

Late Replantation of Avulsed Permanent Incisor: A Case Report

Keila Lais Carrera da Hora^{2,*}, Lorena Vieira Santos¹, Matheus Vieira Rodrigues¹, Erica dos Santos Carvalho³ and Alessandra Castro Alves³

¹Bachelor of Dentistry, School of Dentistry, Federal University of Bahia. Salvador, Bahia, Brazil

²Department of Clinical Dentistry, School of Dentistry, Federal University of Bahia, Salvador, Bahia, Brazil

³Department of Social and Pediatric Dentistry, School of Dentistry, Federal University of Bahia, Salvador, Bahia, Brazil

***Corresponding Author:** Keila Lais Carrera da Hora, Department of Clinical Dentistry, School of Dentistry, Federal University of Bahia, Salvador, Bahia, Brazil, Tel.: +5511949837577, E-mail: keila.carrera@hotmail.com

Citation: Keila Lais Carrera da Hora, Lorena Vieira Santos, Matheus Vieira Rodrigues, Erica dos Santos Carvalho, Alessandra Castro Alves (2024) Late Replantation of Avulsed Permanent Incisor: A Case Report, J Dent Oral Care Med 11(3): 301

Received Date: August 04, 2024 **Accepted Date:** September 04, 2024 **Published Date:** September 08, 2024

Abstract

This paper reports a case of a 10-year-old patient who had their upper right central incisor avulsed due to trauma while engaging in a sporting activity. After 72 hours, the patient sought medical attention, revealing the absence of the tooth in the socket, pain, and swelling. The chosen treatment was delayed dental replantation with stabilization in the socket using a flexible splint. Following maintenance, endodontic treatment was performed, with intracanal medication change after 15 days, followed by clinical and radiographic follow-up. The conducted treatment allowed the tooth to remain in the oral cavity for 60 months without infections, albeit in the presence of progressive resorptive processes. This case report suggests that delayed replantation of a permanent incisor after avulsion can be a beneficial treatment option for pediatric patients, preserving stomatognathic functions and the patient's quality of life until the possibility of definitive rehabilitation.

Keywords: Dental avulsion; Dental trauma; Dental replantation; Pediatric Dentistry

Introduction

Avulsion accounts for 8.5% of dental trauma causing severe damage to teeth and supporting tissues [1]. Initial care is often provided by guardians, who may lack sufficient information, leading to delays in treatment [2]. When a tooth is avulsed, damage occurs to the periodontal ligament (PDL) fibers and the cementum layer, which can result in severe root resorption and ultimately tooth loss. The remaining PDL cells on the root surface, when hydrated, can maintain viability, allowing for healing after replantation without causing significant inflammation. Thus, the shorter the extra-alveolar period, the less desiccation of the PDL fibers. Immediate replantation and proper storage in suitable media for the survival of these cells are crucial factors for improving prognosis [3]. Late replantation is an option in cases where, due to misinformation or other circumstances, immediate replantation is not feasible. It is an alternative that may offer advantages, especially in young patients [4]. This article reports a case of late replantation following the avulsion of the upper right central incisor, with a follow-up period of over five years, aiming to highlight the importance of this approach, particularly in young patients. The contribution of cases like this to the literature fills gaps regarding this approach, which is often overlooked due to an unfavorable prognosis.

Case Description

A 10-year-old male patient attended a public hospital with his mother for emergency care after experiencing a fall during a sports activity on a cement court, resulting in the avulsion of the upper right central incisor. After 72 hours from the trauma, the patient and his mother visited a dental trauma center due to complaints of tooth loss, pain, and swelling. They reported seeking assistance at two public hospitals previously and the medical team did not perform the tooth replantation due to the inadequate storage conditions. The mother brought the avulsed tooth with her, dry and stored it in a paper napkin. She was informed about the possibility of replantation, endodontic treatment with long-term follow-up, and the potential for future tooth loss. The treatment was authorized and consent/assent forms were signed.

In the clinical evaluation, an edematous gingival and tenderness to palpation were observed (Figure 1). Extraoral asepsis and topical infiltrative anesthesia were performed. The socket was curetted to remove the clot, with continuous irrigation using a sterile saline solution. The tooth was prepared through radicular scraping and rinsed with saline solution for reinserting into the socket using the two-digit pressure (Figure 2). A flexible and passive splint with nylon for tooth stabilization was applied for two weeks. Broad-spectrum antibiotics and anti-inflammatory medication were prescribed. Oral care recommendations included avoiding sports activities, brushing teeth with a soft-bristle toothbrush, rinsing with 0.12% chlorhexidine twice a day (for one week), implementing a soft diet, and gradually returning to regular chewing function.



Figure 1: Initial clinical aspect of avulsion in occlusal view



Figure 2: Tooth 11 replanted in the socket

The endodontic treatment was realized to remove the necrotic pulp followed by instrumentation with 2.5% sodium hypochlorite one week after splinting (Figure 3), the intracanal medication was inserted and periodically replaced approximately every three months. At twelve months of follow-up, the attached gingiva exhibited an intact appearance without periodontal pockets or fistula and no painful symptoms. However, a small apical resorption and signs of ankylosis were observed in the radiograph (Figure 4). Progression in the manifestation of surface and replacement resorptions was observed at 24 months, characterized by an increased apical and lateral radiolucent area, loss of hard tissue, and infraocclusion of the tooth (Figures 5 and 6).



Figure 3: Periapical radiograph one week after replantation, performed before endodontic treatment of tooth 11



Figure 4: Small external root resorption visible in the apical region of tooth 11 and signs of ankylosis



Figure 5: 24 months after replantation. Note the progression of external root resorption in tooth 11



Figure 6: Frontal view. Infraocclusion of the tooth and slight movement of the adjacent teeth are observed during the 24--month follow-up after replantation

There was an exacerbation of root resorption advancing into the middle third after 46 months of follow-up (Figure 7). At five years post-trauma, a panoramic radiograph was taken for patient assessment. The replanted tooth exhibited Grade III mobility. Considering these observed factors the patient was referred for orthodontics evaluation and treatment. A hyperdivergent Class II skeletal relationship, maxillary atresia, and dental biprotrusion were identified. Considering the impending tooth loss and malocclusion a treatment plan was devised to close the space coupled with the recontouring of other teeth. A stock tooth was utilized anchored in a conventional fixed appliance during the post-maxillary disjunction retention phase (Figure 8).



Figure 7: Radiograph at 46 months of follow-up. Worsening of root resorption in the middle third is noted

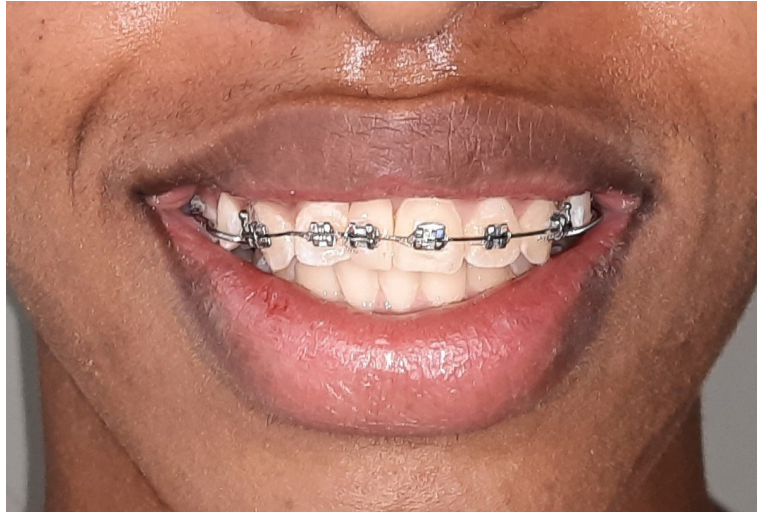


Figure 8: Patient undergoing orthodontic treatment after tooth loss

Discussion

It is noteworthy that increased overjet and the absence of lip sealing, associated with labial positioning of the upper incisors, make the anterior region vulnerable to traumatic dental injuries (TDIs) [5]. Despite this, sports activities may contribute more to the risk of TDIs than the degree of overjet [6] and, even though it is not the primary etiology, it is linked to a higher risk of TDIs [7]. It has been identified that athletes using protective equipment have a significant reduction between 82% and 93% in the incidence of traumatic dental injuries[8]. However, the patient was not using the equipment, which could have provided protection.

Current guidelines from the International Association of Dental Traumatology recommend the prompt reimplantation of a permanent tooth, ideally at the site of the accident [3]. Time is a crucial factor determining the success of reimplantation [9]. For belatedly performed treatment to have a higher chance of success, the tooth should be stored in suitable solutions and dental intervention should occur as swiftly as possible [10]. In the reported case, reimplantation was carried out 72 hours after the trauma, and the tooth was stored in a dry environment, rendering the periodontal ligament (PDL) cells nonviable [11,12], worsening the prognosis. The limited awareness regarding appropriate protocols for tooth avulsion leads to improper handling [2,13].

For maintaining the tooth in the socket, passive and flexible retention, along with adopting oral care practices, favors the prognosis⁶. Flexible splinting of the traumatized tooth to adjacent teeth for two weeks is recommended [3]. The chosen therapeutic approach, in this case, was retention with nylon wire for 14 days, as a longer duration is not correlated with the success of periodontal healing and would impede local hygiene [13,14]. Therefore, the hygiene instructions provided were crucial to prevent biofilm accumulation, infections, and secondary traumas during the retention period, contributing to the patient's recovery after replantation.

After stabilization in the socket, endodontic treatment of the avulsed tooth should be performed within two weeks after late replantation in teeth with a closed apex [3]. Calcium Hydroxide was the intracanal medication used one week after replantation, as it is a biocompatible substance with ideal properties for controlling endodontic infections, reducing inflammatory processes, inducing mineralization, and absorbing plasma exudation. It also has the ability to neutralize endotoxins and reduce metalloproteinases and pro-inflammatory cytokines [15].

Considering the severity of the trauma and the late replantation, the occurrence of ankylosis and external root resorption is expected during follow-up. After dental replantations, the incidence of ankylosis and inflammatory resorption was 51% and

23.2%, respectively, in the literature [16]. As a result of ankylosis, a clinically observable infraocclusion of the replanted tooth can occur with the migration of adjacent teeth, as happened in the reported case after 24 months.

At 60 months of follow-up, the resorptive processes persisted, necessitating a referral for orthodontic planning. Children and adolescents do not yet have complete bone and skeletal development, making implant in the anterior region unfeasible. Rehabilitation with a mini-implant is possible [17], but it is a costly and temporary option. Dental replantation brings aesthetic, occlusal, and psychological benefits while maintaining the thickness of the maxillary palatal bone [18]. Orthodontic treatment with a space maintainer for a future implant is also a viable option. Space maintainers are good aesthetic and functional choices for children and should be replaced as per the patient's needs. Space closure with reshaping after the loss of an upper central incisor is a treatment that provides good adaptation and desirable aesthetics, suitable for adolescents [19].

The survival time of the replanted tooth in this case aligns with other studies [20]. The survival rate of permanently replanted teeth was 50% after 5 years, considering factors such as root development, patient age, tooth storage medium, and extra-alveolar time (whether greater or less than one hour) as significant prognostic factors for the survival rate of permanently replanted teeth after avulsion [20]. Replantation remains the preferred approach even though there is a risk of dental resorptions.

The longer the replanted tooth remains in the socket, the greater the preservation of alveolar bone, maintaining its shape and thickness. This process benefits aesthetics and offers the advantage of delaying implant [19].

Conclusions

In this report, the importance of knowledge about avulsion management and the promotion of care is emphasized. The approach of late replantation is particularly crucial in children and adolescents, where, even in the face of an expected unfavorable prognosis, there is potential to improve the patient's quality of life by enhancing self-esteem and social well-being through this intervention. Additionally, it allows for the preservation of alveolar bone until definitive rehabilitative treatment becomes accessible.

References

1. Ferreira MC, Batista AM, Marques LS, Ferreira F de O, Medeiros-Filho JB et al. (2015) Retrospective evaluation of tooth injuries and associated factors at a hospital emergency ward. *BMC Oral Health*, 15: 137.
2. Cosme-Silva L, Fernandes LA, Rosselli ER, Poi WR, Martins N da S, de Lima DC (2018) Tooth injuries: Knowledge of parents of public school students from the city of Alfenas, Minas Gerais, Brazil. *Dent Traumatol*, 34: 93-9.
3. Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, et al (2020). International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol*, 36: 331-42.
4. Demir P, Guler C, Kizilci E, Keskin G (2020) Survival of avulsed permanent incisors in children following delayed replantation. *Niger J Clin Pract*, 23: 631-7.
5. Petti S (2015) Over two hundred million injuries to anterior teeth attributable to large overjet: a meta-analysis. *Dent Traumatol*, 31: 1-8.
6. Munro M, Ackerman MB (2019) The Degree of Overjet and Anterior Traumatic Dental Injury in the Mixed Dentition: A Single-Center Experience. *J Clin Pediatr Dent*, 43: 360-3.
7. Mesquita GC, Soares PBF, Moura CCG, Roscoe MG, Paiva SM, Soares CJ (2017) A 12-Year Retrospective Study of Avulsion Cases in a Public Brazilian Dental Trauma Service. *Braz Dent J*, 28:749-56.
8. Fernandes LM, Neto JCL, Lima TFR, Magno MB, Santiago BM, Cavalcanti YW, et al. (2019). The use of mouthguards and prevalence of dento-alveolar trauma among athletes: A systematic review and meta-analysis. *Dent Traumatol*, 35: 54-72.
9. Wang G, Wang C, Qin M (2019) A retrospective study of survival of 196 replanted permanent teeth in children. *Dent Traumatol*, 35: 251-8.
10. De Brier N, O D, Borra V, Singletary EM, Zideman DA, De Buck E, et al (2020) Storage of an avulsed tooth prior to replantation: A systematic review and meta-analysis. *Dent Traumatol*, 36: 453-76.
11. Andreasen JO (1981) Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. *Int J Oral Surg*, 10:43-53.
12. Barbizam JVB, Massarwa R, da Silva LAB, da Silva RAB, Nelson-Filho P, Consolaro A, et al (2015). Histopathological evaluation of the effects of variable extraoral dry times and enamel matrix proteins (enamel matrix derivatives) application on replanted dogs' teeth. *Dent Traumatol*, 31: 29-34.
13. Teles GL, Ribeiro EP, Cerqueira JDM, Alves AC, Carvalho E dos S (2021) Population Knowledge and Attitude Toward Emergency Management of Avulsed Permanent Teeth. *Pesqui Bras Odontopediatria Clín Integr*, 21: e0223.
14. Ben Hassan MW, Andersson L, Lucas PW (2016) Stiffness characteristics of splints for fixation of traumatized teeth. *Dent Traumatol*, 32: 140-5.
15. Barbosa-Ribeiro M, Arruda-Vasconcelos R, de-Jesus-Soares A, Zaia AA, Ferraz CCR, de Almeida JFA, et al (2019) Effectiveness of calcium hydroxide-based intracanal medication on infectious/inflammatory contents in teeth with post-treatment api-

cal periodontitis. *Clin Oral Investig*, 23: 2759-66.

16. Souza BDM, Dutra KL, Kuntze MM, et al (2018) Incidence of Root Resorption after the Replantation of Avulsed Teeth: A Meta-analysis. *J Endod*, 44: 1216-27.

17. Lopes JP de L, França E de C, Pretti H, Menezes LFS de, Drummond AF (2018) Mini-implante como estratégia de tratamento para reabilitação protética temporária relato de caso. *Ortho Sci, Orthod sci pract*, 10: 77-87.

18. Tsukiboshi M, Tsukiboshi T (2014) Bone morphology after delayed tooth replantation - case series. *Dent Traumatol*, 30: 477-83.

19. Schneider UEM, Moser L (2021) Orthodontic space closure in a young female patient with solitary median maxillary central incisor syndrome. *Am J Orthod Dentofacial Orthop*, 160: 132-46.

20. Roskamp L, Trevilatto PC, Souza CM, Ignácio SA, de Lima GD, Pereira TM, et al. (2021) The role of polymorphism of the IL6 gene in tooth replantation. *Aust Endod J*, 47: 314-9.

Submit your next manuscript to Annex Publishers and benefit from:

- ▶ Easy online submission process
- ▶ Rapid peer review process
- ▶ Online article availability soon after acceptance for Publication
- ▶ Open access: articles available free online
- ▶ More accessibility of the articles to the readers/researchers within the field
- ▶ Better discount on subsequent article submission

Submit your manuscript at

<http://www.annexpublishers.com/paper-submission.php>