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Management of multiple sequelaes in permanent dentition: 3 years follow-up

CASE REPORT

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Abstract – A 12-year-old patient with multiple sequelaes of permanent dentition due to trauma in primary dentition at the age of 8 months, is presented. Clinical and radiographical examinations revealed aesthetical defects, crown-root malformations (#21), hypoplasia (#12, #22), tooth transposition (#13) and odontoma-like malformation (#11). The performed conservative, endo-surgical and prosthetic treatment to gain back the aesthetic and function is reported.

Almost 40% of all somatic injuries are head injuries in children younger than 6 years old and 18% of them are seen in the oral region in preschool children (1). According to literature, the prevalence of traumatic injury to primary teeth varies from 11 to 39% (2–5). The risk of trauma increases twice between 18 and 30 months, when the child starts walking (2, 3). The house is the most common trauma place at this age and falls are the principal cause of dental trauma (2, 3, 6–8). Although crown fractures are the most common injury to the permanent dentition, luxation injuries predominate in the primary dentition (2, 6–8). It has been stated that the supporting structures in the primary dentition are resilient; therefore, dislocations are more common than fractures (6–8).

Andreasen and Ravn (9) have found that 41% of 213 children has developmental disturbance in permanent dentition after a trauma in primary dentition. The ratio was increased to 53–69% in intrusive luxations (7, 10, 11). The close relationship between apices of the primary teeth and the developing successors explains the disruption of the permanent dentition with great influence of the age of the patient (1, 2, 7, 12). This may lead to disturbance of the enamel with discoloration or may be deeper like hypoplasia. The morphological developmental interference, like dilacerations, root duplication or odontoma, may occur in crown, root or both. Furthermore, there might be disorders of permanent successor's eruption (7, 12).

In luxation injuries, the severity of the trauma and the direction of the dislocation of the affected primary tooth are the other important factors. The frequency of developmental disturbance of permanent teeth is related to age of the patient at the time of the trauma. It is reported that 63% of the cases with disturbances of the permanent teeth had been in cases that the trauma occurred before the age of two. The percentage reduces to 53% when the injuries occur between the ages of 3 and 4 years and to 24% between the ages of 5 and 6 (9).

The aim of this case report is to present the management of multiple sequels in permanent dentition after a trauma in the primary dentition.

Case report

Twelve years old female was referred to the Ege University School of Dentistry Department of Pediatric Dentistry who suffered from anterior aesthetical defects. Her detailed dental history reported by her mother revealed that she was fallen at home when she was 8 months old and she could not recall the details but that some of the primary incisors were avulsed and/or intruded. Soft tissue injuries such as laceration of buccal mucosa and gingival bleeding had occurred. The mother of the patient also stated that she was informed by the dentist about the possible sequels of the permanent successors at that time.

The clinical examination at the present has revealed that five permanent teeth were affected from the trauma of primary predecessor (Fig. 1). The crown malformations and hypoplasia were detected on the upper right lateral incisor (#12) and upper left central and lateral incisors (#21, #22). The upper right central incisor (#11) was failed to erupt and the upper right canine (#13) was transposed to that position.

The orthopantomogram, periapical and occlusal radiographs were taken (Fig. 2a–c). The radiographical exam-

Fig. 1. The clinical appearance of the affected permanent teeth.

ination has revealed an odontoma-like malformation of permanent tooth germ #11. The periapical radiograph showed that the tooth #21 had a root malformation (furcated on the apical one third) and a periapical lesion.

The crown abnormalities of the upper lateral incisors have restorated with composite resin (CLEARFIL AP-X, Kuraray Medical, Inc., Tokyo, Japan) under local anesthesia. After the removal of the caries by using a micromotor and a handpiece with diamond and steel burs, the teeth were isolated with cotton rolls. The teeth were etched with 37% phosphoric acid for 15 s, rinsed with water, air dried and the bonding system (CLEARFIL SE Bond; Kuraray Medical, Inc.) was applied before the final resin restoration. Composite resin of 2 mm thickness was light cured for 40 s and polished with polishing discs (Sof-Lex; 3M ESPE, St.Paul, MN, USA).

The tooth #13 (transpositioned to 11) was ground to remodeling of central incisor gradually for 3 months. The ground surface was treated with fluoride gel (NaF, Sultan Dental Products, Englewood, NJ, USA) as a desensitizing agent. After the final grounding, reshaping of the canine to a central incisor was performed using a composite resin (CLEARFIL SE Bond + CLEARFIL AP-X, Kuraray Medical, Inc.).

The tooth #21 had a crown-root malformation and a periradicular lesion. $Ca(OH)_2$ treatment was performed to provide the healing of periradicular tissues. After 3 months, when the tooth had been asymphtomatic, root canal has filled using gutta percha (ML.029 Gutta Percha, DiaDent Group, Int., Burnaby, BC, Canada) and a root canal sealer (Diaket, 3M ESPE) (Fig. 3). The rest of apical lesion has cleaned by periapical surgery. Composite resin was performed as a temporary restoration. After 1 year follow-up the tooth #21 was restorated with full ceramic crown, because of the inadequate aesthetic of composite restoration. Tooth was prepared with below features:

1 Chamfer finish line
2 1–1.5 mm shoulder width
3 Finishing line following the gingival contours
4 Cervical margins located 0.5 mm subgingivally
5 No sharp edges
6 Adequate tooth reduction in all parts

Fig. 2. (a) The orthopanthomography; (b) Crown-root malformation of the tooth #21 (furcated apex and periapical lesion); (c) The odontoma-like malformation can be seen in the occlusal radiography (arrow).

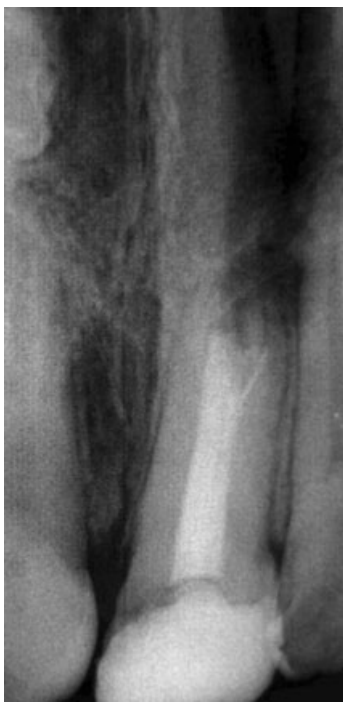

Fig. 3. The healing of periapical tissues after the endodontic treatment.

The retraction cord (No#0 Ultrapak, Ultradent, South Jordan, UT, USA) was placed into gingival sulcus after completing tooth preparation. Impression was made with polyvinysiloxane (Virtual, Ivoclar Vivadent AG, Schaan, Liechtenstein) by using the single-step technique. Impression of opposing arch was made with alginate (Cavex CA37, Cavex, Haarlem, The Netherlands). Color was selected with Chromascope shade guide (Ivoclar Vivadent). Master casts were mounted in a semi-adjustable articulator. The coping was made from IPS e.max CAD block (Ivoclar Vivadent) by Cerec System (Sirona Dental Systems GmbH, Bensheim, Germany) in the laboratory. This coping was checked in the mouth, marginal and internal adaptations were controlled as clinically. After this step, coping was coated with IPS e.max Ceram flourapatite glass-ceramic (Ivoclar Vivadent) and then returned to the clinic for the second check. Crown was glazed after the clinical controls of color, shape and occlusion. Cementation was performed with Variolink II dual-cure resin cement (Ivoclar Vivadent) according to manufacturer's instruction. Excess cement was removed and light cured for 60 s from all directions (Fig. 4).

The patient was followed up every 6 months. The odontoma-like malformation of the tooth #11 was asymthomatic during this period up to 3 years of follow-up. Therefore it has been decided not to perform any surgical treatment till today.

During the 3 years follow-up, the teeth were asymthomatic. There were no clinical or radiographical problems. The patient was aesthetically satisfied (Fig. 5).

Fig. 4. After the cementation of the crown.

Fig. 5. The clinical appearance after 3-years follow-up.

Discussion

Several studies have shown that one out of three children has suffered a traumatic injury by age 5 (7). After a traumatic injury, children are mostly referred to a general practitioner or a hospital emergency room for higher concern of the general health. It is problematic for the young patient and the parents to cope with the trauma and usually the treatment necessity for the traumatized teeth or importance of the follow up is not known to the emergency staff or the parents.

In the present case, although the parents had been informed about the possible consequences of the trauma, the follow up was not carried on by the first applied dentist. Therefore, the patient had referred to the University Clinic with several severe sequels affecting several permanent teeth at the age of 12. The patient was unsatisfied with the missing permanent first incisor and the canine positioned in the incisor area. The first permanent incisor was missing due to an odontoma that had disrupted the eruption. Although odontoma-like malformation is rare after a trauma, it has been reported more frequent when the age of injury ranges less than 1–3 years (7, 12). This is when the half or less than half of

the crown is formed for upper central incisors. The type of the affecting trauma is mostly intrusive luxation. The calcified part of crown displaces into the germ and the germ becomes curved (13, 14). In our case, we were not able to investigate histological findings of the odontoma but radiological examination revealed that the radio-opaque mass is characterized by accumulated dental tissues resembling a miniature tooth, which indicates a compound odontoma (13, 15).

The only possible treatment of an odontoma is surgical removal. In our case, odontoma seems to interfere with the eruption pathway of the canine causing a transposition. Tooth transposition has been described as an interchange in the position of two permanent teeth within the same quadrant of dental arch. The trauma to the primary teeth is one of the commonly accepted etiologic factors. The maxillary permanent canine is the most frequently affected tooth by transposition, however it is very rare to see its transposition with the central incisor (2%) (16–18). In our case, the history of dental trauma to primary teeth and the odontoma seems to be the reasons to the complete transposition of the right maxillary canine**.** The absence of the central incisor or the formation of the odontoma seems to be the predisposing factor. It is noteworthy to point out the need of follow up in trauma cases in the primary dentition where in the present case we may assume that surgical removal of the odontoma at the early stages of the eruption of the canine might have led the canine to its correct position. From this point of view, odontoma not only caused a loss of a permanent incisor but might have guided the transposition.

Andreasen et al. classify the permanent teeth root sequels as duplication or dilaceration/angulation. The pathology of root duplication indicates that a traumatic division of the cervical loop occurs at the time of injury, resulting in the formation of two separate roots (7). In our case, the upper left central incisor had a furcated apex, which needed a complicated endo-surgical treatment. Although, the variety and severity of sequels in permanent dentition can be explained by the predecessors' trauma at a young age, the type of the root malformation isn't compatible with the time of trauma to primary dentition. In this condition, it's unusual for the upper left central incisor that the Hertwig's epithelial root sheath has survived the traumatic force at first, and then became furcated at the developing time of apical one third (approximately 7–8 years old). In our case, the unclear prognosis of the endo-surgical treatment of this tooth led us to be precocious and postponed the final prosthetic treatment 1 year.

Trauma of the primary dentition presents increased risks for multiple and severe sequels of the permanent dentition as the age of the patient decreases and the severity of the injury increases. After the possible treatment of the traumatized primary teeth, the young injured patient should be monitored until the eruption of the permanent teeth and the parents should be informed about the possible and uncontrollable complications of the new dentition.

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