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Case Report

Dental trauma in primary dentition and the importance of its preservation until the eruption of permanent successor: a 6-year follow-up case report

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Abstract: Traumatic dental injuries (TDIs) are a public health concern that requires special attention in primary dentition due to the sequel that can be originated in permanent dentition. This paper aims to report a dental trauma injury highlighting the importance of follow-up the traumatized primary tooth until the eruption of its permanent successor. A 3-year-old female patient referred to a Dental Trauma Care Program (DTCP) in a Brazilian Public University after falling from her own height with the involvement of the deciduous maxillary left central incisor. The child's mother did not seek immediate care. The patient did not have any complaint and the tooth presented an enamel fracture during the clinical examination without radiographic alterations. The procedure performed was occlusal wear and insertion of the patient into the DTCP. After a 6-months clinical and radiographic follow-up, the primary maxillary left central incisor presented crown discoloration and periapical bone rarefaction. The treatment was pulpectomy followed by restoration of the tooth. In the 3-year follow-up, prolonged retention occurred and tooth extraction was the treatment of choice. After a 6-year follow-up, the permanent teeth erupted without any sequelae. TDIs are frequent in the primary dentition and, in some circumstances may interfere with the normal development of the permanent tooth causing irreversible sequelae. This case report reinforces the importance of seeking immediate care whenever dental traumas occur. Besides, a long-term follow-up of the traumatized tooth is essential for successful outcomes. Clinical and radiographic monitoring is fundamental to help dental professionals to decide the best treatment and to minimize potential complications.

Keywords: Pediatric dentistry, primary dentition, permanent dentition, tooth injury, dental trauma

Introduction

Traumatic dental injuries (TDIs) are a public health concern with high prevalence rate in the child population [1-3]. It affects from 8% [4] to 62.1% [5] of children between 2 and 5 years old, which is a critical time for the development of motor coordination and body balance turning TDIs very common events [6, 7]. Moreover, their occurrences are unexpected causing negative esthetic, physical, and psychological repercussions impacting on patient's quality of life [8-10].

Unfortunately, parents and patients do not give special importance to traumatic dental injuries and tend to visit medical institutions only after a significant period of time or only after the patient has acute symptoms of inflammation or aesthetics problems [11].

The time elapsed between dental trauma and dental care is of paramount importance. The consequences of trauma to the primary dentition are related to the development of pulp sequelae which may vary from root resorption, ankyloses, pulp canal obliteration to pulp necrosis [12, 13]. Crown discoloration in primary teeth may be considered an early sign of pulp degeneration [14]. The final diagnosis of pulp necrosis includes progressive crown discoloration, percussion response, and periapical bone

Table 1. Studies evaluating sequels in primary and permanent dentition due to TDI in primary dentition

Author, year	Type of study	TDI	Sequels related to primary or permanent dentition
Borum *et al*., 1998 [15]	Prospective study	Concussion Subluxation Extrusion Intrusion Lateral luxation	Tooth discoloration Pulp canal obliteration Pulp necrosis Permanent displacement Surface or inflammatory resorption Ankyloses
Flores *et al*., 2002 [16]	Literature review	Luxation Intrusion Avulsion	Pulp canal obliteration in primary dentition Hypoplasia, including enamel discoloration and/or enamel defects in permanent dentition
Cardoso *et al*., 2010 [17]	Retrospective study	Fracture without pulp exposure Concussion Subluxation Lateral luxation Intrusion Extrusion	Crown discoloration, pulp necrosis, periapical lesion, pathological root resorption, internal resorption
Flores *et al*., 2019 [18]	Comprehensive review	Intrusion Avulsion Fracture of the alveolar process	Crown discoloration, hypoplasia, crown and root dilacerations
Amorim *et al*., 2018 [19]	Retrospective study	Intrusive luxation Avulsion	Crown and root dilacerations in the successor teeth
Mendoza-Mendoza *et al.,* 2015 [20]	Retrospective study	Subluxation Avulsion	Pathological root resorption associated or not to pulp necrosis Hypoplasia, hypomineralization and delayed eruption

rarefaction. In relation to the permanent tooth, paralysis of root development, white or yellow-brown discoloration, hypoplasia, crown or root dilacerations may occur [15-17] (**Table 1**).

The International Association of Dental Traumatology guidelines have a consensus statement for the management of each type of TDIs aiming to maximize the chances of success and minimize the developmental disorders in the permanent successor. In addition the IADT indicates careful follow up to monitor the development and eruption of the permanent tooth [18]. TDI treatment should be performed the soon as possible and its success will depend on long-term follow-up and periodic clinical and radiographic evaluations [19-21]. Based on it, this paper aimed to report a dental trauma injury highlighting the importance of follow-up the traumatized primary tooth until the eruption of its permanent successor.

Case report

A 4-year-old girl was referred to a Dental Trauma Care Program (DTCP) in a Brazilian Public University after a fall from her own height resulting in a TDI. This program was approved by the Fluminense Federal University ethics committee, CAAE no. 70872117.8.0000.5626, protocol no. 2.320.329. After registration at the DTCP, a signed, written informed consent form was obtained from the patient's caregiver.

An intraoral clinical examination revealed an enamel fracture of the primary maxillary left central incisor (**Figure 1A**), and an anterior open bite caused by a deleterious habit due to pacifier use (**Figure 1B**). The initial radiographic exam did not show any alteration (**Figure 1C**). Slight wear on the incisal edge was performed and the child was included in the DTCP. The mother was instructed about the deleterious oral habits and asked to discourage her child to use the pacifier.

After a 6-months clinical and radiographic follow-up, the primary maxillary left central incisor presented crown discoloration and periapical bone rarefaction. It was observed the correction of the open bite after the removal of the pacifier (**Figure 2A** and **2B**). The treatment of choice was pulpectomy of the tooth followed by its restorative procedure (**Figure 2C**).

In the 3-year follow-up, the maxillary left central incisor was darker. Additionally, it was detected the prolonged retention of this element due to the root canal filling with ZOE paste (**Figure 3A**).

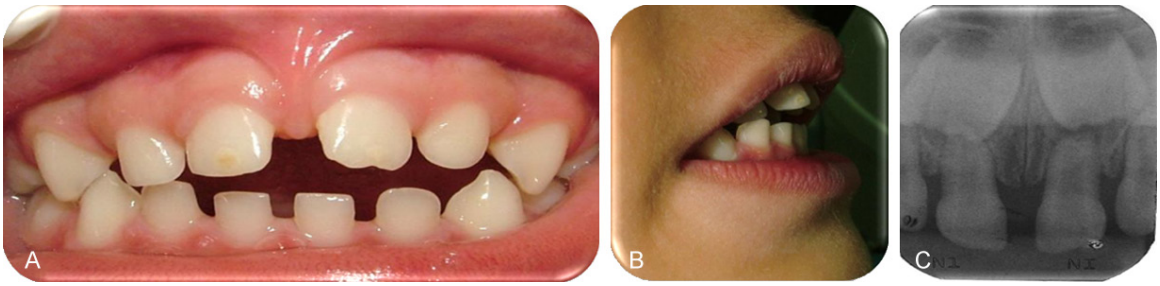

Figure 1. Initial examination: (A) Clinical aspect showing enamel fracture of the primary maxillary left central incisor; (B) Anterior open bite with no lip coverage; (C) Initial radiographic.

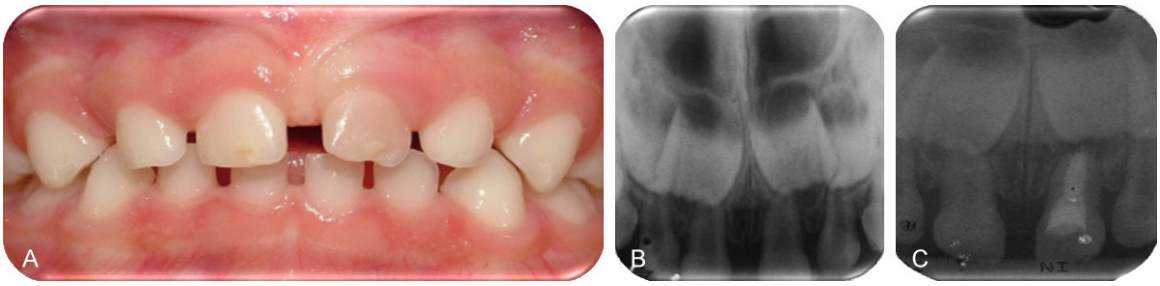

Figure 2. 6 months follow-up: (A) Clinical aspect showing crown discoloration of the primary maxillary left central incisor and the correction of the open bite after removal of the pacifier; (B) Radiographic exam showing periapical bone rarefaction of the primary maxillary left central incisor; (C) Pulpectomy of the primary maxillary left central incisor and root canal filling with ZOE paste.

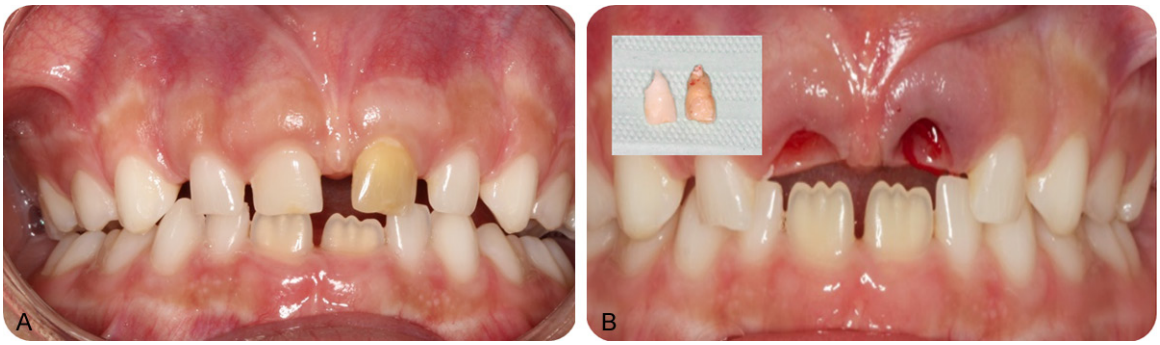

Figure 3. 3-year clinical follow-up: (A) Showing the darkening of the left upper central incisor and detection of prolonged retention; (B) Prolonged retention due to ZOE paste and extraction of the maxillary left and right central incisors.

The procedure of choice was tooth extraction (**Figure 3B**).

After a 6-year follow-up, the permanent maxillary central incisors erupted without any pathological alterations (**Figure 4**).

Discussion

The maxillary central incisors are in an exposed position in the dental arch and are more prone to be affected by traumatic injury in both the primary and permanent dentitions [22]. The assessment of TDI in primary dentition is important due to its high potential to cause periapical sequelae, which may adversely affect permanent teeth development [23].

Previous studies suggest that open bite, increased overjet [5, 24] and inadequate lip coverage in younger children are important predisposing factors associated with TDIs in primary incisors [25, 26]. In the present case report, the child had a deleterious habit and an open

Figure 4. 6-year clinical follow-up showing the permanent maxillary central incisors without any pathological alterations. The child with 9 years old.

bite without lip protection, which may have predisposed this child to traumatize the upper primary central incisor. Additionally, studies show a higher frequency of dental trauma in children aged 0-3 years since they are still in the motor development phase being more susceptible to falls and collisions [17, 27].

As much information as possible that the dentist can obtain of the dental trauma such as where, when and, how the accident had occurred are important data sources to outline the best treatment plan, its potential complications and also to inform parents on how best to prevent dental injuries. The period that elapsed between trauma and the time of seeking dental care is also important influencing directly on the prognosis of the traumatized tooth. Usually, most parents do not seek immediate care for their children [9]. This is corroborated in the present case report, in which the mother just sought care a while after the dental trauma.

TDIs in primary teeth may cause some complications from minimal effects to significant consequences to both dentitions. The most critical period for the development of disorders in central incisors ranges from 4 months to 4 years of age [18]. A study performed by Lopes et al. [28] showed that 74.1% of traumatized anterior primary teeth did not present any significant injury at the moment of trauma, requiring only clinical and radiographic follow-up. In the present study, the initial evaluation of the traumatized tooth showed a small enamel fracture, without radiographic alteration. It was performed only slight wear on the incisal to remove sharp edges. There was no need for any other intervention and the patient was included in the DTCP. Health promotion programs have positive effects on oral health and patient's quality of life. Besides that, the patient can be closely monitored. In terms of clinical and cost-benefits, preventive approaches and oral health promotion programs are more efficacious than dental care [10, 29, 30].

Pulp necrosis is a frequent sequelae found in traumatized primary teeth ranging from 22.3% to 24.0% [31, 32] of cases. Crown discoloration is also an adverse outcome after TDIs, affecting 25.6%-52.4% of the teeth [12, 33]. TDIs in primary teeth can also affect the permanent dentition with a high risk to cause developmental disturbances in the permanent tooth. The apex of the primary tooth is in a very close relationship with the follicle of the successor permanent tooth [13]. After a 6-months clinical and radiographic follow-up, the primary maxillary left central incisor presented crown discoloration and periapical bone rarefaction as late complications of the dental trauma. Pulpectomy with ZOE paste present high clinical success rates [34, 35] and it was the treatment of choice herein, followed by the tooth restoration. After a 3-year follow-up, the primary maxillary left central incisor was darker. Additionally, prolonged retention of the tooth due to the root canal filling with ZOE paste was observed. Thus, the primary tooth was extracted. ZOE paste exhibits a slow or difficult capacity for resorption along with the root of the primary tooth which may lead to prolonged retention of the tooth [35, 36] with a consequent shift in the eruption direction of the permanent successor [37]. In this case report, a rigorous follow-up was crucial, because if the child was not monitored, prolonged tooth retention could have caused a deviation in the eruption of the permanent tooth leading to malocclusion or dental impaction. After a 6-year follow-up, the permanent maxillary central incisors erupted without any pathological alterations.

Clinical and radiographic follow-up is of paramount importance in understanding the possible sequelae of traumatized teeth, making it possible for dental professionals to better treat these teeth and their potential complications [38]. The adherence of family members to the treatment and follow-up are a challenge, and unfortunately, minor injuries are still neglected. If parents and patients become aware that

seeking immediate treatment and adhering to follow-up consultations are the best options, many problems can be avoided.

Conclusion

This case report reinforces the importance of seeking immediate care whenever dental traumas occur. Besides, a regular and rigorous follow-up of the traumatized tooth is essential for successful outcomes. Clinical and radiographic monitoring is fundamental to help dental professionals to decide the best treatment and to minimize potential complications.

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Disclosure of conflict of interest

None.

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