Case Report

Management of an unerupted dilacerated maxillary central incisor: a case report

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Abstract – A case with a dilacerated maxillary permanent central incisor, treated with forced eruption technique is illustrated and the results of the 4-year follow up are presented. After the successful eruption of the tooth, the root development was completed and the root canal was obliterated. The 4-year follow-up results revealed the tooth to be still functional and the radiographic evaluation showed that the periodontal and periapical tissues were intact and healthy. In conclusion, the impacted dilacerated incisor diagnosed in the early mixed dentition should be treated with the aid of orthodontic traction. The long-term follow up showed that once the tooth is placed in the occlusion properly, it may function well esthetically and preserve its periodontal and periapical health.

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The impaction of maxillary permanent incisors possess important problems in terms of esthetics and occlusion in the early mixed dentition (1, 2). The causes of impaction are related to odontoma, supernumerary teeth, cysts, and crown or root malformation of permanent incisors because of the trauma transmitted from primary predecessors (3, 4). In some cases there are no signs of these factors and it is suggested that this anomaly is a result of ectopic development of the tooth germ (3). The frequency of maxillary incisor impaction has been found to range from 0.006% to 0.2% (5).

Crown and root dilaceration, characterized by an angulation between the crown and the root is often related to a traumatized primary incisor and it occurs in the early stages of development of the permanent incisor (6). In many cases, it is positioned as an inverted tooth and present with the palatal face of the crown facing forward 'like the hand of a traffic policeman' (3).

In the literature, it has been stated that impacted incisors can be properly positioned with the aid of direct orthodontic traction (1, 2, 7, 8, 9). However, this treatment method still possesses a clinical dilemma because of the tooth's position and can fail due to ankylosis, external root resorption or root exposure (1, 10). Even though the tooth is successfully brought to occlusion, it may end up with an abnormal root formation or an unesthetic gingival margin (1, 2). As most of the successful cases regarding the orthodontic traction of impacted maxillary central incisors include short-term reports (1, 2, 7, 8, 9), there is lack of information about the long-term results.

In this article, an 8-year-old male with a dilacerated maxillary permanent central incisor, which was treated with forced eruption technique is illustrated and the results of the 4-year follow up are presented.

Case report

The patient was an 8-year-old male with a complaint about the delay in the eruption of his upper right central incisor. The past medical history was unremarkable. The dental history revealed that the upper right primary central incisor exfoliated prematurely because of a trauma at age 1 or 2.

Intraoral examination showed that the upper right permanent central incisor was unerupted whereas the left central incisor and the lateral incisors were placed in the maxillary dental arch. The unoccupied space was inadequate for the eruption of an incisor caused by the drifting of the adjacent teeth. The patient was in early mixed dentition and had an Angle Class I molar relationship.

On panoramic and periapical radiographs (Figs 1 and 2), an inversion of the crown of the upper right central incisor, incomplete root development and open apices of both incisors were observed. After the radiological determination of crown dilaceration, the position of the tooth was determined as, in the vestibular sulcus, right under the labial frenulum.

The treatment modality was chosen so as to force the eruption of the tooth when the age of the patient and the incomplete root formation was taken into account. The parents were informed about the possible risks of the treatment and consent was obtained before the procedure.

Before the forced eruption step, adequate space was obtained with molar bands, standard edgewise brackets and 0.016 inch nickel–titanium arch wire. The surgical exposure of the tooth was performed approximately six-months later. The incision was made using electrosurgery because of the thin mucosa covering the crown. After exposing the tooth, a lingual button was bonded on the palatal surface. Force was applied with an elastic thread tied between the button and a 0.016 × 0.022 inch stainless steel arch wire with a V-shaped bend, which was applied in order to enhance the retention of the elastic thread between the button and wire (Fig. 3). As the dilacerated tooth moved gradually downward, the thread was changed and a shorter one was applied until the vestibular surface of the tooth could be seen.

Hyperplastic tissue on the labial frenulum was seen during the eruption phase (Fig. 4) and a frenectomy was performed. The histopathologic diagnosis was an inflammatory fibrous hyperplasia and ulceration.

Fig. 1. The panoramic radiograph reveals the impacted maxillary right central incisor before treatment.

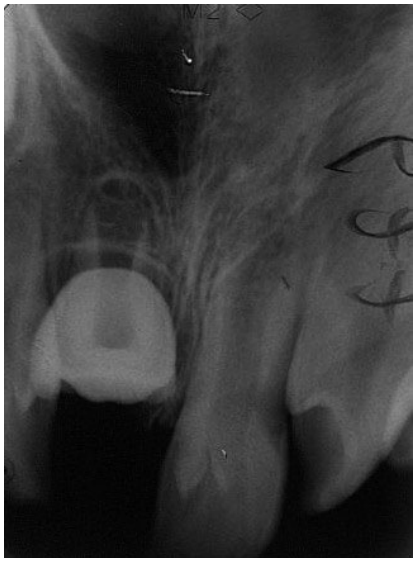

Fig. 2. The pretreatment periapical radiograph shows an inversion of the crown of the right permanent central incisor.

Fig. 3. Surgical crown exposure and lingual button bonded on the palatal surface of the impacted incisor. Application of force with an elastic thread tied between the button and the stainless steel arch wire with a V shaped bend.

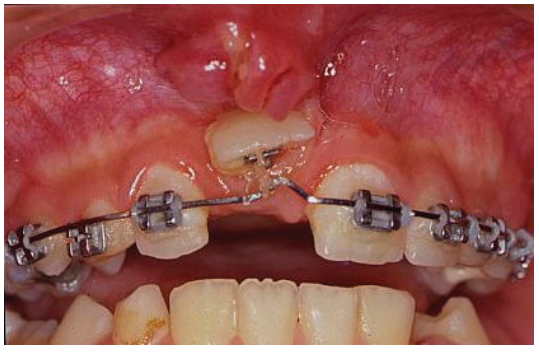

Fig. 4. The downward movement of the tooth and the hyperplastic tissue on the frenulum are seen.

Once the tooth had been moved close to its place in the dental arch, a periapical radiograph was taken and the continuation of root development was observed (Fig. 5). In order to achieve the final alignment and leveling, the attached button and the stainless steel wire were replaced with a standard incisor bracket and a 0.016 × 0.022 inch nickel–titanium arch wire. Ideal overbite and overjet were established. The eruption and positioning were completed after 18 months. The gingival contour and the attached gingiva were acceptable and healthy (Fig. 6). After the removal of the bands and brackets, the patient used an Essix retainer for 4 months.

The radiographic evaluation revealed an obliteration in the root canal and a shorter root compared with the adjacent incisor, with completed apical development. There were no pathological symptoms in the periapical area (Fig. 7).

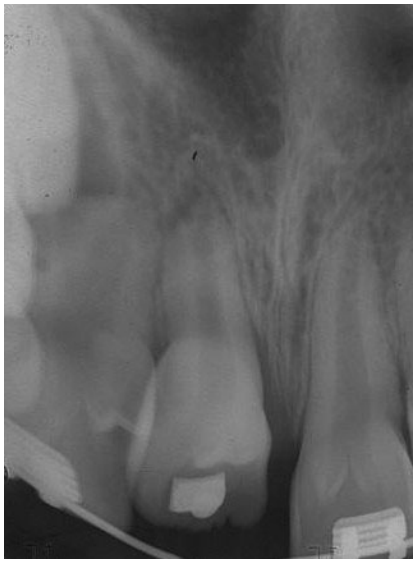

Fig. 5. The periapical radiograph reveals continuation of the root development during the forced eruption phase.

Fig. 6. On the post-treatment intraoral appearance, the tooth is properly positioned and a healthy gingiva and acceptable gingival contour are achieved.

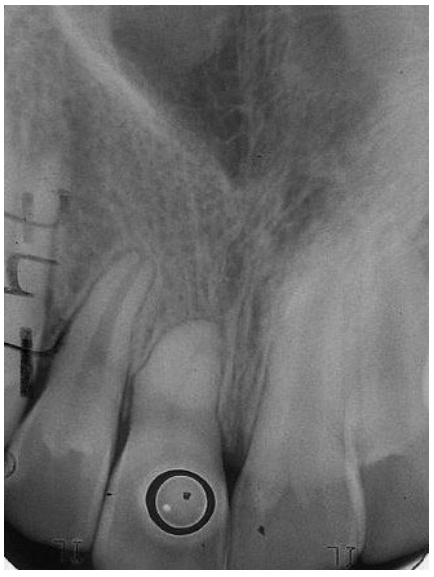

Fig. 7. The post-treatment periapical radiograph reveals the completed root development and the obliteration of the root canal.

The patient was recalled 4 years after the treatment and according to the intraoral examination, the tooth was clinically healthy and functioning well in its proper position (Fig. 8). The panoramic and periapical radiographs (Figs 9 and 10) revealed that the root canal was totally obliterated, the periapical area and periodontium were in good condition and no resorption or pathological symptoms were evident.

Discussion

Impaction of maxillary permanent incisors caused by crown and root dilacerations are not only rare cases in routine clinical course but they also have serious consequences such as esthetic, phonetic and occlusal problems for the young patient.

Fig. 8. The intraoral appearance shows that the erupted incisor is still functioning well and the gingival tissues are healthy 4 years after treatment.

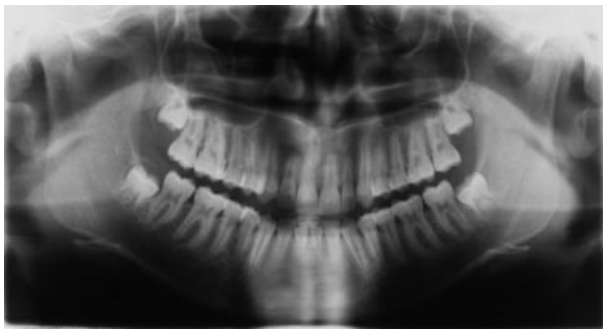

Fig. 9. Four-year follow-up panoramic radiograph.

Fig. 10. Four-year follow-up periapical radiograph shows a healthy periodontium and total obliteration of the root canal.

The impaction of the maxillary incisor is often clinically and radiologically diagnosed in early ages because the non-eruption of the anterior tooth causes concern to parents during early mixed dentition phase (7). Clinical signs of an impacted tooth include retention of the primary tooth, space closure, and elevation of the soft tissue of the palatal or labial mucosa (9). The radiographic findings usually reveal the causes of impaction, such as a supernumerary tooth, an odontoma or a dilaceration; thus the treatment of the impaction is carried out according to the obstacle for eruption (1, 7, 11).

One of the most common local causes for tooth impaction is the dilaceration of the permanent incisor because of traumatic injury to the primary tooth (12). Depending on the localization of the tooth and the degree of dilaceration, a number of treatment options have been suggested in the literature. Surgical exposure and moving the impacted tooth into normal occlusion with light force orthodontic traction is well accepted and reported as a current treatment modality (1, 2, 7, 8, 9). However, in some cases extraction of the tooth is unavoidable, because of the severity of the inversion of the tooth (3, 12). The forced eruption technique is performed by a button or a bracket attached to the teeth after the crown is surgically exposed. The force is applied either by an elastomeric chain or an elastic thread tied between the button and the arch wire (2, 7, 8, 9, 11). In some cases, closed-eruption surgical technique is applied and the flap is returned to its original location after placing the attachment on the impacted tooth (7), while in others the tooth is surgically exposed with an apically positioned flap (1) or a U-Shaped flap (8).

The present case reveals the management of a dilacerated maxillary central with incomplete root development, diagnosed in the early mixed dentition phase. Although forced eruption of the impacted tooth was a clinical challenge, it was decided upon as the best treatment option considering the position of the tooth and the stage of root development. The crown of the tooth was easily palpable in the vestibular sulcus and the covering mucosa was very thin. A small window was opened on the mucosa with the aid of electrosurgery in order to expose the crown and the button was easily attached, with controllable bleeding in the surgical area. The forced eruption technique was applied in accordance with the literature (2, 7, 8, 9, 11) and the tooth was successfully positioned in its proper place.

It is suggested that the success rate of the impacted dilacerated tooth further depends on the degree of dilaceration, position of the tooth, and the amount of root formation. A dilacerated root with an obtuse angle, lower down position, and incomplete root formation of the tooth would bring about a better prognosis for orthodontic traction (7). In the present case, the patient was referred in the early mixed dentition phase and root development was incomplete.

After the successful eruption of the tooth, root development was completed and the root canal was obliterated. Pulp canal obliteration may occur due to many factors including age, caries, dental trauma (13,14), autotransplantation (15) and orthodontic therapy (16). Besides pulp canal obliteration, yellow or gray discoloration and pulp necrosis may be observed (17). However, the need for endodontic therapy in such cases is controversial and it is reported by Robertson et al., that although the risk for pulp necrosis increases over the course of time concomitant with decreased accessibility of these teeth for endodontic treatment, routine endodontic intervention of teeth with ongoing obliteration of the root canal does not seem justified (17). In the present case, mineralization within the pulp canal occurred slowly after the eruption of the tooth and

orthodontic traction can be assumed as the cause of this complication. Although the erupted tooth showed no response to electric pulp testing, no signs of a periapical lesion or discoloration of the crown were observed after the obliteration of the canal and, considering the very difficult accessibility of the canal because of the dilaceration besides obliteration, it was decided to carry out a clinical and radiographic follow up.

The radiographic evaluation after 4 years showed that the periodontal and periapical tissues were intact and healthy and the tooth was functioning in its proper place. No signs of discoloration of the crown was observed.

The treatment and 4-year follow up of the present case shows that, once the condition is diagnosed early, the stage of root development and the shape of the crown are appropriate, and the patient complies with the long and difficult procedures, the forced eruption of the tooth can be accepted as the best treatment option. In comparison with removable and fixed prosthetic appliances including dental implants, the patient's own tooth being the most biocompatible one, would bring about better functional and esthetical results.

In conclusion, the impacted dilacerated incisor diagnosed in early mixed dentition should be treated with the aid of orthodontic traction. The long-term follow up showed that once the tooth is placed in the occlusion properly, it may function well esthetically and preserve its periodontal and periapical health.

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