variety of deformities in developing occlusion especially the impaction and ectopic eruption of adjacent permanent teeth. [3]

Odontoma is considered as the most common odontogenic tumour found in oral cavity and it develop as a result of growth of entirely differentiated epithelial and mesenchymal cells that confers to ameloblasts and odontoblasts. It is composed of tooth like tissues such as enamel, dentin, pulp and cementum and in most patients, diagnosed in first 2 decades of life. Its incidence rate is very rare i.e 0.002- 0.1%, mostly asymptomatic and usually diagnosed during routine radiographic investigations. Odontoma can lead to various complications such as impaction, delayed eruption or retention of deciduous or permanent teeth, most commonly impacted teeth as a result of odontoma are canines followed by maxillary incisors and third molars. [4]

Impacted maxillary incisors may lead to speech difficulties, altered tongue position and above all, create a psychological burden on patient by negatively influencing the facial esthetics. Moreover, local changes in the erupted dentition, such as midline shift, space loss, tipping of the adjacent erupted teeth, and increased chance of impaction, ectopic or delayed eruption of other teeth also occurs. In such situations, early orthodontic intervention to accurately predict tooth position and potential eruption in a developing dentition is critical. For this purpose, a variety of imaging methods have been advocated including panoramic, occlusal, cephalometric, or periapical radiographs. Three dimensional imaging system using cone beam computed tomography (CBCT) overcome the shortcomings of two dimensional (2D) imaging so it is a preferred technical tool to accurately locate the teeth. [2]

When the impacted tooth is at a high position in the jaw and is severely angulated, rotated, or dilacerated, the result may be an abnormal root formation or inappropriate periodontal condition. Such cases can be managed by various modalities such as guided eruption using fixed orthodontic appliance, auto transplantation (surgical repositioning of the impacted tooth) and, in rare circumstances, extraction of the tooth followed by prosthesis. [5]

In this case series, three cases of management of impacted central incisor through various orthodontic appliances are presented which highlight the importance of timely diagnosis and treatment.

Case description

Case 1: A 10-year-old boy presented to the department, with the chief complaint of a missing permanent maxillary left central incisor. [Figure 1A] His medical and dental histories were unremarkable and permanent first molars were in class 1 relationship. IOPA revealed the presence of radioopaque structures like odontome, which were obstructing the path of left central incisor. [Figure 1B]So, it was planned to raise the flap to remove the odontome and surgically expose the incisor to start the fixed orthodontic treatment. [Figure 1C,D] Orthodontic traction force was applied after bonding a button on impacted tooth.[Figure 1E,F] Orthodontic button is a miniature attachment which reduces the risk of fenestration. Brackets were bonded to all erupted maxillary incisors and bands were cemented on first permanent molars. 0.016 NiTi arch wire was placed and secured with elastic modules for levelling and alignment. One end of ligature wire was tied to button and the other end tied to main archwire. Tightening of wire was done after every 10-14 days .When the tooth showed some movement occlusally,

button was replaced with bracket and it was secured with 0.014 NiTi archwire and sequential change in wire was done till the tooth comes in proper position.[Figure 1G] After 9 months, tooth came in proper alignment.[Figure H, I]

Figure 1: (A)- Preoperative picture showing missing permanent maxillary left central incisor.(B) IOPA showing impacted teeth and radioopaque structure obstructing the path of eruption .(C) Intra operative picture (D) Excised tooth like structure (E) After suturing and traction force applied (F) Orthodontic button placed (G) Button replaced with bracket and alignment (H) After 9 months

Case 2: A patient aged 9 yrs came to the department with unaesthetic appearance due to missing upper front tooth.[Figure 2A] Patient had a straight profile and his maxillary left central incisor was missing with space deficiency in the respected area. A supernumerary tooth was present beneath impacted central incisor as visualised in Orthopantomogram. [Figure 2B] The supernumerary tooth was located coronal to the impacted left central incisor, so extraction of supernumerary tooth along with traction of impacted tooth using fixed orthodontics in upper arch was planned. As the space was deficient for incisor, so open coil spring was added to regain the space and ligature wire was tied to the main arch wire and tightened every 10 days.[Figure 2C)] After extraction, incision was given on bulge of central incisor and a button was bonded and a ligature wire was tied. [Figure 2D] Brackets were bonded to the remaining teeth, bands were cemented on the upper first permanent molars and 0.012 arch wire was secured with elastic modules. When the tooth started movement in downward direction button was replaced with bracket and a 0.014 NiTi wire placed.[Figure 2 E] After coming in arch form, tooth was aligned with sequential change of wires and complete correction was achieved in 6 months.[Figure F]

Figure 2: A)-Pretreatment intraoral view showing missing left upper central incisor.(B)-Pretreatment panoramic radiograph showing impacted left central incisor.(C)-Brackets bonded in upper arch with coil spring between right central incisor and left lateral incisor to regain space.(D)-Impacted tooth exposed and button placed and ligated to main arch wire.(E)- Bracket bonded to left central incisor and continuous arch wire placed.(E)- Post treatment picture showing left central incisor in position

Case 3: A 10 yr old boy reported to the department with missing upper left central incisor and malaligned right

central incisor.[Figure 3A]He gave the history of trauma 3 years back. Radiographic examination revealed missing left central incisor and impacted right central incisor.[Figure 3B]Orthodontic button was bonded on partially erupted right central incisor and a Modified Nance palatal arch was fabricated with a hook in right central incisor region and orthodontic traction was applied using e- chain from hook to the button.[Figure 3C,D] As the tooth started erupting occlusally, then Nance appliance was replaced with composite splinting incorporating stainless steel wire hook.[Figure 3E] After 2 months, 2x4 fixed orthodontic treatment was started and tooth was aligned in 6 months by sequential change of arch wires[Figure 3 F,G] and the missing left central incisor was rehabilitated using removable partial denture.[Figure 3 H,I]

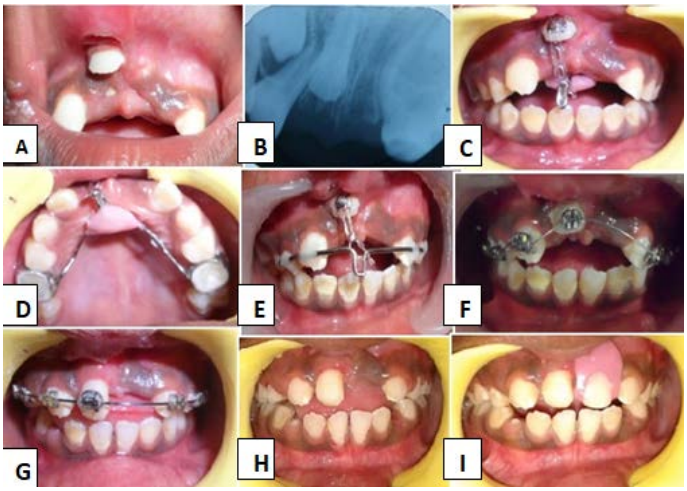

Figure 3: (A)- Pretreatment picture showing partially erupted right central incisor.(B) IOPA showing missing left maxillary central incisor and impacted right central incisor.(C) E chain tied to modified nance palatal arch (D) occlusal view (E) composite splint placed and ligature tied to orthodontic button.(F) button replaced by orthodontic bracket and 2x4 fixed ortho treatmenmt started.(G) after alignment of central incisor (H) after debonding of brackets (I) missing teeth replaced by removable prosthesis

Discussion

Impaction of permanent tooth is rarely diagnosed in mixed dentition stage, however any delay in the eruption of central incisors create a dilemma of tooth impaction. Normal eruption of the central incisors usually takes place between 8 and 10 years of age so, adequate knowledge of the timing and pattern of permanent tooth emergence is essential for proper diagnosis and treatment planning in pediatric dentistry. An anomaly in the eruption of anterior teeth can interfere with facial aesthetics and cause other clinical problems. As a result of their location alone, impacted maxillary central incisors pose a disturbing esthetic dilemma to the parents of a child. Careful supervision of the developing dentition and early diagnosis of aberrations in eruption are essential for early intervention and correction.[2]

Odontoma are intraosseous lesions, found commonly in anterior maxilla and mandible, however, soft tissue lesions also found in gingiva. Although majority of odontoma are asymptomatic, swelling, pain, suppuration, bony expansion and displacement of teeth have been observed. Radiographically, it appears as a hyperdense, noncystic, well defined mass with a radiolucent margin. Odontomas are managed by traditional surgical elimination and recurrence rate is very low. It has been reported that spontaneous eruption of tooth after odontoma removal is predictable however; the ortho- surgical approach had been showen to be warranted for correct tooth positioning. The extent of damage to the teeth enhances with a later diagnosis and early detection and removal of odontomas seems to be associated with a better prognosis for the impacted teeth. [4]

Supernumerary tooth may occur as single or multiple, unilateral or bilateral, erupted or impacted and appear in maxilla /mandible or both. Most commonly single supernumerary teeth found in anterior maxilla region

while multiple supernumerary teeth found frequently in mandibular premolar region. Various complications associated with supernumerary teeth are impaction of adjacent teeth, crowding, diastema, rotation, displacement of teeth, occlusal interference etc. Impaction of permanent incisor because of supernumerary teeth or associated with pathology can be managed by various treatment options such as- (a) extraction or surgical removal of impacted supernumerary tooth and further observation till the permanent incisor erupts, (b) surgical extraction of impacted tooth followed by implant placement (c) surgical repositioning (d) orthodontic correction.[3]

Correction of alignment of impacted maxillary anterior teeth can be a challenging orthodontic problem, however several successful reports have indicated an impacted tooth can be brought into proper alignment in the dental arch. The following factors can be considered before alignment of impacted tooth (a) the position and direction of impacted tooth, (b) the degree of root completion, (c) the degree of dilacerations, and (d) the presence of space for the impacted tooth. A variety of methods and technique have been attempted to treat impacted teeth and it has been suggested that, in up to 75% of patients, impacted teeth erupt spontaneously after removal of over-retained or supernumerary teeth.[6]

Once the cause has been identified and dealt with, it may be that space needs to be created to allow traction to be applied to the affected tooth in order to bring it into the line of the arch. The 2x4 appliance is versatile, easy to use and well tolerated by all patients. The major advantages in carrying out this treatment with a 2x4 appliance are the ease with which space opening can be controlled with a fixed appliance, and also that the force magnitude and vector can be controlled much more precisely than with a removable appliance. The functional improvement coupled with the obvious psychological benefit gives this simple and easily placed appliance a significant advantage over the traditional method of treating these potentially challenging mixed dentition problems.[7]

Various treatment methods for an impacted central incisor include extraction and restoration with a bridge or an implant later when growth has ceased; extraction and closure of the space by substituting the lateral incisor for the central incisor with subsequent prosthetic restoration; and surgical exposure, orthodontics space opening and traction of the impacted central incisor into its proper position as we have done in case 2, however in case 3, we have used a modified Nance appliance. Several authors have suggested surgically exposing impacted incisors and using fixed expansion appliances including bracketing of both permanent and primary teeth to serve as anchorage for orthodontic extrusion. These approaches can prove to be challenging because placing fixed appliances at an early age can cause compliance and hygiene issues. [8] Clinicians should consider treatment goals that minimize injuries to the dentition and the periodontium.[9]

Autotransplantation or repositioning of the tooth in situ has been carried out in teeth with completely and incompletely formed roots. Endodontic treatment should be done before as the pulp cannot regenerate in a completely mature tooth(if the tooth is accessible) or immediately after transplantation. However, there are possibilty of failure of periodontal reattachment or the chances of root resorption in transplanted tooth. As autotransplantation and/or extraction, procedure can jeopardize periodontal health, guided eruption of an impacted tooth is a acceptable alternative. Due to the goal of regaining space and aligning the impacted tooth, orthodontic intervention with guided eruption was planned. The orthodontic guidance was aimed to help the tooth erupt with the normal band of attached gingiva without compromising on bone support. Excessive

extrusive force can cause rapid eruption but without regeneration of the alveolar bone, thus compromising bone support and vitality of the tooth.[5]

The duration of the orthodontic treatment according to the available literature is multifaceted and may depend on the number of treatment phases, pretreatment skeletal patterns, location of impacted teeth, oral hygiene, patient's compliance, etc. In the literature, it is suggested an average time for traction and alignment of impacted canines of 18–30 months and for impacted incisors of 21.6 ± 8 months. Our mean treatment time may have been somehow shorter than these findings, which could be explained by not including the time of the complete orthodontic treatment, just the time to achieve the correct incisor alignment. A surgically exposed impacted tooth is usually brought into the arch using a bonded attachment such as a Begg bracket, a cleat or button, or a Monkey Hook.[10]

Controversy exists regarding the amount of time the clinician should wait to apply post surgical orthodontic forces after exposure and bonding. Some authors recommend application of force immediately after exposure. Others recommend waiting for one to two weeks. This decision seems to be the individual preference of the clinician.[1]

In this case series, we used different treatment modalities for guiding eruption of impacted incisor. Careful supervision of the developing dentition and early diagnosis of aberrations in eruption are essential for early intervention and correction.[2] Therefore, treatment of impacted maxillary permanent central incisor s pose a significant clinical challenge and requires particularly skilled management when it involves very young and anxious parents.

References

1. Adak A, Sarkar A, Saha S et.al. Guiding impacted upper incisor into normal alignment: a case report. Int J Health Sci Res. 2018; 8(10):289-293.
2. Katsikogianni EN, Arqub SH, Chandhoke T, Giannakopoulos NN, Barbosa-Liz DM. Dental features and treatment findings of impacted maxillary central incisors: A multicenter study. Int J Orthod Rehabil 2019;10:1-9.
3. Kalaskar R and Kalaskar A. Multidisciplinary management of impacted central incisors. Contemporary Clinical Dentistry 2011; 2-1
4. Isola G, Cicciu M, Fiorillo L, Matarese G. Association between odontoma and impacted teeth. J Craniofac Surg 2017; 28: 755-758.
5. Dave H, Samrit V, Duggal R, Kharbanda OP. Management of a Horizontally Impacted and Dilacerated Central Incisor in the Early Mixed Dentition. J Dent Child 2015;82(3):163-7
6. Pawar RO, Mapare SA. Treatment of Multiple Impacted Canines - Maxillary Left Canine and Both Mandibular Canines: A Case Report. Int J Sci Stud 2016;4(1):294-296.
7. Dowsing P, Sandler PJ. How to effectively use a 2× 4 appliance. Journal of orthodontics. 2004 Sep 1;31(3):248-58.
8. Tai K, Shin J, Park J, Sato Y. A Modified Palatal Appliance for Forced Eruption of Impacted Central Incisor. J Clin Pediatr Dent 2019;43- 6
9. Pinho T, Neves M, Alves C. Impacted maxillary central incisor : Surgical exposure and orthodontic treatment. Am J Orthod Dentofacial Orthop 2011;140:256-65
10. Vashi, N. and Vashi B. Eruption and alignment of impacted teeth with multi- purpose attachment. J. Clin. Orthod 2012; 46: 486-90