Revisiones Narrativas
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A literature critical review of current post-trauma guidelines in the primary dentition

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Abstract: The optimal healing of the injured tissues depends on several factors, including the post trauma orientations. For this reason, the objective of this study was to perform a critical analysis of the actual guidelines post-trauma on primary dentition. The search strategy was performed in August-September 2021, in MEDLINE/PubMed; SCOPUS; BVS; ProQuest; Science Direct under the terms DeCS/MeSH, within the last 5 years, without language restriction. Eleven articles were selected, and the following topics were analyzed: oral hygiene, antiseptics, medications, risk activity, diet/nutrition, sucking habits, complications, follow-up and associated sequelae. The use of soft brushes and alcohol-free chlorhexidine digluconate, limitation of medication prescription, soft diet, suspension of sucking habits and post-traumatic sequelae in the permanent dentition were the main findings. It seems to be necessary studies verify the effectiveness of the actual post-trauma orientation and to standardize the instructions given after traumatic dental injuries (TDI) in the primary dentition with the aim of improving the short -and long- term prognosis.
Key words: Tooth injuries, Primary tooth, Child, Pediatric dentistry.

Una revisión crítica de la literatura sobre las directrices actuales post trauma en dentición primaria.

Resumen: La cicatrización óptima de los tejidos lesionados depende de varios factores, entre ellos las orientaciones postraumáticas. Por esta razón, el objetivo de este estudio fue realizar un análisis crítico de las orientaciones actuales post-trauma en dentición primaria. La estrategia de búsqueda fue realizada en agosto-septiembre de 2021, en MEDLINE/PubMed; SCOPUS; BVS; ProQuest; Science Direct bajo los términos DeCS/MeSH, en los últimos 5 años, sin restricción de idioma. Se seleccionaron 11 artículos y se analizaron los siguientes temas: higiene oral, antisépticos, medicamentos, actividad de riesgo, dieta/nutrición, hábitos de succión, complicaciones, seguimiento y secuelas asociadas. El uso de cepillos suaves y digluconato de clorhexidina sin alcohol, la limitación de la prescripción de medicamentos, la dieta blanda, la suspensión de los hábitos de succión y las secuelas postraumáticas en la dentición permanente fueron los principales hallazgos. Parece necesario realizar estudios para verificar la eficacia de la orientación postraumática real y estandarizar las instrucciones dadas tras lesiones dentales traumáticas (LDT) en la dentición primaria con el objetivo de mejorar el pronóstico a corto y largo plazo.

Palabras clave: Traumatismo de los dientes, Diente primario, Niño, Odontología pediátrica.

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Uma revisão crítica da literatura das atuais diretrizes pós-traumáticas na dentição decídua.

Resumo: A cicatrização ideal dos tecidos lesionados depende de vários fatores, incluindo as orientações pós-traumáticas. Por esse motivo, o objetivo deste estudo foi realizar uma análise crítica das atuais orientações pós-trauma na dentição decídua. A estratégia de busca foi conduzida em agosto-setembro de 2021, nas bases de dados MEDLINE/PubMed; SCOPUS; BVS; ProQuest; Science Direct utilizando os termos descritos no DeCS/MeSH, dos últimos 5 anos, sem restrição de idioma. Onze artigos foram selecionados e os seguintes tópicos foram analisados: higiene bucal, antissépticos, medicamentos, atividade de risco, dieta/nutrição, hábitos de sucção, complicações, acompanhamento e sequelas associadas. O uso de escovas macias e de digluconato de clorexidina sem álcool, a limitação da prescrição de medicamentos, a dieta branda, a suspensão dos hábitos de sucção e as sequelas pós-traumáticas na dentição permanente foram os principais achados. Estudos parecem ser necessários para verificar a eficácia do aconselhamento pós-traumático real e para padronizar as instruções dadas após a lesão dentária traumática (LDT) na dentição decídua, a fim de melhorar o prognóstico a curto e longo prazo.

Palavras-chave: Trauma dentário, Dente decíduo, Criança, Odontopediatria.

Introduction

Traumatic dental injuries (TDI) are frequent in children from 0 to 6 years of age [1-3], being higher between 2 and 3 years of age [2,8]. The incidence of TDI in primary dentition varies from 1% to 3%[6], reaching a prevalence of 22% to 30%[1,6,7]. It has become a worldwide public health problem [4,5]. The main causes of TDI are unintentional falls, collisions and recreational activities associated with the onset of crawling, walking, and running[9,10]. On the other hand, traffic accidents are associated with severe facial fractures[11].

TDIs are defined as any lesion in hard or soft tissue within and/or around the oral cavity[1]. The treatment approach will depend on the accuracy of the clinical and radiographic diagnosis[2], the child's ability to cooperate, and the attitude of the parents towards the treatment[3].

The optimal healing of the injured tissues depends on several factors, such as the management of the TDI, the post trauma instructions[4] and the prevention of future injuries[5]. For these reasons, it is important to verify if the actual post-trauma recommendations are effective to prevent premature tooth loss of traumatized primary teeth.

The objective of this study was to perform a critical analysis of the actual guidelines post-trauma on primary dentition.

Methods

The research was elaborated based on the following P.E.O question: Population (Primary dentition), Exposure (Traumatic dental injuries), Outcome (Current post-emergency guidelines). The research question was: What are the current

guidelines after traumatic dental injuries in primary dentition?

Eligibility Criteria

The sample considered studies conducted in humans, being inclusion criteria: clinical studies (case series, cohorts, cross-sectional, randomized clinical studies) evaluating the approach to dentoalveolar trauma in primary dentition. In addition, studies that compiled available information, such as clinical guidelines and systematic reviews, were considered.

Exclusion criteria were: studies performed in adults or adolescents, not describing post-traumatic indications or not available in their entirety from the database. Those with data older than 5 years were not included.

Search strategy

Although this work is a review of the literature, the search strategy was carried out systematically. The literature search was carried out between the months of August and September of 2021, on the following databases: MEDLINE/PubMed, SCOPUS, BVS, ProQuest and Science Direct. DeCS terms ("Tooth injuries", "Primary tooth"), MeSH terms ("Tooth injuries", "Primary tooth") and keywords related to dentoalveolar trauma and primary dentition were used to search for potential articles. In addition, the reference lists of the selected articles were reviewed by hand to identify potentially relevant studies that might have been overlooked during the initial searches of the electronic databases. No language restriction was applied.

The titles and abstracts of all references were reviewed. Duplicates were eliminated and articles that met the inclusion criteria were selected based on their titles and abstracts.

The search and the analysis of the articles were performed by one reviewer (G.J).

Results

Overall, 1527 articles were identified from databases, and after duplicate removal (n=156), 1371 articles remained for an initial selection. A comprehensive evaluation of the titles and abstracts resulted in the exclusion of 1158 articles. A full-text review was conducted on 213 retrieved articles, and this process led to the exclusion of 202 studies. In the end, 11 (1 cohort study, 1 observational study, 2 case reports, 4 clinical guidelines, 1 systematic review, 2 literature reviews) were maintained for the final analyses (Figure 1).

The main results were summarized in the following tables: Instructions considering the oral hygiene and use of antiseptics (Table 1), Instructions considering medication use (Table 2), Instructions considering the diet/food (Table 3), Other instructions (Table 4).

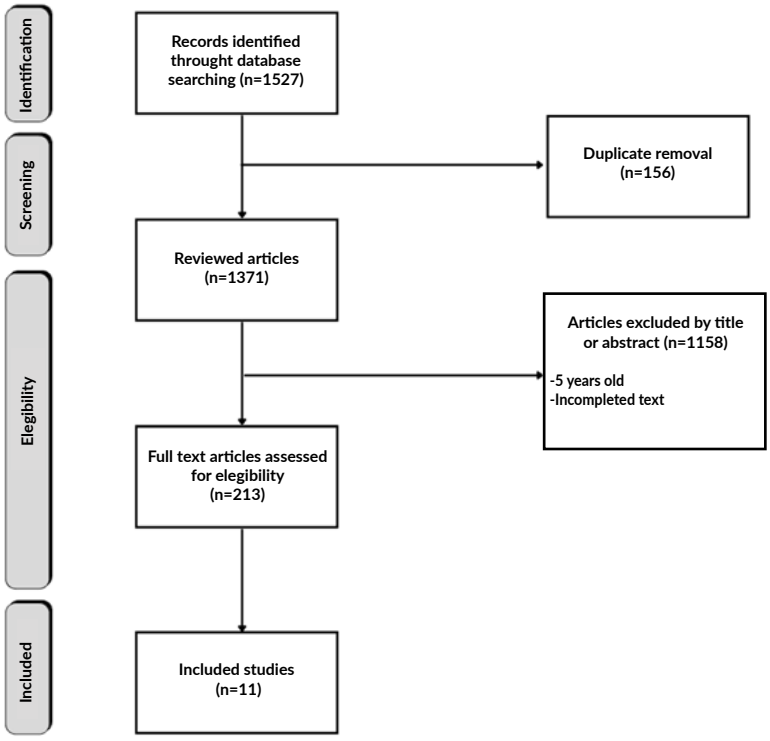

Figure 1. *Summary of the search strategy according to PRISMA criteria ("Preferred Reporting Items for Systematic reviews and Meta-Analyses").*

Table 1. *Instructions considering the oral hygiene and use of antiseptics.*

Publication	Main Results	
	Oral Hygiene	Oral Antiseptics
Malmgren *et al*[14]	Soft Brush.	Topical application of 0.1% alcohol-free chlorhexidine digluconate, 2 times a day for 7 days.
Day *et al*[3]	Soft brush or cotton swab.	Topical application of 0.1% alcohol-free chlorhexidine digluconate, 2 times a day for 7 days.
Levin *et al*[15]	Meticulous oral hygiene.	Rinse with 0.12% alcohol-free chlorhexidine digluconate for 7 or 14 days. Topical use in young children.
Holan *et al*[16]	Meticulous oral hygiene.	Topical application of 0.2% alcohol-free chlorhexidine digluconate several times a day, after meals for 7 days.
Lessa *et al*[17]	Oral hygiene instruction.	None
Chatzidimitriou K. *et al*[18]	Soft Brush.	Alcohol-free chlorhexidine digluconate mouthwash 0.1%
Chipana-Herquinio *et al*[19]	Meticulous oral hygiene.	None

Table 2. *Instructions considering medication use (antibiotics/ analgesics/ anti-inflammatories)*

Publication	Main Results		
	Antibiotics	Analgesics	Anti-inflammatories
Malmgren *et al*[14, 20]	No evidence for systemic use.	Acetaminophen: management of acute pain in TDI (intrusive/ lateral dislocation and root fracture)	Ibuprofen: management of acute pain in TDI (intrusive/ lateral dislocation and root fracture)
Holan *et al*[16]	Use in case of severe dislocations, and significant damage to oral tissues.	No evidence for systemic use.	No evidence for systemic use.
Mehrabi *et al*[21]	Limited evidence of systemic use. Only indicated in cases of compromised medical conditions.	No evidence for systemic use.	No evidence for systemic use.
Day *et al*[3]	Use only in TDI associated with soft tissue and other injuries. Need for significant surgical intervention. Medical status commitment.	Acetaminophen: management of acute pain in TDI (intrusive/ lateral dislocation and root fracture)	Ibuprofen: management of acute pain in TDI (intrusive/ lateral dislocation and root fracture)

Table 3. *Instructions considering the diet/food.*

Publication	Main Results
Malmgren *et al* [14, 20]	Soft diet for 10 days.
Day *et al*[3]	Caution in feeding.
Holan *et al*[16]	Soft diet for several days.
Chatzidimitriou *et al*[18]	Soft diet for 14 days.

Table 4. *Other instructions.*

Publication	Main Results
Malmgren *et al*[14]	To inform of permanent sequelae. Pacifier/bottle restriction for 7 days.
Day *et al*[3]	To inform of permanent sequelae Adult supervision during potentially dangerous activities. To warn about possible complications such as: swelling, increased mobility, sinus tract and signs of infection.
Goswami *et al*[22]	To inform the importance of the subsequent follow-up in the prognosis of TDI.
Özgür *et al* [23]	To inform the importance of the subsequent follow-up in the prognosis of TDI. To inform of permanent sequelae
Bossú *et al*[13]	To inform the importance of the subsequent follow-up in the prognosis of TDI.

Discussion

This literature review collected a total of 11 studies regarding the instructions given to parents after traumatic dental injuries in the primary dentition. Only 4 of them were clinical studies, in which this information was provided partially[6-8] and/or totally[9]. Nowadays, post-trauma counseling is based on the consensus of expert specialists in the area; however, its effectiveness has not been addressed in clinical studies.

This is relevant considering that it is stated that the prognosis of TDI is related to post-emergency intervention orientations[3,10]. Therefore, it is necessary to guarantee that these measures are adequate to favor optimal healing of the injured tissues, as well as to achieve standardization in topics such as: oral hygiene, use of oral antiseptics, use of medications (antibiotics / analgesics / anti-inflammatory drugs), diet, management of sucking habits (nutritive / non-nutritive), restriction of risk activities, associated complications, relevance of follow-up and future sequelae in the permanent dentition.

Guidelines for oral hygiene and use of oral antiseptics

Regarding oral hygiene indications, they are not very specific in the education given to tutors, nor does it emphasize the relationship with tissue healing. Only one study by Lessa *et al.* 2020[6] expresses the need to carry out education related to oral hygiene instruction after the emergency consultation. However, the type of toothbrush, the frequency or the duration of the oral hygiene is not specified. Some authors do agree on the importance of using a soft brush[2,7,8] traumatic dental injuries.

The prescription of oral antiseptics seems to be a universal topic. From the 7 studies that incorporate guidelines related to oral hygiene, more than half of them refer to the topical use[2,8-10] and/or as a rinse[7,10] of the alcohol-free chlorhexidine digluconate. As for its concentrations, they vary between 0.1% and 0.2%. Various studies conclude that the effectiveness in terms of bacterial plaque control is similar to 0.1%-0.12% or 0.2%[11,12]. Its use should be recommended topically with cotton swabs and/or gauze instead of indicating its use as a rinse in children under 6 years of age due to the risk of ingestion of the chlorhexidine solution.

Only 2 authors mentioned that the frequency and duration[7,9] of the use of alcohol-free chlorhexidine digluconate is due to the parents´ discretion. There is an apparent consensus of regimen of 2 times a day for 7[2,8-10] or 14 days[10], estimated time for the repair of the gingival fibers[9].

Medication prescription

On this topic, the use of medications seems to be a consensus that it should be limited. The use of systemic antibiotics after dental trauma emergency care have limited or insufficient evidence[8,13]. There are some specific indications for its use such as patients with compromised general medical status[2,13,14], need for surgical intervention[2], severe tooth dislocations and significant

damage to the oral tissues[2,9]. However, some authors Holan *et al.* 2019[9] and Day *et al.* 2020[2] do not mention the type of dislocation or damage to the oral tissues.

The use of analgesics and anti-inflammatories was reported in a coincident way by Malmgren *et al.* 2017[8] and Day *et al.* 2020[2], indicated for lateral/intrusive dislocations and root fractures which may be associated with severe pain. However, there are no pharmacological guidelines when only soft tissues are involved.

There is a lack of recommendations for the prescription of antibiotics, analgesics and anti-inflammatories regarding the indication, dosage, frequency, and duration of treatment, thus leaving it to the professional criteria. That is why an individualized evaluation of the patient is required, considering the severity of the injuries and the risk of bacterial contamination. It is important to call attention to the fact that the use of antibiotics must be rigorous, due to the growing increase in antibiotic resistance globally[15]. As for analgesics, to limit their use for a maximum of 3 days, the period of greatest pain[16,17], re-evaluating the patient if it persists after this period of time so as not to mask another source of pain.

Diet/Feeding instructions

Diet/nutrition is only mentioned in 4 studies, appearing to have no greater relevance in the healing of the tissues involved. All the authors agree on changing the diet towards a "soft diet"[2,7-9], understood as one that consists of easily digestible foods, low in fiber, cooked, and of a soft consistency[18]. The duration of this regimen varies between 10 to 14 days[7-9,14], with no relation to the severity of the associated traumatic dental injuries. No recommendations are given regarding the temperature at which food should be eaten, to promote healing of the affected tissues. These instructions should be considered important due to the fact that the literature has shown that hot or cold stimuli may influence pulpal healing due to the effect of the temperature on cellular metabolism[19].

Restriction of sucking habits and risky activities

Nutritive and non-nutritive sucking habits are only mentioned by Malmgren *et al.* 2017[8] which restricts the use of pacifiers and bottles for 7 days due to the need for rest of the affected tooth, thus allowing the repair of the periodontal fibers. In addition, the long term sucking habits may be associated with the development of malocclusions[20-22], increasing the risk of suffering dental trauma[23,24]. No author refers to the management and/or suspension of digital suction.

Regarding risky activities, only one author indicates the need for parental supervision of potentially dangerous activities[2]. This is noteworthy considering that the main causes of TDI are associated with involuntary falls, collisions, and recreational activities such as crawling, walking, and running[5,25]. For this reason, it is necessary to guide parents in the use of mouthguards when performing sports and/or risky activities such as: soccer, hockey, cycling or others. In addition, to avoid bad habits

such as biting objects, ice cubes and/or toy, and to reinforce the importance of adult supervision of babies and infants, and the use of a car seat when minors are transferred[26].

Complications and sequelae in permanent dentition

Only 45% of the studies declare that it is necessary to explain to the parents the possible sequelae in the permanent dentition. It should be noted that serious alterations can occur as a result of orofacial trauma at an early age[27]. These sequelae are frequently related to enamel alterations with aesthetic compromise; however some severe sequelae may lead to the loss of the permanent successor[27,28]. Alveolar fracture, intrusion and avulsion are mentioned as the types of injuries which may cause sequelae in the permanent successors, mainly if the injury occurs before 3 years of age[28,29]. The sequelae observed at the level of the crown and the root of the permanent successor are associated with TDI occurrence at 2 and 4 years of age, respectively[27].

Less than half of the authors identify complications that require an observation by the caregiver such as swelling, increased mobility, sinus tract and signs of infection[2] in the traumatized primary tooth. In a more consensual manner, most authors attach importance to informing the need for follow-up of TDI, due to its relationship with short and long-term prognosis[4,30,31].

However, only half of the authors indicate that controls should be performed until the traumatized primary tooth has exfoliated and the permanent tooth has erupted[2,6,8-10,13,14]. The controls should consider the follow-up of possible sequelae in the traumatized primary teeth, to timely perform the adequate treatment to prevent its premature loss. The permanent tooth should also be monitored, both in its eruption process and in the timely intervention of some types of sequelae such as crown or root dilaceration.

Finally, it is necessary to call attention to the way in which this guidance are delivered to parents. The emergency dental consultant is a stressful moment to all the individuals. For this reason, these instructions should be given not only verbally, but also as a written medium such as a brochure to facilitate the understanding by the responsible adult.

Conclusion

This critical review shows that studies are required to verify the effectiveness of the post-trauma orientations that are delivered to guardians, along with their standardization, with the aim of improving the short- and long-term prognosis of TDI.

Interest conflict.

There are no conflicts of interest on the part of any of the authors.

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