

Autotransplantation of an Impacted Central Incisor with Severe Root Dilaceration

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Abstract

Trauma to the deciduous maxillary centrals, especially the intrusive type, may affect normal development of the permanent incisor. In severe cases the trauma may cause dilaceration of the root due to displacement of the crown in a vestibular or palatal direction while root growth continues in the normal apical direction. Severe root dilaceration will affect tooth eruption and impaction of these teeth is common. Treatment options of the impacted teeth include surgical removal of the tooth, surgical exposure of the tooth and orthodontic traction or autotransplantation of the tooth. The case report describes treatment of an impacted maxillary central due to early trauma of the deciduous incisor at age 2 years. The impacted tooth showed severe root dilaceration with the crown directed buccally. The first stage was orthodontic space regainer, followed by surgical extraction of the tooth, removal of the apical third of the root and apexification with glass-ionomer cement, autotransplantation, root canal treatment and final orthodontic treatment. Five years follow-up showed normal PDL along the root of the central and normal occlusion. Slight yellow discoloration of the crown was observed that will be treated by internal whitening. The result of this case shows that autotransplantation of an impacted central with severe dilaceration can be performed after removal of the most dilacerated part of the root in order to avoid penetration of the buccal cortical plate by the root apex during orthodontic traction.

Keywords: Impacted teeth; Root dilaceration; Autotransplantation

Introduction

The permanent maxillary central incisor erupts at 7-8 years of age during the transition from deciduous to mixed dentition. Failure to erupt during the timeframe may result in aesthetic and sociopsychological concerns that could compromise Oral Health Related Quality of Life (OHRQoL) [1]. Children with a normal dental appearance of the maxillary anterior region would be judged by peers and adults to be better looking, more desirable as friends, more intelligent, and less likely to behave aggressively [2]. Parental satisfaction and children's OHRQoL were associated with children's dental caries status [3]. Factors causing eruption disturbances of permanent teeth can be broadly divided into systemic and local factors. Systemic factors include vitamin D-resistant rickets, endocrine disorders, long-term chemotherapy, oral clefts, Gardner and Down syndromes [4]. Local factors include supernumerary teeth, odontoma, and trauma affecting tooth germination, root dilaceration, crowding, or periapical lesions of primary incisors [5]. Diagnosis of eruption disturbances involves clinical and radiological examinations. A normal eruption time of up to 4 months for the maxillary incisors and up to 12 months for the mandibular incisors is generally acceptable [6]. Central incisors with eruption disturbances exhibited less growth compared to those erupted normally within the same individual. Furthermore, impaction due to obstacles such as supernumerary teeth tended to orient the crown distally, while primary retention without clear causes tended to orient the crown mesially [1]. Tooth dilaceration refers to an angulation which can occur anywhere along the length of the tooth, its crown,

cemento-enamel junction, along the root or only involving the apex of the root and resulting in disruption of the normal axial relationship of the tooth [7]. The malformation occurs by displacement of the crown, due to trauma to deciduous predecessors, usually during early tooth development, in a vestibular or palatal direction, while root growth is still progressing in a cranial direction. With continued tooth development, tooth eruption becomes unlikely and the tooth remains impacted [8]. Dilacerations are estimated to occur in 3-14.3% of permanent dentition and the treatment of an unerupted incisor due to root dilaceration involves surgical removal or exposure followed by orthodontic treatment [9-11]. This article presents an alternative treatment of a maxillary permanent incisor with severe root dilaceration in a 10-year-old girl.

Case Presentation

A 10-year-old girl was referred by her general dentist to the pediatric dental clinic of Barzilai Medical University Center in Ashkelon for consultation. The chief concern was the non-eruption of the maxillary left permanent incisor. The girl was physically healthy and the parents remembered a traumatic injury in the frontal oral region at the age of 2 years with intrusion of the deciduous upper left deciduous incisor. The girl had a balanced facial pattern with a skeletal Class 1 occlusion (Figure 1). Intraoral examination showed a caries-free early mixed dentition. The maxillary lateral left incisor showed a mesial angulation and a cross-bite tendency and the deciduous left canine was in a tete-a-tete occlusion (Figure 2).



Figure 1: Balanced facial pattern.



Figure 2: Intraoral status.

The girl was referred to panoramic radiograph (**Figure 3**). The radiograph revealed a dilacerated left permanent central incisor and missing second premolars in the mandible. In order to evaluate the

location and degree of the dilaceration. The girl was referred to a CB CT that showed a buccal angulation of the crown of the impacted incisor and a severe dilaceration of the root (**Figure 4 and 5**).



Figure 3: Panoramic radiograph.



Figure 4: CB CT.

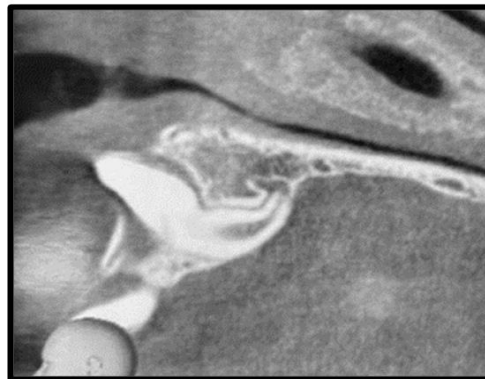


Figure 5: Note the severe dilaceration of the root of central incisor.

The treatment options were discussed with the orthodont and included: surgical extraction and prosthodontic restorations with an implant and ceramic crown or by orthodontic space closure and restoration of the lateral, orthodontic space opening, surgical exposure and orthodontic traction of the tooth into proper alignment. The main factors that affected the success rate of orthodontic traction of the impacted incisors were severe root dilacerated incisors that were located high in the alveolus [12]. An alternative treatment modality was suggested to the parents that included orthodontic space opening and autotransplantation of the central incisor after

surgical removal of the apical third of the root, under general anesthesia.

Treatment phases

The first orthodontic stage of space opening took about six months. Under general anesthesia the maxillary left incisor was exposed and extracted, The apical third of the root was removed using a 330 carbide bur and apexification was performed using a glass-ionomer material (EQUIA by GC Europe). A new alveolar socket was prepared and the tooth was re-implanted in the socket without pressure. An orthodontic bracket was bonded on the buccal surface and an orthodontic wire (round SS 0.14) was attached to the brackets (Figure 6).

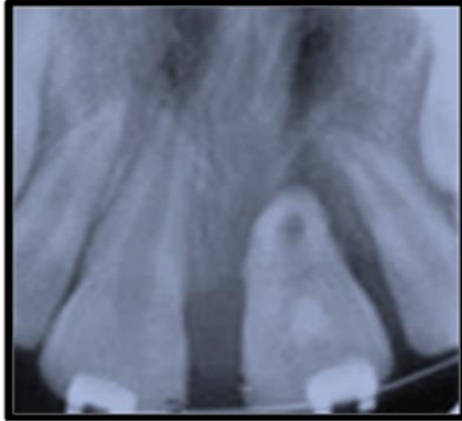


Figure 6: Autotransplantation of the central incisor after root reduction and apexification.

The pulp canal was filled with calcium hydroxide. The recovery from the GA was normal and after a month a full root canal treatment was performed. The second orthodontic phase was performed after the re-implanted central showed normal mobility and full eruption of the permanent teeth, and it took about two years.

Follow-up of 5 years showed a healthy PDL and a class 1 occlusion (**Figure 7-9**). A slight yellow discoloration of the left upper central occurred that will be treated by internal whitening. The mandibular second deciduous molars are still in the mouth and when time will come will be replaced by implants and ceramic crowns.



Figure 7: Follow-up.



Figure 8: 5 years follow up.



Figure 9: At the last follow-up examination.

Discussion

The treatment of dilacerated permanent anterior teeth is always a clinical dilemma. In the past the solution was surgical/orthodontic treatment [13]. More recently the orthodontic approach was described successfully [9,11,12]. Most dentists believe that the outcome of dilaceration is due to early trauma. Other clinical sequelae related to trauma include ankylosis and cervical root resorption, potent factors to the increased failure rate of orthodontic traction of the dilacerated teeth [12,14]. Out of 27 cases with root dilaceration treated orthodontically, 5 cases failed due

to ankylosis and invasive root resorption [12]. A dilacerated tooth is more resistant to extrusion than a tooth with normal root, making the apical area more prone to resorption. Depending on the degree of dilaceration, the apical portion of the root can penetrate the labial cortical plate, so that it would be intraorally palpable in the labial sulcus and in severe cases the root apex can be even exposed into the oral cavity [15]. In our case the root dilaceration was very severe in the apical third and the possibility of penetration of the labial cortical plate during the orthodontic traction was taken into consideration.

The autotransplantation procedure is a clinical procedure with high success rate for impacted permanent canines or when a premolar bud is autotransplanted in the anterior maxillary region due to missing central [16,17]. This case report showed that impacted centrals with severe root dilaceration can be

treated by autotransplantation with apical root resection. Orthodontic movement of the autotransplanted teeth can be performed six months after treatment, when normal mobility of the tooth is present.

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