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Root hypoplasia: an unusual sequela to primary tooth trauma

SHORT COMMUNICATION

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Abstract – The traumatic injury to primary teeth has been associated with diverse consequences in permanent dentition. The root abnormalities in permanent teeth are relatively rare. An unusual and rare case of sequelae to primary tooth trauma has been presented here. The complexity of the impact which occurred at the age of 4 years and 8 months resulted in root hypoplasia in 11, 21, root duplication in 12 and avulsion of 22 tooth bud.

Primary tooth trauma is a common phenomenon, having severe immediate as well as long-term consequences. The prevalence of traumatic injuries in children up to 6 years of age has been observed to vary from 11% to 30% (1). The maxillary incisors are the most frequently affected teeth with luxation being the most common form of injury (2).

The pliability of the child's facial skeleton and periodontal ligament, smaller basal bone in comparison with tooth volume and shorter roots of primary teeth make the luxation injuries – intrusion and avulsion, a frequent occurrence (2). The immediate consequences range from tooth discoloration, pulp necrosis, pulp canal obliteration and gingival retraction to pathological root resorption, altered physiological root resorption, tooth displacement and tooth loss (2, 3).

The long-term consequences affecting the permanent dentition depend upon the type of trauma, its severity, direction of impact and the stage of developing tooth germ (2, 3). The coronal abnormalities exhibited as enamel hypoplasia, crown dilacerations and white, yellow-brown discolouration are the most common. Anomalies of root include root duplication, dilacerations and partial or complete arrest of root formation. Trauma may also lead to alteration in the eruption process, sequestration of permanent tooth germ and odontoma like malformations (3).

The root abnormalities especially interruption of root formation are relatively rare (4). A rare case of root hypoplasia in permanent teeth as a result of traumatic injury in primary dentition has been presented here.

Case report

A nine-year-old girl reported to the outpatient department with the chief complaint of irregular upper front teeth. The medical history of the patient was non-contributory. There was a history of trauma at the age of 4 years and 8 months. The girl had fallen from approximately 25 feet, which led to laceration in lower lip and avulsion of 51, 52, 61, 62. The injury was adequately managed with no further discomfort. The patient also reported delayed eruption of 11 and 21 after 8 years of age.

The extra-oral examination revealed a scar mark in lower lip. The intra-oral examination exhibited proclined 11, with 21 in normal position. It was also observed that 12 was malformed, while 22 was missing (Figs 1 and 2). All the maxillary anterior teeth were vital with grade-one mobility.

Radiographic examination

The orthopantomograph revealed abnormal root morphology in 11, 12 and 21 (Fig. 3). It also exhibited

Fig. 1. Showing proclination of 11 and malformation of crown in 12.

Fig. 2. Mirror image of maxillary arch showing normal crown structure in 11 and 21 along with malformation in 12.

Fig. 3. Orthopantomograph showing abnormal root morphology in 11, 12 and 21 and absence of 22.

absence of any evidence of 22. Intra-oral periapical radiograph showed that the root of 11 was short and thin with slight distal curvature. The root of 21 seemed to be of normal length, although it was also thin and mesially curved. Both the roots were thinner mesiodistally as compared with the cervical portion of relatively normal crown. The root morphology of 12 was more obscure with presence of two very thin roots (Fig. 4).

Treatment

The patient's complaint of irregular upper front teeth was addressed first. For reasons of grade-one mobility of the 11, 21 and 12 and hypoplasia of their root, the impracticability of any orthodontic treatment was explained to the patient and her parents. The poor prognosis of the affected permanent teeth was also emphasized and a treatment plan comprising of extractions of these teeth followed by functional space maintenance using a removable partial denture was suggested. A recommendation regarding fixed prosthodontic rehabilitation after an age of 18 years along with implants was made. The parents were unwilling for the extraction of the permanent teeth and did not return for the follow-up.

Discussion

The traumatic injury to primary teeth has been described to be most commonly associated with coronal abnormalities in the permanent teeth (3, 4). Von Arx emphasized the close approximation of the roots of primary teeth and the permanent crowns to be the principal factor for the high frequency of the enamel hypoplasia and crown malformation (5).

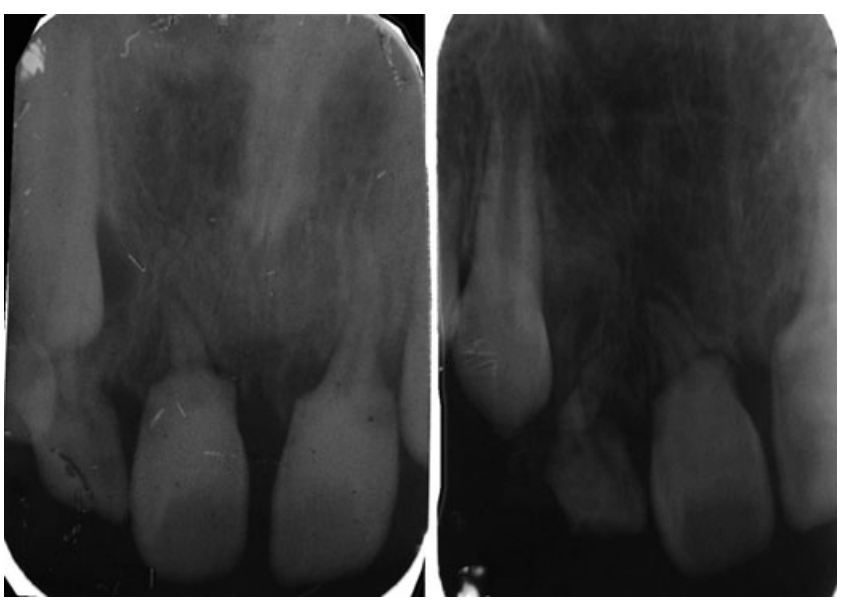

Fig. 4. Intra-oral periapical radiographs showing thin and curved root in 11, 21 and 12 along with root duplication in 12.

The aetiology of various root anomalies has been described to be trauma, genetic factors, therapeutic radiation, orthodontic treatment and mechanical blockage of the path of eruption by neoplasms, cysts and supernumerary teeth (6). Andreasen et al. have stated that the partial or complete arrest of the root formation is a rare sequela occurring in only 2% of the permanent teeth following trauma to the primary dentition (3).

The root hypoplasia in 11 and 21, without any coronal abnormality, can be attributed to the timing of the traumatic incident. The impact of the injury which resulted in avulsion of 51, 52, 61, 62 might have indirectly affected the proper function of Hertwig's epithelial root sheath of the developing central incisors (4). Since the crown formation is completed between 4 and 5 years of age, the crowns of 11 and 21 remained unaffected.

The malformation in the crown of 12 might have occurred because of disturbance in amelogenesis, which seems to be incomplete at the time of the injury. The abnormal function of the Hertwig's root sheath could have caused the duplication of its root (4). Tooth agenesis along with an odontoma has been previously described by Arenas et al. (2) The cause of missing 22 is obscure. A more severe nature of dento-alveolar injury, not properly described in the dental history, which had led to loss of the calcified tooth bud of 22 can be speculated as a possible cause. However, a congenitally missing tooth cannot be excluded.

The completion of the root and vitality of these teeth is unusual and difficult to explain. Dampening of the traumatic force because of avulsion of primary teeth and the pliability of alveolar bone leading to a temporary arrest in root formation might have caused this aberrancy. An association of avulsion of primary teeth with the root hypoplasia and various abnormalities of permanent dentition described here has never been previously reported.

The hypoplasia of root threatens the longevity of the affected teeth. The mobility and proclination of the incisors affect aesthetics and hamper function. These drawbacks warrant the extraction of the malformed teeth along with appropriate functional space maintenance and future prosthetic rehabilitation with or without implants.

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