

CIRCULAR ENAMEL HYPOPLASIA IN PERMANENT MAXILLARY INCISORS SUBSEQUENT TO TRAUMA TO THEIR PREDECESSORS: A 10-YEAR FOLLOW-UP CASE REPORT

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Received on August 20, 2009 / Accepted on November 6, 2009

ABSTRACT

This report describes a case of a 1½-year-old child with traumatic intrusion of maxillary incisors. A ten-year clinical and radiographic follow-up was conducted at the Rio de Janeiro State University's Dental Traumatology clinic, in Brazil. The permanent maxillary incisors presented circular enamel hypoplasia as a sequela of the trauma to their predecessors. The multidisciplinary treatment was conducted in different phases, according to dental development, until total eruption of the permanent incisors.

Keywords: Tooth injury, odontogenesis, enamel hypoplasia.

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INTRODUCTION

Traumatic injuries to the primary dentition are very frequent, affecting from 4% to 30% of all children [1]. The frequency varies according to the child's age at the time of the accident, gender, type, and location of trauma [1, 2, 7]. The most commonly affected teeth in primary dentition are the upper central incisors [3, 11, 12, 15]. Children at the ages between 1 and 4 are the most affected, since, at this stage, they have insufficient motor control and fall quite often [7, 16].

Developmental disturbances in the permanent teeth as a consequence of injuries to their predecessors vary from 12 to 69% [1, 2, 6]. A relevant aspect in this high prevalence is the close anatomical relationship of the permanent crowns to the apices of the primary teeth [1, 2, 11, 18, 19].

Sequelae severity depends on the child's age, the primary root resorption and permanent successor development stages at the time of injury, and the type and extension of trauma [1, 3]. The younger the child, the more severe are the consequences on the permanent tooth's crown [9]. Sequelae for permanent dentition following a trauma to their predecessors are usually related to intrusive luxation, extrusive luxation, and avulsion [3, 9, 13]. Enamel discoloration, enamel hypoplasia, crown and root dilacerations are the most frequent resulting damages [2, 3, 5, 8, 12, 19].

Frequency of enamel hypoplasia in the successors following trauma is 12% [1, 7]. This sequela is usually found after intrusive luxation, extrusive luxation or avulsion [1, 3, 5, 6] when the permanent tooth germ is in a Nolla's stage between 1 and 5 [4, 7, 14].

Enamel hypoplasia due to trauma presents a white discoloration in clinical examination. However, products of blood degradation sometimes infiltrate the area affected during the enamel matrix development, resulting in yellow-brown discolorations.

After eruption, the successor teeth may show a horizontal line surrounding the teeth's crown on the cervix area, known as circular enamel hypoplasia [1, 3, 4]. This development disturbance can be detected by radiographic image, unlike the enamel opacities, which can only be diagnosed following crown eruption [1, 2].

Clinical enamel hypoplasia characteristics include unfavorable aesthetics, higher dentin sensitivity, malocclusion, and dental caries susceptibility [17]. The treatment challenge in this type of injury is to promote a complete oral rehabilitation in both aesthetics and in the patient's masticatory function [10].

Topical fluoride application is effective in reducing dentin sensitivity to thermal variations and to acid foods, which are frequently observed in permanent, recently erupted hypoplastic teeth [1, 10, 13]. In most of cases, temporary glass ionomer restorations are necessary until definitive rehabilitation is possible [1, 8].

CASE REPORT

A one-and-a-half-year-old girl was brought to the Rio de Janeiro State University's Dental Traumatology clinic by her mother. She stated that the child had a recent incident of dental trauma due to a fall from a bench. Clinical examination revealed a lower lip laceration and a possible intrusive luxation of the upper incisors, which was confirmed by a maxillary occlusal radiography (Figs. 1, 2 and 3).



■ **Figure 1** – Lower lip laceration (1 $\frac{1}{2}$ -year-old).



■ **Figure 2** – Maxillary incisors intrusive luxation (1 $\frac{1}{2}$ -year-old).



■ **Figure 3** – Intrusive luxation confirmed by radiography (1 $\frac{1}{2}$ -year-old).

Periodic clinical and radiographic follow-up were conducted in order to control re-eruption of the intruded primary incisors, and the eruption of permanent successors. The radiographic image when the child was seven-years-old, showed circular enamel hypoplasia on the central and right lateral incisors, and a slight hypoplasia on the left lateral incisor. These sequelae were clinically confirmed upon the re-eruption of the primary teeth (Figs. 4 and 5).



■ **Figure 4** – Radiographic follow-up (7 years old).



■ **Figure 5** – Circular enamel hypoplasia (7 years old).

Initial treatment consisted in periodic appointments for oral hygiene instruction, prophylaxis, and fluoride varnish applications, due to the greater susceptibility to dental caries and dentin sensitivity.

The restorative treatment began with temporary glass ionomer restorations when the permanent central incisors initiated their eruption. The patient returned at the age of 8 years to receive composite resin restorations, which were only carried out on the central incisors, since

the left lateral incisor presented subgingival hypoplasia, which hindered the adhesive restorative procedure. The conventional Single Bond adhesive system® (3M ESPE), as well as the Herculite XRV® (Kerr) resin color A3 Dentin were used to cover the darkened dentin areas. A layer of Herculite XRV® color A2 Enamel was added exceeding the limit of the enamel-dentin junction and leaving about 0.5 mm of tooth preparation unfilled on the facial surface in order to add a thin increment of microfilled resin color A2 (Durafill®, Heraeus Kulzer) (Fig. 6).



■ **Figure 6** – Composite resin restorations (8 years old).

New restorations were done at the age of 12 when the teeth were totally erupted. The conventional adhesive system Single Bond 2 (3M ESPE) and the nanofilled resin Filtek Supreme XT (3M ESPE) were used. For permanent central incisors, a resin layer was used with dentin opacity (color A3D) to cover the darkened dentin areas. Body resins colors A2B and A2E were used for filling the dentin area, in order to leave a minimum layer for enamel resin color WE. The enamel resin color WE was used on the lateral incisor due to the hypoplasia. For both of the restoring stages with composite resins, silica tips (Jiffy, Ultradent) and diamond paste (Diamond Excel, FGM) were used for the finishing and polishing procedures, respectively (Fig. 7).



■ **Figure 7** – Final composite resin restorations (12 years old).

DISCUSSION

A high prevalence of enamel hypoplasia in permanent successors following intrusive luxation is observed when the dental trauma occurs in early childhood [1, 3, 5, 6, 7]. During this period, the crown buds of the permanent successors are beginning their calcification, rendering them more susceptible to developmental disturbances. In early ages, children tend to fall more often, and the close anatomic relationship between the apices of primary incisors and the successor's buds can cause more complex sequelae to the crowns of permanent successors [18].

In this particular case, the impact from the fall, the type of trauma, and the successor's developmental stage (1/3 of crown completed) contributed to the severity of the enamel sequelae reported [4]. Circular enamel hypoplasia is a more extensive enamel disturbance resulting in a line surrounding the crown of the injured teeth, and it most frequently occurs as a result of trauma in children around the age of 2 years [3, 4, 6, 8, 14].

The early radiographic diagnosis is important in this kind of sequelae management, because it determines the appropriate clinical intervention, minimizing damages to the dentin and pulp [1, 3]. Moreover, the patient's and the parents' cooperation in attending recall appointments is crucial to a proper and successful treatment.

Conservative restorations of anterior teeth with composite resins were chosen in this case because they were expected to perform quite well both functionally and aesthetically for 10 years or more if placed and finished adequately.

This reported case reinforces the importance of an early diagnosis, as well as of a proper clinical and radiographic longitudinal follow-up in order to monitor and minimize possible severe developmental disturbances. By means of an adequate multidisciplinary approach, it was possible to provide a favorable prognosis and a satisfactory aesthetic treatment for the maxillary permanent incisors affected by enamel circular hypoplasia.

ACKNOWLEDGMENTS

The authors would like to thank Professor Sônia Marçal for her contribution to this manuscript.

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