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# Eruption Delay and Sequelae in Permanent Incisors Following Intrusive Luxation in Primary Dentition: A Case Report

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## Abstract

With respect to its consequences, intrusive luxation is one of the most severe form of dental traumatic injuries in primary dentition. This case report presents crown and root deformation of a permanent incisor together with its delayed eruption which have resulted from a traumatic injury to its predecessor.

Epidemiological studies have reported a varying frequency of 12–35% for traumatic injuries in primary dentition (1-4). This reported variation in the observed injuries could be explained by the differences in patient selection methods, registration of injuries and applied diagnostic criteria.

One of the most severe form of dental traumatic injuries in primary dentition is intrusive luxation (5). The severity of this type of injury comes from not only the damage it causes on the traumatized tooth and the surrounding soft tissues but also the potential risk for sequela on the succeeding permanent teeth. Because of the close anatomic relationship with the apices of the primary incisors, permanent incisors are under increased risk for development of malformations (1, 3-5). The observed types of permanent tooth malformation following trauma to their predecessors include enamel hypoplasia, dilaceration of the crown, root angulation, root duplication, arrest of root development and eruption disturbance (6-8). This case report aims to present the consequences of an overlooked intrusive luxation in primary dentition.

## Case report

A 12-year-old healthy boy was presented to the department of pediatric dentistry. Parents' main concern was the eruption failure of permanent left central incisor. In clinical examination, a small tooth part which is thought to be the incisor edge of the maxillary left permanent incisor was observed (Fig. 1). His parents reported that he had fallen with a pacifier in his mouth and hit his face when he was 8 months old. They reported that primary maxillary left central incisor had been severely intruded. No radiographic examination had been carried out at that time. Because of the parental concerns, extraction of the tooth was delayed and could be accomplished 4 months after the traumatic injury. He has not been seen by any dentist until his visit to our clinic. Radiographic examination revealed the eruption delay of maxillary left permanent incisor (Fig. 2). Furthermore, on the periapical radiograph, it was observed that some areas of the crown (e.g., incisal third) were not fully formed and uniformity of the enamel radiopacity was not detected. Although two roots were detected, only one root canal was visible. Extraction of the tooth under local anesthesia was followed by fabrication of a removable prosthetic appliance.



**Figure 1** Introral view of the patient.



**Figure 2** Periapical radiograph showing eruption delay and crown/root deformation of the permanent left maxillary central incisor.

The tooth was observed after extraction. Together with the missing 1/3 incisal part of the crown, the hypoplastic nature of the enamel especially on the palatal surface was noted. The tooth had also two roots (**Fig. 3**). However, a CT (computerized tomography) scan of the tooth revealed no extra pulp canal in the distal root.



**Figure 3** Clinical view of the tooth following extraction.

## Discussion

The percentage of developmental disturbances of permanent incisors that could be attributed to the injuries of their predecessors ranges from 12 to 74% (**7, 9, 10**). The reported developmental

disturbances for permanent teeth include enamel hypoplasia, crown and/or root deformation, eruption disturbances (2, 11, 12). The influence of trauma to the primary incisors on their permanent successors can be related to several factors such as the spatial relationship of the involved teeth, the degree of resorption of the primary root at the time of injury, the direction of the traumatic force, the type of injury to the primary incisor, the developmental stage of the permanent tooth bud, and the child's age at the time of the injury (13, 14).

Intrusive luxation of a primary tooth bears the highest risk of damaging the permanent tooth germ (15, 16). In a cephalometric study, the thickness of the hard tissue barrier between primary incisors and their successors was found to be <3 mm (14). This finding may also help to understand the potential serious disruptive effect of (severe) intrusion injuries on permanent tooth germs during odontogenesis.

The age of the child at the time of sustained trauma is another major point of concern. Research data indicate serious sequel following intrusion of primary incisors before the child is 2 years old (13, 15). This is owing to the fact that germs of the permanent teeth are particularly sensitive in the early stages of their development, which occurs between the ages of 4 months and 4 years (1, 13). At this critical time, injury or inflammatory changes can interfere with the different levels of odontogenesis, such as morphodifferentiation, organization, mineralization, or the final preeruptive maturation (1, 13, 17). In the present case, there was a partial arrest of crown formation resulting in defective crown formation and enamel hypoplasia. Also, the intraoral presence of a pacifier at the time of trauma may have increased the severity of the intrusion and as well as the sequel of the permanent maxillary central incisor. Similarly, Turgut et al. (18) have recently reported an unusual developmental disturbance of an unerupted permanent incisor owing to primary tooth trauma.

Intrusion of primary incisor may also result in different types of root malformation when it occurs around the age of 2 years when less than half of the crown is formed (1, 19, 20). Severe intrusion injuries may generate a distortion or displacement of Hertwig's epithelial root sheath, leading to root duplication, root dilaceration, or complete cessation of root formation (8, 21). In the present case, it was thought that impact of the sustained injury on the cervical loop might have resulted in development of a (rudimentary) distal root.

Eruption failure or delay, ectopic eruption, and misalignment of permanent incisors are also possible outcomes following traumatic injuries to their predecessors (22, 23). These conditions may arise from the physical displacement of the permanent germ (with or without dilaceration), the abnormal changes that might occur in the connective tissue overlying the permanent tooth, formation of thick/fibrous gingiva, and lack of eruption guidance from the prematurely lost primary incisor (1, 22, 23).

Most of the 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. Therefore, following the trauma and especially in cases of intrusion injuries where the children are less than 3 years of age, parents should be informed about the possible effects upon developing teeth. In all children with a history of traumatized primary tooth, preeruptive radiology to achieve early detection and treatment of possible severe developmental disturbances is recommended.

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