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Unusual Ectopic Eruption of a Permanent Central Incisor Following an Intrusion Injury to the Primary Tooth

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ABSTRACT

Intrusive luxation of primary teeth carries a high risk of damage to underlying permanent tooth germs. Ectopic eruption of permanent incisors is an unusual outcome of traumatic injury to their predecessors. In this case report, we describe the multidisciplinary management of the consequences of a primary tooth intrusion that led to severe ectopic eruption of the permanent left central incisor in a horizontal position at the level of the labial sulcus.

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Preschool-age children lack the psychomotor skills needed to perform precise and safe movements and, as a result, they are susceptible to falls and other injuries.^{1,2} According to the literature, 15%–30% of children suffer traumatic injuries to primary teeth.^{3–5} In contrast to the hard-tissue injuries that are more commonly seen in permanent dentition, luxation injuries predominate in the primary dentition.^{6,7} The larger bone marrow space resulting in high elasticity of alveolar bone surrounding the primary teeth has been cited as the reason for this.¹

Intrusive luxations constitute 4.4%–22% of traumatic injuries in primary dentition.^{1,5,8–10} In the case of an intruded primary tooth, developmental disturbances of the successor permanent tooth can occur as a result of the close proximity of the developing permanent tooth germ to the primary root apex.⁶ With an overall prevalence of 41%,¹¹ these developmental disturbances include white or yellow-

brown enamel discoloration with or without enamel hypoplasia, crown–root dilaceration, odontoma, root duplication or angulation, arrest of root development, germ sequestration and eruption disturbances.^{12–14}

Ectopic eruption of a permanent incisor may result from traumatic injury to its predecessor.¹⁵ The condition is caused by the physical displacement of the permanent germ, the lack of eruption guidance by the prematurely lost primary incisor or both.¹⁵ In this case report, we describe the management of a permanent central incisor that was erupting ectopically because of prior intrusive luxation of the corresponding primary tooth.

Case Report

A healthy 9-year-old boy was referred to the pediatric dentistry clinic with the chief complaint of ectopic eruption of the maxillary left central incisor. Reportedly, at 4 or 5 years of age he had experienced a fall that caused



Figure 1: Frontal view of the anterior maxillary arch at the patient's first visit. Despite retraction of the lips, the ectopically erupted incisor is not visible. Inset: Occlusal view of the anterior maxillary arch.

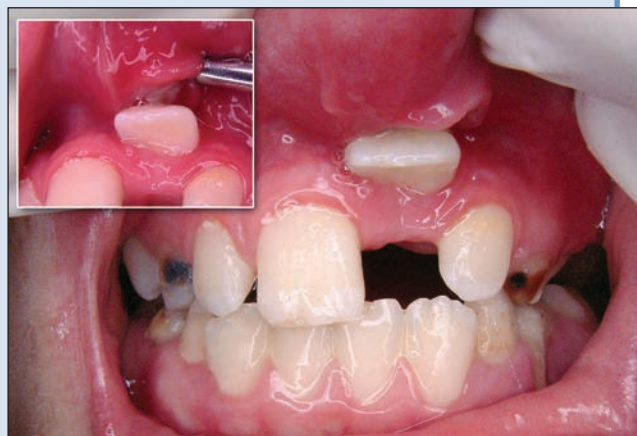


Figure 2: The ectopically erupted incisor was exposed by stretching the upper lip forward and up. Inset: view of the "pseudo pouch" with edematous borders and a purulent exudation.



Figure 3: Radiographic view of the left central incisor revealing no root dilaceration.

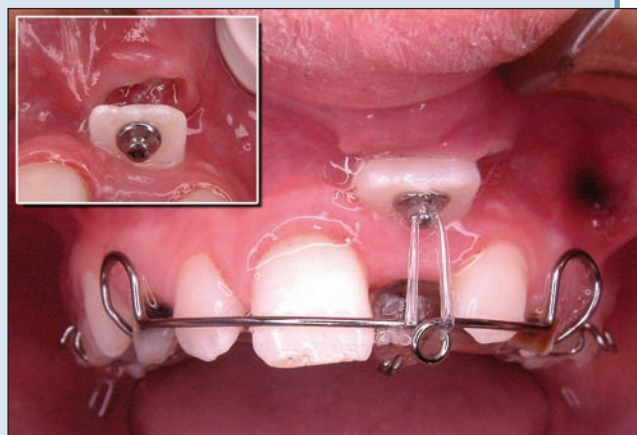


Figure 4: Orthodontic extrusion and respacing was initiated using a modified fan-type appliance. Inset: an orthodontic button, bonded to the palatal aspect of the incisor.

severe intrusion of his primary left central incisor and premature loss of the tooth 1 month later.

Intraoral examination revealed the absence of the maxillary left central incisor within the dental arch, along with slight closure of the eruption space caused by displacement of the neighbouring incisors (**Fig. 1**). The central incisor could only be visualized when the patient's upper lip was stretched up and outward as much as possible (**Fig. 2**). Trauma had caused displacement of the tooth to an almost horizontal position at the level of the labial sulcus, forcing the incisor to erupt toward the inner labial mucosa. Over time, chronic soft-tissue irritation caused by the tooth's incisal aspect had caused formation of a "pseudo-pouch" with a swollen, elevated border that overlapped the crown in the resting position of the lip (**Fig. 2, inset**). Stretching of the upper lip

also revealed a purulent exudation that had accumulated within the pouch. An occlusal radiograph showed no root dilaceration (**Fig. 3**).

Following orthodontic consultation, an initial treatment plan was formulated to regain the approximately 2 mm of space lost as a result of displacement of the neighbouring incisors and to move the left central incisor to a normal position. An impression of the maxillary arch was taken to permit fabrication of a fan-type expansion appliance, containing a modified vestibular arch and a palatal hook (**Fig. 4**). The patient was prescribed antibiotics and anti-inflammatory drugs. A chlorhexidine mouth rinse was recommended, oral hygiene motivation was provided and another visit was scheduled. At the next appointment, an orthodontic button was bonded to the palatal surface of the incisor (**Fig. 4, inset**). After



Figure 5: Fixed orthodontic therapy was needed for further extrusion of the left central incisor. Note the extent of healing of the inner labial mucosa.



Figure 6: Post-treatment view showing correct alignment of the left central incisor, an acceptable gingival contour and excellent healing of the inner labial mucosa.

fitting the fan-type appliance, extrusive orthodontic movement of the left incisor was initiated by securing an elastic ligature between the button and the palatal hook of the appliance. The patient was instructed in the use of the appliance and how to change the ligatures and was scheduled for weekly follow-up visits.

Two months later, the lost space had been completely recovered. During that time, the labial mucosa healed dramatically as the irritating incisal edge was moved gradually in the occlusal direction. Because of the extent of extrusion achieved, the palatal button was relocated to the labial surface of the tooth to achieve sufficient orthodontic force in the proper direction. During the third month, fixed orthodontic therapy was initiated to further extrude the tooth and to ensure its correct alignment within the maxillary arch (**Fig. 5**).

After a further 2 months, orthodontic extrusion of the left central incisor was completed, and the gingival margin of the tooth was brought to the approximate level of that of the neighbouring teeth (**Fig. 6**). In addition to complete healing of the inner labial mucosa, the tooth and supporting tissues appeared to be in good condition radiographically. The tooth was temporarily secured to the neighbouring incisors with an acid-etch composite resin to prevent relapse. Regular follow-up visits over the subsequent 12 months were uneventful.

Discussion

Intrusion injuries to primary teeth present the highest risk of damage to permanent tooth germs.¹⁶ Many factors influence the sequelae of intrusion injuries: age, direction and severity of intrusion and type of treatment.¹⁷ Intrusive-type injuries to primary incisors most commonly take place between 1 and 3 years of age.^{5,6} Several

reports have shown that the younger the child at the time of the intrusion injury, the more severe the induced sequelae to the successor tooth.^{11,18} Despite the occurrence of severe ectopic eruption in the present case, developmental disturbances such as discoloration, hypoplasia, crown or root dilaceration or root angulation were not observed in the affected permanent incisor. Because the trauma had occurred at a relatively later age, the effect on the permanent successor tooth may have been limited to alteration of the eruption pathway.

Many studies have reported intrusive luxation to be the most frequent cause of developmental disturbances in permanent teeth.^{17,19,20} The intimate relation between the primary incisors and their successors explains the disruptive effect of intrusion injuries on permanent teeth,⁶ one of which is the disturbance of eruption. Children with a history of trauma experience a higher percentage of malpositioned incisors compared with those without trauma.¹⁵ This case presents a similar outcome, except that the severity of impact caused the successor to erupt in a highly unusual pattern without any crown–root or root dilaceration. To our knowledge, no such disturbance has been reported in the dental literature previously.

Considering the position of the ectopically erupted incisor and the insufficient arch length, it seemed difficult to bring the maxillary central incisor into the dental arch. However, regaining sufficient space and ensuring sufficient traction in the right direction allowed us to move the ectopically erupted tooth into the correct position. Although we initially expected to correct this problem with removable appliances, fixed orthodontic therapy was necessary to achieve proper levelling and angulation. Eventually, functional and esthetic problems were solved when the central incisor was positioned in the arch.

When abnormally positioned ectopically erupted incisors are moved into the arch, discrepancies are often observed between the gingival levels of the affected and neighbouring teeth. Clinical experience has shown that light forces are more effective than strong ones in moving ectopically erupted teeth and achieving a good gingival position.²¹ Following fixed orthodontic therapy, the gingiva of the central incisor was brought close to the level of that of the adjacent central incisor, thus eliminating the need for gingival plastic surgery. ➤

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