



DENTAL TRAUMA IN CHILDHOOD: INTEGRATIVE REVIEW

REVIEW ARTICLE

GOMES, Mariana Amélia Sena¹, SILVA, Kedson de Sousa², MEIRA, Gabriela de Figueiredo³, OLIVEIRA, Nayhane Cristine da Silva de⁴

GOMES, Mariana Amélia Sena. *et al.* **Dental trauma in childhood: integrative review.** Revista Científica Multidisciplinar Núcleo do Conhecimento. Year: 08, Issue: 06, Vol. 02, Pages: 179-190. June 2023. ISSN: 2448-0959, Access link: <https://www.nucleodoconhecimento.com.br/dentistry/dental-trauma>, DOI: 10.32749/nucleodoconhecimento.com.br/dentistry/dental-trauma

ABSTRACT

The aim of this work is to conduct a literature review on aspects of dental trauma in deciduous dentition, based on data found in the PUBMED, LILACS, BBO, and SCIELO databases regarding the proposed topic. Trauma to deciduous teeth occurs in preschool children and is often associated with behavioral traits such as curiosity and restlessness, leading children to explore environments that result in falls, leading to an increased incidence of injuries. The success of post-traumatic care is related to the emergency care provided at the time of the event, as delayed treatment can result in a series of problems according to the trauma suffered. To avoid problems resulting from trauma and delayed treatment, there are protocols and guidelines that can be used in the treatment of dental trauma, with each treatment corresponding to a type of trauma.

Keywords: Dental trauma, Pediatric dentistry, Accident prevention, Health education.

INTRODUCTION

Dental trauma is common in early childhood and is classified by the World Health Organization (WHO) as a public health problem, ranging from small enamel cracks to permanent tooth loss. Traumatized teeth can cause not only aesthetic but also physical and functional damage, with numerous consequences for the health of pediatric patients (MACHADO, 2019).



The damages induced by trauma are varied and can even lead to early loss of teeth, as well as greater occlusal problems if not managed properly. Among the places most likely to experience dental trauma, the school environment was the most prominent, with deciduous teeth and soft tissues adjacent to dental elements being the most affected. The best way to prevent dental trauma is to provide information to parents and teachers about the best course of action for different types of dental trauma (COSTA, 2014).

Emergency care in cases of acute dental trauma can ensure a better prognosis, prevent pulp necrosis, or premature tooth loss. Therefore, the patient should be immediately referred to a dentist so that necessary action can be taken promptly (SANABE, 2019).

Thus, the objective of this work is to conduct a literature review on aspects of dental trauma in deciduous dentition.

METHODOLOGY

This study is an integrative literature review, using various articles from the following databases: Scientific Electronic Library Online (SCIELO), Latin American and Caribbean Literature in Health Sciences (LILACS), *Bibliografia Brasileira de Odontologia* (BBO), Scholar Google, and National Library of Medicine (PUBMED/Medline). Using the descriptors dental trauma, pediatric dentistry, dentistry, dental trauma, including articles in English and Portuguese. Articles published in the last 5 years were included, such as observational studies, case reports, and literature reviews.

According to the selected descriptors, the initial search resulted in 40 articles (phase 1); thereafter, the following procedures were performed: exclusion of duplicates in the databases (phase 2); titles were read and excluded according to the objectives of this study (phase 3); abstracts were read and exclusions were made according to established criteria (phase 4); the articles used for analysis in this review were read in



their entirety (phase 5). At the end of the five phases, a total of 16 studies were obtained to compose the review.

LITERATURE REVIEW

FACTORS ASSOCIATED WITH DENTAL TRAUMA

Cetinbas *et al.* (2018) state that at different age groups, Dental Trauma (DT) affects both dentitions and is common in early childhood when children learn to crawl, walk, and run, even without motor coordination, and later in childhood, falls, collisions with objects such as furniture, and falling from high places are also common and can lead to DT.

During adolescence, when children engage in sports and recreational activities, there are always exposures that put their physical integrity at risk, with potential for falls or electrical shocks and bicycle accidents (JORGE *et al.*, 2019; ANDERSSON, 2019).

There are other factors that can lead to DT, such as harmful oral habits, oral perforation, iatrogenic injury (medical examination, such as laryngoscopy or during intubation), drugs, and alcohol (GOMES, COSTA, and BONOW, 2019).

CLASSIFICATION OF DENTAL TRAUMA

The classification of dental injuries is very important and can be used as a guide to aid in the diagnosis of deciduous and permanent dentitions, providing not only treatment guidance but also possible prognosis. We can classify DTs according to the current Andreasen classification accepted by the WHO (FLORES, 2018; AMORIM *et al.*, 2021).

INJURIES TO SOFT AND HARD TISSUES

Among the injuries to the hard tissues of the tooth, we can find all injuries that result from enamel cracks, dentin (with or without pulp exposure), and even involving the root. They can be divided into complete and incomplete enamel fractures.



Uncomplicated coronal fractures can be divided into: fractures of enamel and dentin without pulp involvement, fractures of enamel with dentin involvement; complex coronal fractures include: coronal fractures without pulp exposure, and crown-root fractures with exposed pulp and root fractures (ANDREASEN and AHRENSBURG, 2019; DIANGELIS *et al.*, 2019; FLORES, 2018).

INJURIES WITH PULP INVOLVEMENT

Flores (2018) addresses that fractures involving exposed enamel, dentin, and pulp are uncommon in deciduous teeth. Therefore, a radiographic diagnosis should be performed to assess the extent of the fracture and the stage of root development, as Marinho (2019) states. In very young children with hypoplastic roots, it is important to preserve pulp vitality by performing a partial pulpotomy or overpass pulpal procedure. Pulpotomy treatment involves the complete removal of the coronal pulp and, in this way, preserves the root pulp according to Nino and Del (2018), and the same treatment applies in cases of fully formed roots. Thus, clinical control can be performed in week 1, and clinical and radiographic control can be performed in weeks 6-8 and year 1 (MALMGREN, 2021).

ENAMEL AND DENTIN INJURIES

The most commonly found injuries involve fractures of enamel and dentin with loss of dental structure but without pulp involvement, mainly on the mesial aspect of the upper incisors and may be accompanied by lesions in the supporting tissues. Teeth affected in this way exhibit normal mobility and are not sensitive to percussion. On radiographs, the loss of dentin and enamel can be seen, and the distance between the fracture and the pulp chamber should be evaluated. Therefore, the most suitable treatment for coronal fractures is to completely seal the affected dentin with glass ionomer to prevent microleakage (WANDERLEY and OLIVEIRA, 2019).



POST-TRAUMA RECOMMENDATIONS

Cortes *et al.* (2018) proposed a more appropriate approach following a traumatic injury. These recommendations include: a soft diet for 10 to 14 days; good oral hygiene, including dental brushing after each meal, using a soft brush. Apply 0.12% chlorhexidine externally, twice a day, for a week. This measure is important to prevent plaque accumulation. Limiting pacifier use is advisable as it can influence tissue healing after trauma and the pulp prognosis of traumatized teeth due to suction forces. Parents should be informed about possible complications such as inflammation, discoloration of the crown, increased mobility, or fistula, and should be vigilant for signs of gum inflammation as well as the possibility of complications in the development of permanent successor teeth, especially in cases of intrusion and avulsion in children under 3 years old (COSTA *et al.*, 2021).

TREATMENT OPTION

Replantation of permanent teeth is a conservative approach that aims to reposition the avulsed tooth in its own alveolar bone and should be considered the treatment of choice. The time the tooth remains out of the socket should be as short as possible to achieve the best treatment effect within the first 30 minutes and provide a better prognosis. However, the study authors propose various time intervals for teeth outside the socket. According to this research, the trauma-to-treatment interval is at least 15 minutes, which is considered non-critical (BLAKYTTY *et al.*, 2021).

RESULTS AND DISCUSSION

Without proper treatment, children with dental trauma can experience a negative impact on their quality of life, suffering from low self-esteem and problems in personal and social relationships (BLAKYTTY *et al.*, 2021).

Thus, the most affected age range in childhood is 1 to 3 years, which is related to factors like motor coordination, spongy and plastic bones. According to Souza *et al.*



(2018) and Menegotto *et al.* (2017), the highest prevalence among children was in the age range of 7 to 12 years.

Contrary to this, focusing on a treatment approach, for permanent tooth trauma, Rebouças, Neto, and Sousa (2018) stated that the ideal time for dental replantation should be at least 15 to 30 minutes to ensure patient safety.

Continuing this line of thought, Guedes-Pinto *et al.* (2018) and Melo (2017) observed that damage to the periodontal ligament cells is a consequence of the extra-alveolar phase, meaning the time between avulsion and dental replantation, and environmental factors are involved. The teeth should be preserved because periodontal ligament cells are unable to multiply and differentiate into fibroblasts, especially if stored in a dry environment for more than 15 minutes. A deciduous tooth that has been avulsed should not be repositioned in the socket, as permanent damage can lead to complications such as bacterial infection, abscess formation, mobility, ankylosis, prolonged retention, and inflammatory resorption, contraindicating dental replantation (GUEDES-PINTO *et al.*, 2018; MACHADO, 2019).

On the other hand, in cases of dental trauma, parents and/or caregivers are often laypersons and may make decisions that compromise the treatment and prognosis of traumatized teeth. Therefore, means of dental storage, extra-alveolar time, trauma, time to dentist consultation, accurate diagnosis, intraoral and extraoral exams are factors directly related to trauma treatment. In this situation, dentists must effectively communicate knowledge about dental trauma and the appropriate actions to take in each case to those who interact with children on a daily basis or are involved in accidents (BRANDÉO, 2020; SOUSA, 2018).

Silva *et al.* (2017) reported that after trauma involving avulsion, the remaining periodontal ligament cells on the root surface are deprived of blood supply and lose stored cellular metabolites. To maintain physiological cellular metabolism, these nutrients must be supplemented as quickly as possible. An ideal storage medium should maintain physiological pH, metabolism, and osmolarity to preserve the vigor and vitality of periodontal fibers while the tooth is transported to the dental office.



Regarding extra-alveolar time, in this scientific study, parents and/or caregivers (68.7%) reported taking up to 30 minutes to seek treatment for their traumatized child. One of the most intriguing current challenges in dental traumatology is finding the best transport medium for cellular viability, both periodontal and endodontic, presenting antioxidant properties that neutralize biotic contamination, with pH and osmolarity values similar to those of the tooth, and being cost-effective and accessible (SANABE, 2019).

Thus, it is understood that the success of dental trauma treatment begins minutes after the accident and depends on the proper execution of emergency care provided on-site until the correct diagnosis is made by the dentist using accurate records and intraoral and extraoral exams, thereby promoting the correct case management behavior. Therefore, the success of post-traumatic care is related to the emergency care provided at the time of the event (ALBUQUERQUE *et al.*, 2018).

Therefore, currently, there seems to be no consensus in the literature on the ideal pattern of tooth movement. In cases where the tooth is not attended to by a dentist in a short period, the tooth may suffer alterations in supporting structures, discoloration, and even the vitality of the element, depending on the trauma. Thus, some consequences of dental trauma are frequently recognized as dental problems (FLORES, 2021; TRAEBERT and CLAUDINO, 2018).

There are protocols that can be used to guide dental trauma treatment. For example, in cases of enamel fracture or enamel and dentin fracture, the fragment should be stored in physiological saline for later bonding. When this technique is not possible, restoration with composite resin is indicated. In cases of coronal fractures with pulp involvement, for a good prognosis, treatment should occur within three hours of the trauma, and any fragments should be bonded after initial emergency treatment, whenever possible. In cases of coronoradicular fractures involving enamel, dentin, cementum, and pulp, horizontally, the tooth can be preserved by repositioning it correctly and following with endodontic treatment to prevent pulp necrosis. But if the fracture is vertical, extraction is the only option (SILVA *et al.*, 2020).



Silva *et al.* (2020) also affirm that in cases of root fractures involving dentin, cementum, and pulp, tooth mobility can occur, and repositioning of the

tooth should be done, followed by stabilization, and endodontic treatment might be necessary. In cases of fractures of the alveolar wall and process involving the bone, the fragment should be repositioned, and rigid or semi-rigid stabilization should be applied for four weeks.

Pulp capping or partial pulpotomy is recommended when pulp involvement occurs in trauma. For complete root formation, pulpectomy is recommended. There are also guidelines for the treatment of luxation injuries, such as: concussion, only monitoring pulp vitality for about 1 year; subluxations, stabilizing the tooth with a flexible splint for two weeks; complete root formation, endodontic treatment is indicated; lateral luxation, manually or with forceps, the tooth should be repositioned, with four weeks of stabilization, and pulp vitality monitored; intrusion, eruption should be allowed to happen without intervention, but if the tooth has intruded more than 7 mm, repositioning with orthodontic or surgical treatment is recommended (FONSECA *et al.*, 2021).

CONCLUSION

The results of this study present the main treatments for dental trauma, with children being the most affected group, and dental replantation being one of the options. However, the lack of knowledge among parents/guardians can compromise the quality and effectiveness of treatment. Therefore, dental professionals should guide parents and teach them the best course of action in the event of accidents leading to dental trauma.

The success of post-traumatic care is related to the emergency care provided at the time of the event. In case of delayed treatment, teeth can suffer various issues depending on the trauma suffered. To avoid problems arising from trauma and treatment delays, there are protocols and guidelines that can be followed for dental trauma treatment, with each action corresponding to a specific type of trauma.



Further research is needed in this area to distribute more information about childhood dental trauma, and corrective and educational public policies should be developed to reduce accidents that can cause trauma and ensure correct post-trauma actions.

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Submitted: May 23, 2023.

Approved: June 6, 2023.

¹ Bachelor's degree in Dentistry from Fаметro University Center. ORCID: 0009-0008-2036-7455. Lattes Curriculum: <http://lattes.cnpq.br/7064391656930511>.

² Bachelor's degree in Dentistry from Fаметro University Center. ORCID: 0009-0008-8376-7923.

³ Ph.D. in Pediatric Dentistry from Federal University of Santa Maria (2020); Master's degree in Dental Sciences from Federal University of Amazonas (2016); Specialist in Orthodontics from Ceproeducar (2020); Specialist in Public Health from Unyleya College (2018); Bachelor's degree in Dentistry from Federal University of Amazonas (2013). ORCID: 0000-0002-8285-8769. Lattes Curriculum: <http://lattes.cnpq.br/3710771916871688>.

⁴ Advisor. Specialization in Pediatric Dentistry from Blauro Cardoso de Mattos Institute of Higher Education (2020), Bachelor's degree in Dentistry from Federal University of Amazonas (2018). ORCID: 0000-0003-2056-5853. Lattes Curriculum: <http://lattes.cnpq.br/2255456614872519>.