# Management of an Unerupted Dilacerated Maxillary Central Incisor after Trauma to the Primary Predecessor

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### ABSTRACT

The most common cause of permanent maxillary incisor dilaceration is usually trauma to the primary predecessor, such as avulsions, intrusions, or gross displacement of primary incisors. The purpose of this case report was to describe the surgical exposure and orthodontic traction of an unerupted dilacerated permanent maxillary central incisor performed on a young girl. During the surgical exposure, a hole was placed in the tooth crown, and elastic chains, inserted though the hole, were used for traction. The alignment and leveling of the impacted incisor were performed with sequential stainless steel wires. Good periapical and periodontal health, combined with adequate occlusion and a positive esthetic outcome, demonstrated the satisfactory results of this case. (J Dent Child 2012;79:30-3)

Received April 24, 2010; Last Revision November 4, 2010; Revision Accepted January 28, 2011.

Keywords: tooth, unerupted, orthodontic appliances, tooth intrusion

Dilaceration is the result of a developmental anomaly in which there has been an abrupt change in the axial inclination between the crown and the tooth's root.<sup>1</sup> The criteria to recognize a root dilaceration is somewhat controversial, according to scientific literature. The root is considered to have a dilaceration toward the mesial or distal direction if there is an angle of 90° or greater along the axis of the tooth or root. Other authors have defined dilacerations as a deviation from the normal axis of the tooth of 20° or more in the apical part of the root.<sup>2,3</sup>

Tooth dilacerations can be asymptomatic or can react in various ways, including noneruption of the affected tooth, prolonged retention of the primary predecessor tooth, or apical fenestration of the labial cortical plate.<sup>4,5</sup> Possible causes of dilaceration are trauma, developmental disturbances, and developmental syndromes. Root dilacerations are more commonly found in the maxilla and posterior teeth. The prevalence in permanent incisors ranges from approximately 5% to 16%.<sup>67</sup>

Dilaceration of a permanent maxillary central incisor is usually the result of trauma to the predecessor tooth, such as an avulsion, intrusion, or gross displacement of the primary incisor<sup>8</sup> due to the close relationship between the apexes of the primary teeth and their permanent successors. The frequency of maxillary incisor impaction has been found to range from 0.006% to 0.2%.<sup>9</sup> Orthodontic traction after surgical exposure is a current treatment modality, but includes possible failures due to ankylosis, external root resorption, or root exposure. Moreover, if the tooth is successfully brought into occlusion, an unesthetic gingival margin could appear.<sup>10</sup>

The purpose of this case report was to describe the successful management of an impacted and dilacerated permanent maxillary incisor with combined surgical and orthodontic treatment.

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## CASE DESCRIPTION

A healthy 9-year-old girl presented to the Department of Pediatric Dentistry and Orthodontics at Federal University of Rio de Janeiro, Rio de Janeiro, Brazil, with a complaint of an unerupted permanent maxillary central incisor. Her past medical history was unremarkable other than a history of trauma to her primary maxillary incisors due to a fall at the age of 2. At that time, the primary right incisor suffered a severe intrusion; the tooth reerupted after a few months. No treatment was carried out until the parents brought the child to this clinic. The clinical and radiological examinations identified a permanent maxillary right central incisor with an accentuated root dilaceration impacted in the region of the nasal floor. The patient presented an angle Class I molar relationship, adequate space for the incisor, and early mixed dentition. An inversion of the crown of the permanent maxillary right central incisor, incomplete root development, and open apices of both incisors were observed via an orthopantomograph and periapical and lateral cephalometric radiographs (Figures 1 and 2).

The treatment plan consisted of surgical exposure followed by light orthodontic traction of the impacted central incisor. During surgical exposure, there was inadequate access for bonding a button on the crown, and the field was contaminated with blood and saliva. Consequently, a hole was drilled through the tooth's incisal edge, away from the dentin. Orthodontic elastics were inserted though the hole to increase reliability and thoroughness of the traction procedure (Figure 3). Standard edgewise brackets were bonded on the anterior segment of the arch, and the teeth were aligned and leveled until a stainless steel rectangular arch wire  $(0.019 \times 0.026$  inch) could be used as anchorage.

Different types of orthodontic mechanisms with elastic chains (to apply traction) were used. The direction of force was adjusted to guide the impacted central incisor into the correct position without disturbing the other teeth. As the dilacerated tooth moved gradually downward, the elastic chains were constantly changed (every 3 weeks) until the tooth's vestibular surface was exposed. Following exposure, a standard incisor bracket was bonded and traction became easier. Final alignment and leveling were achieved with round and rectangular wires (Figure 4).

The orthodontic attachments were removed after 30 months when the correct alignment of the upper incisors was achieved and a short period of retention was observed. A resin restoration was placed to fill the hole that had been placed in the incisal region of the tooth. The gingival margin and the attached gingiva were acceptable and healthy, and the occlusion was satisfactory (Figure 5). A periapical radiograph revealed partial obliteration of the root canal space and a shorter root compared with the adjacent incisor. No pathological signs in the periapical area were observed (Figure 6).



Figure 1. A pretreatment orthopantomograph and periapical radiograph revealed an unerupted dilacerated right central incisor.



Figure 2. A pretreatment lateral cephalometric radiograph revealed a dilacerated tooth in the region of the nasal floor.



Figure 3. A hole was placed in the crown of the tooth for traction procedures.



Figure 4. An incisor bracket was bonded on the vestibular surface. Final alignment and leveling were achieved with round and rectangular stainless steel wires.



Figure 5. The satisfactory final occlusion.



Figure 6. A post-treatment periapical radiograph showing a partial obliteration of the root canal space and no signs of periapical inflammation.

### DISCUSSION

Children who suffer dental trauma at an early age, particularly in cases of luxation and avulsion, require special attention.<sup>11</sup> During this period, the permanent incisors are in continuous formation, and any injury can disturb their morphology.<sup>12</sup> Intrusive luxation is observed in approximately 41% of cases of trauma in primary teeth and is the type of injury most related to the malformation of permanent teeth. The impaction of the maxillary incisor is often clinically and radiographically diagnosed at an early age, because the lack of eruption of an anterior tooth causes parental concern during the early mixed dentition phase.<sup>13</sup> Depending on the tooth's localization and the degree of dilaceration, the prognosis may be difficult, and multidisciplinary therapy is important with the inclusion of a pediatric dentist, maxillofacial surgeon, orthodontist, endodontist, and periodontist.<sup>14</sup> In our case, because the trauma occurred at a relative early age, the severe root dilaceration caused the impaction of the permanent tooth leading to a functional and esthetic problem for the young patient.

Surgical exposure and bringing the impacted tooth into normal occlusion with light orthodontic traction is reported as a current therapy<sup>3,10,13,15,16</sup> and was the option in this case. The interesting peculiarity in our case was the method of traction: drilling a hole in the crown, rather than using a bonded attachment, as was described in the other articles cited. This innovative method was chosen after surgical crown exposure. We observed inadequate access for the bonding procedure and a field contaminated with blood and saliva. The only disadvantage of this method was the need for a composite restoration of the hole when the traction was finished. Because of this innovative method, a comparison with the other reported cases was not feasible.

If an erupted dilacerated tooth needs future root canal treatment, the presence of dilacerations can severely complicate this treatment. The prognosis will not become evident until the dentist has undertaken initial endodontic treatment to determine whether the canal can be negotiated completely and then adequately disinfected and filled.<sup>1</sup> In some cases, extraction of the dilacerated tooth is unavoidable, because of the severity of the acute angle in the root.<sup>17</sup> After extraction of a maxillary incisor, tooth substitution with a prosthetic or implant or auto transplantation of a premolar to the maxillary incisor region may be a realistic treatment.<sup>18</sup>

In our case, the periodontal status of the exposed incisor after orthodontic treatment revealed an acceptable gingival margin, eliminating the need for gingival recontouring surgery. A periapical radiograph revealed the obliteration of the pulp canal but with no signs of periapical infection, similar to a previous case reported by Kuvvetli, Seymen, and Gencay.<sup>15</sup>

Accurate and early diagnosis, along with the multidisciplinary approach, permitted the orthodontic traction of the unerupted maxillary incisor into normal alignment, maintenance of a healthy zone of attached gingival, and ideal alveolar bone height. In conclusion, the satisfactory results obtained with the patient's own tooth demonstrated the advantages of this approach and eventually restored the esthetics of a young girl.

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