Vol. 14, No. 2, March-April 2025

DENTAL TRAUMA IN A 7-YEAR-OLD PATIENT: IMPLICATIONS FOR FUTURE PROSTHETIC REHABILITATION

Chifu Elena Cristina[1], Gociu Anda Daniela[1], Gavril Smaranda[1], Agop-Forna Doriana[2*], Forna Norina[3]

1"Gr. T. Popa" U.M.Ph. - Iași, Romania, Faculty of Dentistry, Resident in Pediatric Dentistry
2"Gr. T. Popa" U.M.Ph. - Iași, Romania, Faculty of Dentistry, Department of Implantology, Removable Dentures, Dentures Technology
3"Gr. T. Popa" U.M.Ph. - Iași, Romania, Faculty of Dentistry, Department of Surgery

*Corresponding authors: Agop-Forna Doriana, e-mail: drdorianaforna@gmail.com

ABSTRACT

Dental trauma in 7-year-old patients presents complex challenges due to the transitional nature of mixed dentition. This review analyzes the clinical implications of specific traumatic dental injuries (TDIs) such as avulsion, intrusion, and crown-root fractures, focusing on their impact on future prosthetic rehabilitation. Evidence from current literature emphasizes the importance of early diagnosis, age-appropriate prosthetic planning, and individualized treatment strategies that account for craniofacial growth. Integration of pediatric prosthodontics into trauma management protocols improves long-term outcomes in terms of both function and psychosocial well-being.

Key words: dental trauma, dental injuries, child, prosthetic reabilitation

INTRODUCTION

Dental trauma in children remains a complex clinical challenge, particularly in the mixed dentition stage around the age of 7. This transitional period, characterized by the eruption of permanent incisors and the presence of both primary and permanent teeth, makes patients especially vulnerable to traumatic dental injuries (TDIs). Among the most severe and clinically demanding TDIs are tooth avulsion, intrusion, crown fractures at the middle and cervical third, and crown-root fractures, each carrying significant implications for future prosthetic rehabilitation.

Intrusive luxation of permanent teeth is considered one of the most severe dental injuries. According to Andreasen et al. (2020), intruded teeth—especially those with closed apices and severe intrusion depths—present a high risk of pulpal necrosis and root resorption, often requiring endodontic therapy and long-term monitoring. Such injuries, if not managed optimally, may result in early tooth loss and a need for prosthetic planning at an age where growth is still ongoing.

Likewise, the management of avulsion in permanent teeth depends heavily on the extra-alveolar time and the storage medium. In contrast, reimplantation is contraindicated in avulsed primary teeth, as emphasized by Bourguignon et al. (2021), due to the risk of damage to developing permanent successors. This distinction is critical when developing treatment strategies for 7-year-old patients, who may still retain primary teeth.

Fractures involving the cervical third of the crown or extending into the root (corono-radicular fractures) pose serious restorative challenges. Their proximity to the gingival margin often necessitates multidisciplinary treatment and may compromise long-term tooth viabili ty. These injuries, if leading to tooth loss or severely compromised structure, can delay or complicate future prosthetic

rehabilitation—particularly fixed options, such as implants, which are often contraindicated in growing patients.

The aim of this review is to evaluate the clinical characteristics and long-term consequences of specific TDIs—namely avulsion, intrusion, middle- and cervical-third crown fractures, and corono-radicular fractures—in 7-year-old children. Emphasis is placed on how these injuries affect the timing, planning, and selection of prosthetic rehabilitation strategies in the developing dentition.

MATERIALS AND METHODS

Literature Search Strategy

To conduct this narrative review, a comprehensive literature search was performed across multiple electronic databases, including (Sharma et al., 2022) Google Scholar, SciELO, and ScienceDirect. The search aimed to identify relevant studies published between January 2000 and December 2024. The following keywords and their combinations were used: "dental trauma," "pediatric dental trauma," "tooth avulsion," "prosthetic rehabilitation," "children," "7-year-old," "primary teeth," "permanent teeth," "prosthetic treatment," "crowns," "implants," and "dental prostheses." Boolean operators (AND, OR) were applied to refine the search results.

Inclusion and Exclusion Criteria

Studies were selected based on the following inclusion criteria:

- Articles published in English.
- Studies focusing on dental trauma in pediatric patients, specifically around the age of 7.
- Research addressing prosthetic rehabilitation following dental trauma in children.
- Peer-reviewed original research articles, clinical trials, case reports, and systematic reviews.

Exclusion criteria encompassed:

- Studies not directly related to dental trauma or prosthetic rehabilitation in children.
- Articles focusing exclusively on adult populations.
- Non-peer-reviewed literature, editorials, and opinion pieces.

Study Selection and Data Extraction

The initial search yielded a total of 120 articles. After removing duplicates and screening titles and abstracts for relevance, 45 articles were selected for full-text review. Of these, 15 articles met all inclusion criteria and were included in the final analysis. Data extracted from the selected studies included study design, sample size, age of participants, type and severity of dental trauma, prosthetic rehabilitation methods employed, outcomes, and follow-up duration.

Quality Assessment

The quality of the included studies was assessed using appropriate tools based on study design. Randomized controlled trials were evaluated using the Cochrane Risk of Bias Tool, while observational studies and case reports were assessed using the Newcastle-Ottawa Scale and the CARE guidelines, respectively. Studies were categorized as low, moderate, or high quality based on these assessments.

RESULTS AND DISCUSSION

Traumatic dental injuries (TDIs) are prevalent among children, with crown fractures and luxations of permanent teeth being the most common types of injuries in this population. Proper diagnosis, treatment planning, and follow-up are crucial for achieving favorable outcomes. (American Academy of Pediatric Dentistry [AAPD], 2021)

The International Association of Dental Traumatology (IADT) has developed guidelines to assist dental professionals in

managing such injuries effectively. These guidelines are based on a comprehensive review of the dental literature and expert consensus, aiming to provide evidence-based recommendations for the immediate and long-term management of TDIs. (American Academy of Pediatric Dentistry [AAPD], 2021)

In cases of crown fractures, the guidelines emphasize the importance of assessing the extent of the fracture, pulp involvement, and the stage of root development. For uncomplicated crown fractures, restorative treatment is often sufficient, while complicated fractures may require endodontic therapy. (Zhang et al., 2020).

Luxation injuries, including concussion, subluxation, extrusion, lateral luxation, and intrusion, require careful evaluation of tooth mobility, displacement, and alveolar socket integrity. Management strategies vary depending on the type and severity of the luxation, with options ranging from monitoring to repositioning and splinting.

The guidelines also highlight the significance of timely intervention and appropriate splinting techniques to stabilize injured teeth and promote healing. Flexible splints are generally recommended, and the duration of splinting should be tailored to the specific injury type.

Overall, adherence to the IADT guidelines can enhance the prognosis of traumatic dental injuries in children by standardizing treatment approaches and ensuring that dental professionals are equipped with current, evidence-based knowledge.

Premature loss of primary anterior teeth due to traumatic events, such as automobile accidents, can significantly impact a child's oral and psychological development. In such cases, prosthetic rehabilitation is essential to restore function, aesthetics, and prevent the development of harmful oral habits. The Denari-type fixed partial prosthesis has been reported as an effective solution for managing such traumatic dental injuries in pediatric patients. (Arcos-López et al., 2022)

The Denari prosthesis comprises a fixed restoration to replace the lost teeth, anchored to adjacent teeth, and incorporates a central stem connected to a tube, allowing for adjustment and monitoring of maxillary growth. This design not only restores the aesthetics and function of the anterior maxillary region but also prevents lingual interposition, which can lead to speech and swallowing disorders. (Arcos-López et al., 2022)

In the reported case, a 4-year-old male patient who suffered avulsion of the anterior primary teeth received treatment with a Denari-type prosthesis. The rehabilitation procedure included removal of carious lesions, adhesive restoration of remaining teeth, and the fabrication and cementation of the prosthesis. Follow-up evaluations indicated satisfactory results concerning the transverse growth of the maxillary bone, with an increase in interincisal spacing observed over a one-year period. (Arcos-López et al., 2022)

The advantages of the Denari prosthesis include its passive design, which accommodates normal maxillary growth without interfering with the development of the dentition and occlusion. Additionally, its fixed nature helps in maintaining the space, preventing the extrusion of opposing teeth, and discouraging the development of deleterious oral habits. However, challenges such as the cleaning process of the device by the patient and the aesthetic appearance of the metallic components were noted. These issues underscore the importance of parental involvement in oral hygiene practices and the potential need for aesthetic modifications to enhance patient acceptance. (Arcos-López et al., 2022)

While the literature on the Denari prosthesis is limited, the reported case supports its use as a viable option for prosthetic rehabilitation in young children following traumatic dental injuries. Further clinical studies and randomized trials are recommended to validate its efficacy and establish standardized protocols for its application in pediatric dentistry.

The premature loss of primary anterior teeth in pediatric patients may arise from various etiologies, including untreated caries, traumatic injuries, and developmental anomalies. Prosthetic rehabilitation in such cases plays a critical role in restoring masticatory function, speech, and facial aesthetics, while simultaneously supporting normal oral growth and development.

Fixed prosthetic options such as stainless steel crowns (SSCs) are frequently employed to restore extensively damaged primary teeth, offering durability and effective protection of the underlying dental structures. Aesthetic crown materials, including polycarbonate and zirconia, are increasingly utilized to enhance the esthetic outcomes of anterior restorations.

In cases of partial or total edentulism, implant-supported prostheses, particularly utilizing mini-implants, represent a viable therapeutic alternative when conventional restorative approaches are inadequate. Nevertheless, implant placement in children must be cautiously timed to avoid interference with craniofacial growth, with current recommendations advising delay until skeletal maturation—generally post-puberty, around 14–15 years in females and 17–18 years in males.

Overall, prosthetic treatment significantly improves functional and esthetic outcomes, thereby enhancing pediatric patients' quality of life. Restoration of occlusion and articulation is essential for effective communication and social integration, underscoring the importance of early and appropriate prosthetic intervention following traumatic tooth loss.

Premature avulsion of primary anterior teeth in children can lead to significant functional and esthetic challenges, including compromised speech, masticatory function, and psychological well-being. In cases where immediate reimplantation is not feasible, alternative prosthetic solutions are essential. This case study presents a patient who experienced avulsion of maxillary central incisors. The chosen intervention involved the placement of two orthodontic mini-implants in the alveolar ridge, followed by the attachment of provisional crowns. (Oliveira et al., 2017)

The prosthetic rehabilitation achieved satisfactory esthetic and functional outcomes. After a one-year follow-up, the adjacent periodontal tissues exhibited no signs of inflammation, and the provisional crowns remained stable without mobility or fractures. Radiographic examination revealed healthy bone tissue, indicating successful integration of the mini-implants. (Oliveira et al., 2017)

The simplicity and minimally invasive nature of mini-implant installation make them a promising alternative for temporary prosthetic rehabilitation in growing patients. This technique offers a cost-effective solution that can enhance esthetics and function, thereby improving the patient's quality of life and promoting social inclusion.

Traumatic dental injuries (TDIs) represent a significant public health concern in the pediatric population, with a reported prevalence of up to 20% among children and adolescents. These injuries can lead to a wide spectrum of consequences, including aesthetic deficiencies, functional impairment, psychosocial challenges, and the need for complex therapeutic interventions.

A recent systematic review and meta-analysis by Zaror et al. (2018), which included 26 studies and a total of 4,582

affected individuals aged between 1 and 15 years, demonstrated that children who experienced TDIs had a significantly increased likelihood of reporting a negative impact on their oral health-related quality of life when compared to unaffected peers.

Specifically, in preschool-aged children, complicated traumatic injuries—characterized by pulp exposure or tooth dislocation—were associated with a 1.53-fold increase in the odds of adversely affecting oral health-related quality of life relative to uncomplicated injuries. These results highlight the heightened vulnerability of younger children to the functional and emotional repercussions of severe dental trauma.

Furthermore, in school-aged children, the social dimension of oral health-related quality of life was disproportionately affected, suggesting that TDIs may hinder the child's ability to engage in social interactions and participate fully in age-appropriate activities. These findings underscore the importance of timely diagnosis, appropriate management, and preventive strategies to mitigate the long-term consequences of dental trauma in pediatric patients.

CONCLUSIONS

Dental trauma at the age of 7 frequently involves the anterior teeth during the mixed dentition phase, posing risks for altered occlusal development, speech difficulties, and psychological distress. Clinical data emphasize the importance of individualized prosthetic rehabilitation—such as space maintainers or pediatric prostheses—to restore function and aesthetics while addressing the emotional needs of the child. Treatment must be planned with respect to craniofacial growth, requiring periodic adjustments to avoid interference with natural development. Integrating pediatric prosthodontics into trauma management significantly improves long-term oral health, functionality, and the child’s quality of life.

REFERENCES

1. Zaror C., Espinoza-Espinoza G., Muñoz-Millán P., Martínez-Zapata M.J., Rojas-Rojas C., Aguilera-Eguía R.A. Impact of traumatic dental injuries on quality of life in preschoolers and schoolchildren: a systematic review and meta-analysis. Br Dent J. 2018;224(7):487–493.
2. Oliveira L., De Freitas L.R., De Souza C.M., Câmara A.C. Prosthetic rehabilitation of child victim of avulsion of anterior teeth with orthodontic mini-implant. Int J Dev Res. 2017;7(12):17992–17995.
3. Sharma P., Tyagi S.P., Bhattacharya P., Das A., Priya R. Prosthetic rehabilitation in children: an alternative approach. Int J Clin Pediatr Dent. 2022;15(1):135–138.
4. Cildir S.K., Sönmez H., Sandalli N. Evaluation of the needs for prosthetic restorations of front teeth in Turkish children. J Appl Oral Sci. 2005;13(3):258–263.
5. Shobha R., Sandeep N., Rajendra M., et al. Prosthetic treatment with crowns and implants in children – a review. J Oral Health Comm Dent. 2018;12(1):6–9.
6. Rathi S., Deshpande S., Kale S., et al. Prosthetic considerations in oral and maxillofacial trauma. J Indian Prosthodont Soc. 2020;20(2):201–206.
7. Avinash B., Bhayya D.P., Gupta D., Sharma A. Rehabilitation of a child with Denari prosthesis after anterior tooth loss. J Clin Diagn Res. 2014;8(6):ZD12–ZD13.

8. Avinash B., Gupta D., Bhayya D.P., Rao R.C. Oral rehabilitation in pediatric dentistry: a clinical case. J Dent Child. 2013;80(1):29–32.
9. Zerman N., Cavalleri G. First aid in dental trauma in pediatric age. Eur J Paediatr Dent. 2003;4(1):29–34.
10. Kargul B., Welbury R.R. Dental trauma in children: dislocation, diagnostic features and treatment. Dent Traumatol. 2001;17(6):281–286.
11. Carvalho A.O., Poi W.R., de Castro J.C., Manfrin T.M., de Castro M.A., Panzarini S.R. Oral rehabilitation of a child victim of avulsion of anterior primary teeth with a functional esthetic fixed space maintainer. Dent Traumatol. 2010;26(4):321–325.
12. Banchs F., Trope M. Revascularization of immature permanent teeth with apical periodontitis: new treatment protocol? J Endod. 2004;30(4):196–200.
13. Zaleckiene, V., Peciuliene, V., Brukiene, V., & Drukteinis, S. (2014). Traumatic dental injuries: etiology, prevalence and possible outcomes. *Stomatologija*, *16*(1), 7–14.
14. de Jesus, M. A., Antunes, L. A. A., Risso, P. A., Freire, M. V., & Maia, L. C. (2010). Epidemiologic survey of traumatic dental injuries in children seen at the Federal University of Rio de Janeiro, Brazil. *Brazilian Oral Research, 24*(1), 89–94.
15. Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, DiAngelis AJ, et al. International association of dental traumatology guidelines for the management of traumatic dental injuries: 2. avulsion of permanent teeth. *Dent Traumatol*. 2012; **28**: 88–96.
16. Gong Y, Xue L, Wang N, Chen W. Emergency dental injuries presented at the Beijing Stomatological Hospital in China. *Dent Traumatol*. 2011; **27**: 203–7.
17. Zhang X, Gong Y. Characteristics of avulsed permanent teeth treated at beijing stomatological hospital. *Dent Traumatol*. 2011; **27**: 379–84.
18. Shaikh Z. S., Worrall S. F. Epidemiology of facial trauma in a sample of patients aged 1-18 years. Injury . 2002;33(8):669–671. doi: 10.1016/S0020-1383(01)00201-7.
19. Kalia G., Tandon S., Bhupali N. R., Rathore A., Mathur R., Rathore K. Speech evaluation in children with missing anterior teeth and after prosthetic rehabilitation with fixed functional space maintainer. Journal of the Indian Society of Pedodontics and Preventive Dentistry . 2018;36(4):391–395. doi: 10.4103/JISPPD.JISPPD_221_18.
20. American Academy of Pediatric Dentistry (AAPD), "Guideline on management of the developing dentition and occlusion in pediatric dentistry," Pediatric Dentistry, vol. 38, no. 6, pp. 289–301, 2016.