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Case Report

An unusual developmental disturbance of an unerupted permanent incisor due to trauma to its predecessor – a case report

Turgut MD, Tekçiçek M, Canoğlu H. An unusual developmental disturbance of an unerupted permanent incisor due to trauma to its predecessor – a case report. © Blackwell Munksgaard, 2006.

Abstract – Developmental disturbances of unerupted permanent tooth result from trauma to primary tooth as there is a close proximity between the root of the primary tooth and its permanent successor. The damage to the unerupted permanent tooth occurs by the transmission of traumatic forces to the permanent tooth germ. In the present case, however, a developmental disturbance on the permanent maxillary central incisor resulting from a direct effect of the inversely intruded primary maxillary central incisor is presented. The intruded tooth was extracted under general anesthesia. Upon eruption of the permanent central incisor, a localized crown malformation along with enamel hypoplasia which was not classified as a developmental disturbance before was observed. The damaged sites were restored with a light-cured composite resin.

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Key words: dental trauma; permanent maxillary incisor; intrusion; primary tooth; hypoplasia; crown malformation

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Traumatic injuries in the primary dentition stage are a commonly encountered problem in the dental practice. The prevalence of primary teeth injuries varies from 15 to 30% (1–4). Although different types of traumatic injuries can occur, luxation injuries constitute the majority of primary tooth injuries (5–9). This may be attributed to the high elasticity of the alveolar bone as well as the short resorbed roots which make primary teeth more subject to luxation injuries (10).

As there is close proximity between the roots of the primary teeth and the permanent tooth germs, any type of trauma to the primary teeth is of major importance (11). However, intrusive luxation injuries are associated with developmental disturbances of the permanent teeth (10, 12, 13). In addition to the type of trauma, the degree of damage is dependent on the age of the patient at the time of injury due to the developmental stage of the permanent tooth (14). The prevalence of developmental disturbances of permanent teeth secondary to primary tooth trauma is reported to be between 12 and 69% (11). Andreasen et al. (15) classified the sequelae affecting the permanent teeth as white or yellow-brown enamel discoloration with or without enamel hypoplasia, odontoma, crown/root dilaceration, root duplication or angulation, root development arrest, germ sequestration and eruption disturbances.

In general, damage to the permanent teeth resulting from primary teeth trauma is due to the indirect effect of the traumatic force transmitted to the permanent tooth germs (11, 16). However, in the following case report, a localized crown malformation along with enamel hypoplasia resulting from direct trauma of an intruded primary tooth is presented.

Case report

A healthy 5-year-old boy was referred to the department of pediatric dentistry for routine dental examination. Clinical examination revealed that the primary maxillary left central incisor was missing. His parents reported that he had fallen at the age of 8 months. In addition, they indicated that he had a pacifier in his mouth when he fell. Radiographic examination revealed that the primary maxillary left central incisor was inversely intruded. The crown of the intruded deciduous tooth penetrated into the crown of the permanent left central incisor. The degree of penetration extended into the middle third of the permanent tooth crown. The root of the intruded tooth was absent (Fig. 1). In addition, the parents reported that neither the root portion had been extracted nor had they noticed any other tooth part after trauma.

Given the severity of the intrusion (grade III), extraction was determined to be the treatment of choice. The parents were informed of the proposed treatment as well as possible complications resulting from trauma to developing permanent tooth germs. The parents requested that extraction of the intruded tooth be carried out under general anesthesia in conjunction with a scheduled circumcision. After 2 months, the intruded tooth was extracted under general anesthesia and the patient was scheduled for follow-up. The 6 month post-treatment periapical radiograph clearly revealed a crown malformation on the permanent maxillary left central incisor (Fig. 2).

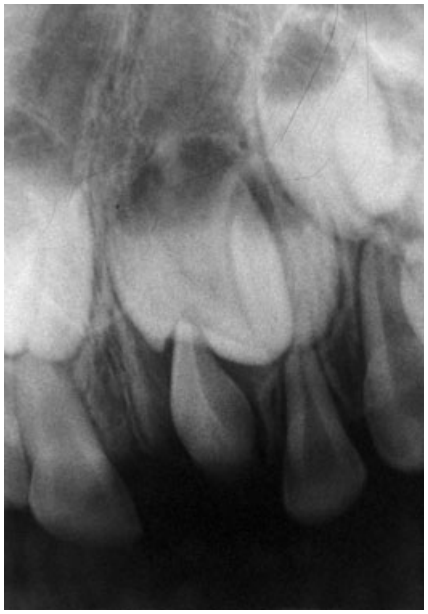

Fig. 1. A periapical radiograph demonstrating the lack of root portion of inversely intruded primary maxillary left central incisor and its penetration into the crown of its permanent successor.

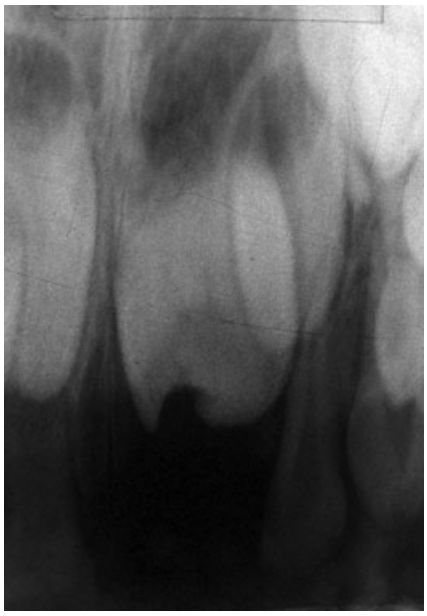

Fig. 2. A periapical radiograph taken 6 months after the extraction exhibiting a crown malformation on the permanent maxillary left central incisor.

The patient returned 2 years later with a complaint of abnormal tooth shape. Clinical examination revealed that the permanent maxillary left central incisor had erupted into the oral cavity with evidence of crown malformation and enamel hypoplasia (Fig. 3). The mesial incisal corner of the crown was absent and the malformation site extended to the middle third of the crown. Moreover, there was evidence of enamel hypoplasia adjacent to malformation. The disturbance involved both enamel and dentin. The defect was restored with a light-cured composite resin (TPH; Dentsply Caulk, Milford, DE, USA) (Fig. 4).

Fig. 3. Intraoral view of the patient showing the crown malformation along with enamel hypoplasia on the permanent maxillary left central incisor.

Fig. 4. Intraoral view of the patient after the restoration of the permanent maxillary left central incisor with a light-cured composite resin.

Discussion

Developmental disturbances of the permanent teeth, involving the crown, are reported to occur more frequently than developmental root or eruption disturbances (10). This may be attributed to the close relationship between the roots of the primary teeth and the crowns of the permanent teeth as well as the incidence of such injuries occurring during the developmental stage of the permanent crown. As the majority of traumatic injuries regarding primary teeth is reported to occur between 1and 3 years, crown disturbances comprise the majority of the developmental injuries (4, 6, 9, 17, 18). The degree of damage is dependent on the stage of crown formation. White discoloration is the result of accelerated deposition of minerals caused by trauma during the maturation stage of enamel development. Yellow-brown discolorations are caused by the incorporation of breakdown products of hemoglobin from bleeding in the periapical area. The destruction of ameloblasts in the active enamel epithelium results in enamel hypoplasia (14, 15). In the present case, there was a partial arrest of crown formation resulting in localized crown malformation and enamel hypoplasia. Both the nature of the trauma and the age of the patient could explain the occurrence of this phenomenon. Intrusion injuries of primary teeth result in the highest risk of damaging the permanent tooth germs (10). In the present case, the primary tooth was not only intruded but was also in an inverse position. The trauma history suggests that the tooth was intruded and inverted at the same time. In addition, lack of root with no extraction history and the age of the child at the time of trauma suggest that the root development was incomplete.

Intruded teeth may invade the follicle of the permanent germ and destroy the enamel matrix depending on the severity of the intrusion (19–21). In the present case the intrusion was so severe that the intruded tooth not only invaded the periodontal space but also penetrated the developing permanent tooth. The inversion of the tooth may have contributed to the severity of the event. Moreover, the intraoral presence of a pacifier at the time of trauma may have increased the severity of the intrusion, acting as a lever and transmitting additional and rotational force to the tooth.

The age of the child at the time of trauma is right for such a crown malformation as enamel matrix formation had not been completed. As ameloblasts are irreplaceable and no further cell division occurs after completion of enamel formation, a localized arrest of crown development is likely to occur after trauma (10).

Developmental disturbances to the permanent tooth secondary to trauma is well documented in the literature (11, 16). Trauma during the primary dentition stage can also affect the underlying permanent tooth germ by a direct contact of the impacting object with the developing permanent tooth. Abbot and Gregory have reported crown fracture following such trauma (22). However, in the present case, the unerupted permanent tooth was directly affected by the intruded deciduous tooth.

As no such disturbance has been reported in the dental literature, crown malformations accompanied by enamel hypoplasia have not been classified previously as a developmental disturbance. Similar to the present case, Katz-Sagi et al. (23) recently reported an unusual case of a pulp canal obliteration in an unerupted maxillary central incisor and a crown malformation on the adjacent unerupted central incisor due to primary tooth trauma. As the teeth had not yet erupted, the authors did not report the presence of enamel hypoplasia with coronal malformation. Therefore, it may be concluded that many primary tooth injuries have the potential to create manifold disturbance of the developing permanent tooth depending on the severity and type of the injury as well as the developmental stage of the permanent tooth.

References

1. Forsberg CM, Tedestam G. Traumatic injuries to teeth in Swedish children living in an urban area. Swed Dent J 1990;14:115–22.
2. Andreasen JO, Ravn JJ. Epidemiology of traumatic dental injuries to primary and permanent teeth in a Danish population sample. Int J Oral Surg 1972;1:235–9.
3. Hargreaves JA, Cleaton-Jones PE, Roberts GJ, Williams S, Matejka JM. Trauma to primary teeth of South African pre-school children. Endod Dent Traumatol 1999;15:73–6.

4. Cunha RF, Pugliesi DM, de Mello Vieira AE. Oral trauma in Brazilian patients aged 0–3 years. Dent Traumatol 2001;17:210–2.
5. Altay N, Gungor HC. A retrospective study of dento-alveolar injuries of children in Ankara, Turkey. Dent Traumatol 2001;17:201–4.
6. Cardoso M, de Carvalho Rocha MJ. Traumatized primary teeth in children assisted at the Federal University of Santa Catarina, Brazil. Dent Traumatol 2002;18:129–33.
7. Onetto JE, Flores MT, Garbarino ML. Dental trauma in children and adolescents in Valparaiso, Chile. Endod Dent Traumatol 1994;10:223–7.
8. Perez R, Berkowitz R, McIlveen L, Forrester D. Dental trauma in children: a survey. Endod Dent Traumatol 1991;7:212–3.
9. Llarena del Rosario ME, Acosta Alfaro VM, Garcia-Godoy F. Traumatic injuries to primary teeth in Mexico City children. Endod Dent Traumatol 1992;8:213–4.
10. von Arx T. Developmental disturbances of permanent teeth following trauma to the primary dentition. Aust Dent J 1993;38:1–10.
11. Andreasen JO. Injuries to the developing teeth. In: Andreasen JO, Andreasen FM, editors. Textbook and Color Atlas of Traumatic Injuries to the Teeth, 3rd edn. Copenhagen: Munksgaard; 1994. p. 457–94.
12. Brin I, Fuks A, Ben Bassat Y, Zilberman Y. Trauma to the primary incisors and its effect on the permanent successors. Pediatr Dent 1984;6:78–82.
13. Ravn JJ. Developmental disturbances in permanent teeth after intrusion of their primary predecessors. Scand J Dent Res 1976;84:137–41.
14. Diab M, ElBadrawy HE. Intrusion injuries of primary incisors. Part III: effects on the permanent successors. Quintessence Int 2000;31:377–84.
15. Andreasen JO, Sundstrom B, Ravn JJ. The effect of traumatic injuries to primary teeth on their permanent successors. I. A clinical and histologic study of 117 injured permanent teeth. Scand J Dent Res 1971;79:219–83.
16. Kocadereli I, Turgut MD. Management of occlusal and developmental disturbances resulting from an ankylosed maxillary second primary molar: case report. J Dent Child 2003;70:178–81.
17. Glendor U. On dental trauma in children and adolescents. Incidence, risk, treatment, time and costs. Swed Dent J Suppl 2000;140:1–52.
18. Fried I, Erickson P. Anterior tooth trauma in the primary dentition: incidence, classification, treatment methods, and sequelae: a review of the literature. ASDC J Dent Child 1995;62:256–61.
19. Zilberman Y, Fuks A, Ben Bassat Y, Brin I, Lustmann J. Effect of trauma to primary incisors on root development of their permanent successors. Pediatr Dent 1986;8:289–93.
20. Wald CY. Consequences of intrusive injuries to primary teeth. J Pedod 1978;3:67–77.
21. MacGregor SA. Management of injuries to deciduous incisors. J Can Dent Assoc 1969;35:26–34.
22. Abbott PV, Gregory PJ. Complicated crown fracture of an unerupted permanent tooth – a case report. Endod Dent Traumatol 1998;14:48–56.
23. Katz-Sagi H, Moskovitz M, Moshonov J, Holan G. Pulp canal obliteration in an unerupted permanent incisor following trauma to its primary predecessor: a case report. Dent Traumatol 2004;20:181–3.