World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

Check for updates

Replantation of young permanent teeth: Techniques and Management of traumatic pulp exposure

Tiara Nurramadhanty, Delaneira Alvita, Ardianti Maartrina Dewi and Soegeng Wahluyo *

Department of Pediatric Dentistry, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, Indonesia.

World Journal of Advanced Research and Reviews, 2024, 24(02), 639–643

Publication history: Received on 23 September 2024; revised on 02 November 2024; accepted on 04 November 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.24.2.3352

Abstract

Introduction: Dental traumatology is one of the most challenging pediatric treatment aspects. Avulsion of young permanent teeth is a rare and serious traumatic dental injury that needs immediate and complex management. Tooth avulsion is a severe dental trauma defined by complete displacement of the tooth out of its alveolar socket. The primary approach to managing such cases is tooth replantation. The management of replanting the tooth according by the guideline such as the extra oral time which should be very short, the time of pulp removal after replantation, and the appropriate storage medium.

Case History: A 9-year-old male presented with history of fall from the slide he played and injuries sustained to the maxillary region. He was referred to the IGD RSKGM-P Airlangga Surabaya and complained that his upper tooth was loose from its socket around 2 hours of trauma. The tooth was soaked in normal saline.

Discussion: The optimal treatment option following an avulsion injury is to replant the avulsed tooth immediately. The duration of the extraoral period and the storage conditions of the tooth significantly influence the prognosis. The prognosis for avulsion injuries is highly dependent on timely intervention, appropriate treatment planning and techniques, and effective emergency management. Post-replantation, regular monitoring is essential to assess for ankylosis, resorption, mobility, and vitality of the tooth.

Conclusion: Successful replantation of young permanent teeth with traumatic pulp exposure relies on timely intervention, proper technique, and careful postoperative management.

Keywords: Dental trauma; Replantation; Young permanent teeth; Pulp exposure; Quality of life

1. Introduction

Dental traumatology is one of the most challenging aspects of treating the pediatric population. Children and adolescents have a high propensity for dental trauma. Among children and young adults, traumatic dental injuries (TDIs) comprise approximately 5% of all injuries [1]. Avulsion is seen frequently in the age group of 7-11 years. In this age group the relatively resilient alveolar bone provides minimal resistance to extrusive forces, and the maxillary central incisors are the teeth most commonly affected [2].

Avulsion is serious traumatic dental injury that corresponds to complete displacement of the tooth out of the alveolar bone socket. Avulsion of young permanent teeth is relatively rare and varies from 0.5% to 16% in all traumatic dental injuries [3]. Maxillary central incisors are the most commonly involved teeth due to their prominent position in the arch. 71% of dental trauma occurs to the maxillary incisors and males experience trauma twice as often as females do [4].

* Corresponding author: Soegeng Wahluyo

The treatment of choice for avulsion is immediate replantation. Long-term success depends on many factors such as extraoral dry time, storage media type and time, periodontal ligament (PDL) cell vitality, type and time of splinting, and follow-up care [5].

The periodontal ligament (PDL) cells left on the root surface of an avulsed tooth after trauma must be prevented from dehydration to maintain their function and viability [6]. Storage media and extra-oral time are the two most critical factors that affect the condition of the PDL cells [7]. This case report highlights the techniques and management executed in the successful replantation of a young permanent maxillary central incisor avulsed despite an extend extra-oral duration of 120 minutes after extra-oral root canal treatment.

2. Case History

A 9-year-old male patient was referred to the IGD RSKGM-P Airlangga Surabaya with complaint that his upper tooth was loose from its socket after falling from the slide in the playground which he played around 2 hours prior. The tooth was soaked in normal saline before the patient went to the hospital. The patient did not have any medical history of systemic disease, nor did he have any food or medication allergies. The parents want a treatment to make their child have a tooth again.

The patient was examined for extraoral signs of injury, including swelling and symmetry of the face. No other oral injury was clinically detected. The intraoral examination revealed that the maxillary young permanent central incisors (tooth 12,21) were avulsed with lacerations of soft tissue of gingiva (Figure 1A). The avulsed teeth had been kept in normal saline, from the moment of trauma until emergency visit 15 minutes later. The crown of the avulsed teeth were intact, and the roots had closed apexes. There are no mobility on the other teeth. But there is an enamel fracture on avulsed tooth. Holding the crown of each tooth, we performed extraoral root canal treatment prior to replantation. The obturation was done with gutta-percha and sealer, followed by final restoration with composite. We applied a base (ZnPO4) and restored the teeth with composite.

Figure 1 (A) Intraoral examination before replantation; (B) The avulsed teeth 11, 21

For the next step, we prepared for the replantation. We do extraoral asepsis with alcohol and intraoral with povidone iodine 1%. After that, local anasthesia with pehacain (Lidocaine 20 mg and Epinephrine 0.0125 mg/mL) was performed around the socket of 11 and 21. After anasthesia was done, curettage was performed to all of the socket walls carefully. Curettage was carried out vertically along the socket wall to remove blood cloth and debris from the socket. Irrigation with saline water is allowed after the curettage.

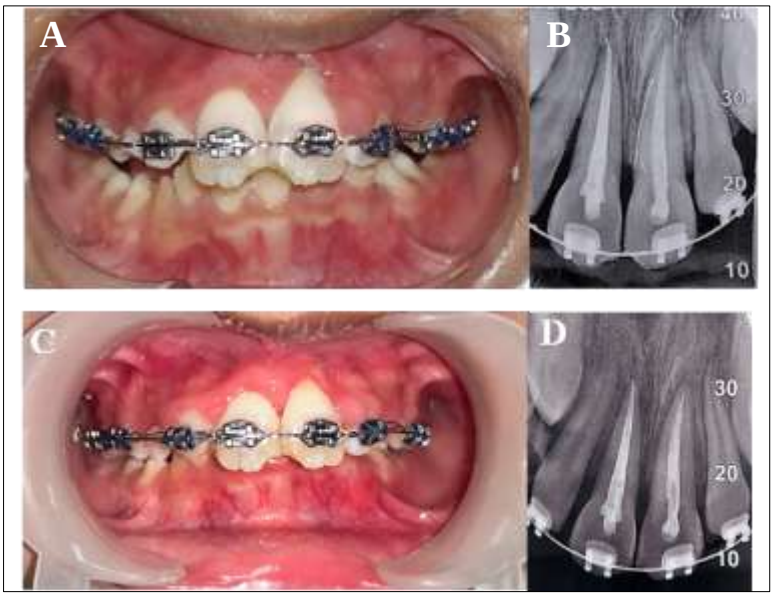

Figure 2 A. Follow up intra oral examination after 1 week; B. Radiographic examination follow up after 1 week; C. Follow up intra oral examination after 1 month; D. Follow up intra oral examination after 1 month

3. Discussion

Dental avulsion mostly affects children and adolescents with a prevalence of 17.5%. It is mostly found among males than females [8]. Several studies have investigated the effect of dry storage that play an important role in the viability of the periodontal ligament cells and may be responsible for the occurrence of inflammatory resorption. It has also been shown that the periodontal ligament cells can survive a drying time of 10 to 15 minutes, but the possibility of their survival beyond this time where the drying time exceeds 60 minutes may be very limited; as a result, the risk of early resorption increases [9].

As in this present case, the avulsed teeth were kept in normal saline for 120 minutes from the moment of trauma until emergency visit and remained intact. A recent study shows that the risk of developing severe inflammatory resorption is related to root canal traeatment. The timing of pulp extirpation after replantation is very important and it must be done promptly to reduce the risk of early complications [10]. Regarding our case, endodontic treatment (biomechanical preparation followed by obturation with Gutta-percha and sealer) used to be performed extraoral before the replantation. This aspect of the treatment of replanted teeth has been the most controversial and has undergone several changes over time. From a previously reported clinical study of replanted teeth, the risk of ankylosis is significantly higher with mature teeth with closed apex than immature teeth. Moreover, it has been shown that internal and external root resorption (inflammatory or replacement) have different incidences after dental avulsion and replantation. However, internal root resorption is the least common [10,11].

The prognosis of an avulsed replanted permanent tooth depends on different criteria as the amount of damage to the root surface, the degree of root development of the avulsed teeth, and the extra-alveolar dry period and storage medium in which the tooth was kept prior to replantation [12]. Many factors can affect the clinical success of a tooth replantation such as endodontic treatment, antibiotic prescription, age of the patient, type of splinting used, and the time of the replantation, as well as the time kept for the storage [11]. There are reports of replanted teeth having favorable prognosis and could last for over 30 years. Some of them remain in function for 5 years or more, but most of them are lost due to root resorption or other complications like ankylosis. However, good management of the infection may lead to a tissue regeneration and give a good environment for its healing [12]. It has been reported that a favorable prognosis of replanted teeth with an arrested external root resorption after a 2 year follow-up has shown that the use of milk as a storage medium maintains the viability of periodontal ligament cells [13].

As for our case, the 2 replanted teeth have not shown any sign of root resorption or ankylosis. The technique of pulp removal before replanting the tooth and the appropriate storage medium after avulsion are directly associated with a good prognosis of a replanted tooth staying on the dental arch for a long time [14]. Orthodontic splints require particular materials, including wires and brackets. These devices use button brackets or fixed orthodontic appliances that are cemented to the teeth and joined by wrapping flexible wire around the buttons. The ability to synchronize the teeth's

movement is the benefit of utilizing a bracket in this situation. The major concern regarding these splints is their ability to exert forces on the teeth that can interfere with healing. A study analyzing splints constructed with orthodontic materials revealed that they always generate some force [15].

Regular clinical and radiographic evaluation of the replanted teeth is advised at 2 weeks, 4 weeks, 3 months, 6 months, and 1 year [17]. However, we continue to follow up on this case by doing regular check-up and radiographic evaluation.

4. Conclusion

The replantation of young permanent teeth following traumatic pulp exposure requires timely and precise management, including handling techniques, root surface cleaning, and correct positioning, to preserve function, aesthetics, and oral health in children.

Compliance with ethical standards

Acknowledgments

The authors thank the reviewers for their insightful suggestions.

Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this document.

Statement of informed consent

Informed consent was obtained from patient included in the study.

References

[1] Levin L, Day PF, Hicks L, et al. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: General introduction. Dent Traumatol 2020; 36:309-313.

[2] Alotaibi S, Haftel A, Wagner ND: Avulsed Tooth. StatPearls Publishing, Treasure Island (FL); 2023

[3] El Kharroubi S, Drouri S, Doumari B, Dhoum S, El Merini H: Management of 3 avulsed permanent teeth: case report of a 3-year follow-up. Case Rep Dent. 2022, 2022:2081684. 10.1155/2022/2081684

[4] Singh M, Singh N, Dhiman RK, Kumar D: External replacement resorption in an avulsed reimplanted permanent incisors. J Int Clin Dent Res Organ. 2013, 5:27-30.

[5] Adnan S, Lone MM, Khan FR, Hussain SM, Nagi SE. Which is the most recommended medium for storage and transport of avulsed teeth? A systematic review. Dental Traumatol. 2018;34:59-70.

[6] Parthasarathy R, Srinivasan S, C V, Thanikachalam Y, Ramachandran A: An interdisciplinary management of avulsed maxillary incisors: a case report. Cureus. 2022, 14:e23891. 10.7759/cureus.23891

[7] M. Mazur, R. Marasca, L. Ottolenghi , et al., "Different resorptive patterns of two avulsed and replanted upper central incisors based on scanning electron microscopy and stereomicroscopic analysis: a case report," Applied Sciences, vol. 10, no. 10, p. 3551, 2020.

[8] M. Trope, "Clinical management of the avulsed tooth: present strategies and future directions," Dental Traumatology, vol. 18, no. 1, pp. 1–11, 2002.

[9] B. Petrovic, D. Markovi'c, T. Peric, and D. Blagojevic, "Factors related to treatment and outcomes of avulsed teeth," Dental Traumatology, vol. 26, no. 1, pp. 52–59, 2010.

[10] A. M. Mavridou, E. Hauben, M. Wevers, E. Schepers, L. Bergmans, and P. Lambrechts, "Understanding external cervical resorption patterns in endodontically treated teeth," International Endodontic Journal, vol. 50, no. 12, pp. 1116 1133, 2017.

[11] D. D. Müller, R. Bissinger, M. Reymus, K. Bücher, R. Hickel, and J. Kühnisch, "Survival and complication analyses of avulsed and replanted permanent teeth," Scientific Reports, vol. 10, no. 1, p. 2841, 2020.

[12] K. S. Nene and V. Bendgude, “Prognosis of replanted avulsed permanent incisors: a systematic review,” International Journal of Pedodontic Rehabilitation, vol. 3, no. 2, p. 87, 2018.

[13] A. Al-Kahtani, “Avulsed immature permanent central incisors obturated with mineral trioxide aggregate: a case report,” Journal of International Oral Health: JIOH, vol. 5, no. 3, pp. 88–96, 2013.

[14] N. Brier De, D. A. Zideman, and E. De Buck, “Storage of an avulsed tooth prior to replantation: a systematic review and meta-analysis,” Dental Traumatology, vol. 36, no. 5, pp. 453 476, 2020.

[15] Hanna Sobczak-Zagalska, Katarzyna Emerich.Best splinting methods in case of dental injury–a literature review. Journal of Clinical Pediatric Dentistry, 44.2: 71-78. 2020.

[16] Hanna Sobczak-Zagalska, Katarzyna Emerich. Best Splinting Methods in Case of Dental Injury–A Literature Review. The Journal of Clinical Pediatric Dentistry. 2020; 44 (2). doi 10.17796/1053-4625-44.2.1

[17] Wahluyo, Soegeng. Endodontik Regeneratif Pada Gigi Imatur Anak. Surabaya: Revka Prima Media; 2021