History of Medicine, 2022, 8(1): 91-98

DOI: 10.17720/2409-5834.v8.1.2022.012

Reviving a smile against the clock: Savingan avulsed incisor after hours

Arun Sharma, Rashi Gupta, Prashant Gupta, Charanjeet Singh, Karuna Sharma

Rama Dental College Hospital & Research Centre, Rama University, Mandhana, Kanpur, Uttar Pradesh- India 209217

Abstract

Avulsion represents a particularly severe and infrequent form of dental trauma that demands prompt and comprehensive treatment. This case study focuses on the effective handling of a dislodged upper front tooth, which was replanted next day outside the oral cavity and kept in milk. A 11-year-old male encountered a traumatic injury to his front upper teeth due to a mishap while cycling. The clinical evaluation noted that tooth number 11 had been avulsed and was subsequently reinserted following the protocols set forth by the International Association of Dental Traumatology (IADT), and secured with a splint. Root canal therapy commenced one week following the replantation. The endodontic treatment was concluded two weeks after the tooth was reinserted, at which point the splint was also removed. The patient was monitored over the course of one month, three months, six months, and one year, demonstrating no clinical complications or signs of resorption in the radiographic assessments.

Keywords: Avulsion, follow up, reimplantation

Introduction

In the realm of dental injuries, avulsion of a tooth stands out as a significant and acute event, where a tooth is forcibly dislodged from its socket due to trauma, severing the periodontal Ligament and cutting off its blood supply. The management of such injuries is a delicate process that demands prompt and precise intervention. This case report delves into the intricate details of a tooth avulsion, evaluating the efficacy of immediate replantation paired with contemporary anti-resorption therapy.

Dentoalveolar trauma arises from an abrupt impact to the teeth and related structures, which can result in a range of injuries, including the complete detachment of a tooth from its socket. These traumatic dental injuries are predominantly seen in children aged between 7 and 11 years, often due to accidental falls, sports, traffic accidents, and violence[1]. Among these, avulsion, which signifies the total removal of a tooth from its bony socket, is a severe form of dental trauma but occurs relatively infrequently, accounting for 0.5% to 16% of all dental trauma cases. The most frequently affected teeth are the upper central incisors due to their forward placement in the dental arch[2,3].

Replantation stands as the foremost treatment strategy for avulsed teeth. Nevertheless, under certain conditions such as high decay, gum disease, serious heart or immune conditions, or

patient anxiety, replantation may not be advised. Despite a number of replanted teeth displaying a reduced rate of long-term retention, the finality of not replanting dictates that efforts should be made to preserve the tooth when possible[4]. Studies, especially in children, have shown a high survival rate (nearly 79.3%) for replanted teeth when International Association of Dental Traumatology (IADT) guidelines are followed[5]. Factors influencing the success of replantation include the patient's overall health, the developmental stage of the root apex, the storage medium used, and the duration the tooth remains outside of the mouth.

To enhance the chance of a successful replantation, it is crucial to prevent the periodontal ligament cells on the avulsed tooth from drying out to preserve their viability[6]. The choice of storage medium and the length of time the tooth spends outside the oral environment are paramount. Milk and other solutions such as Hank's balanced salt solution, Viaspan, Propolis, saliva, or saline may be used to store the avulsed tooth temporarily. Milk is often preferred for its availability and for being physiologically compatible, thus widely recommended[5]. Prolonged drying time beyond an hour significantly harms the periodontal ligament cells and can lead to complications such as root resorption.

This report case report demonstrates the meticulous management and successful replantation of an avulsed maxillary central incisor that was outside the mouth for a day. It illuminates the critical aspects of emergency response, the biological principles underlying successful tooth preservation, and the long-term outcomes of replantation procedures, providing valuable insights into the challenges and solutions in the quest to save and restore avulsed teeth.

Case Presentation

The description pertains to a 11-year-old male who experienced a fall, impacting the anterior maxillary region. There were no significant medical history concerns, and he was conscious and responsive during examination. An external examination showed slight abrasions and swelling of the upper lip and lacerations on the chin which were sutured. Internally, the right maxillary central incisor (tooth 11) was missing(Figure:1), and the nearby gingiva was lacerated. The examination of the anterior maxillary segment excluded the possibility of a dento-alveolar fracture. Radiovisiography indicated that the socket of tooth 11 was empty but the surrounding bone structure, including the lamina dura, was intact, with no additional injuries or fractures to adjacent teeth and bone. The diagnosis was an Ellis class V fracture involving 11

Figure:1

Figure:2

The patient saved the dislodged tooth by storing it in milk (figure:2) and arrived at the Department of Pediatric & Preventive Dentistry next day of the traumatic event.The patient was educated on the potential complications of replanting the avulsed tooth, such as inflammatory resorption, replacement resorption or ankylosis, and tooth discoloration, given that the tooth was out of the mouth. With informed consent obtained, it was agreed to reinsert and replant the tooth. The avulsed tooth was intact, featuring a complete crown and a fully developed root with a closed apex(Figure:3). After removing the teeth from the milk, it was carefully held by the crown to avoid contact with the root surface, which was then gently rinsed with saline to clear any attached debris.

Figure 3

Local anesthesia was provided through labial and palatal infiltration using 2% lignocaine without vasoconstrictor in the affected area. The alveolar socket was then carefully rinsed with normal saline. The tooth was repositioned in its socket using gentle pressure(Figure:4), and its placement was confirmed with radiovisiography. The occlusion of the replanted toothwas satisfactory, eliminating the need for occlusal adjustment

Figure 4

The tooth was then stabilized using a splint made of 0.4 mm stainless steel orthodontic wire,

which was secured with a light-cure flowable composite resin(Figure:5 & Figure:6) .The labial surfaces of the maxillary anterior teeth were spot etched at the middle third level of the crown with 37% phosphoric acid for 20 seconds, followed by rinsing and air drying. A bonding agent was applied and light-cured for 20 seconds. Packable composite was added at the spots, and the orthodontic wire was secured in place, with light curing for each tooth for 20 seconds.

Figure 5 Figure 6

For post-operative care, oral analgesics and antibiotics (amoxicillin 500 mg + clavulanic acid 125 mg twice daily and metronidazole 400 mg three times daily) were prescribed for five days. The patient was also advised to get an anti-tetanus booster dose. Dietary recommendations included a soft diet for two weeks and oral hygiene maintenance using a soft-bristled toothbrush and 0.12% chlorhexidine mouth.

One week later, the patient returned for conventional root canal therapy on the replanted tooth. In the first seating access opening and biomechanical preparation(BMP) was done followed by placement of calcium hydroxide (intracanal medicament) which was sealed with a temporary filling.(Figure:7)

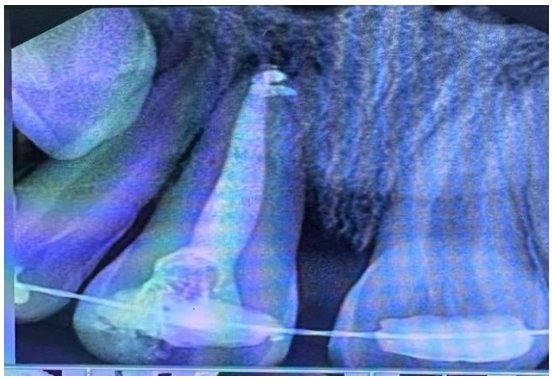


Figure 7

Two weeks after the replantation, the intracanal medicament was removed, and the root canal space of the replanted tooth was filled using gutta-percha with the help of lateral condensation.(Figure:8) After a week splinting was removed.(Figure:9)

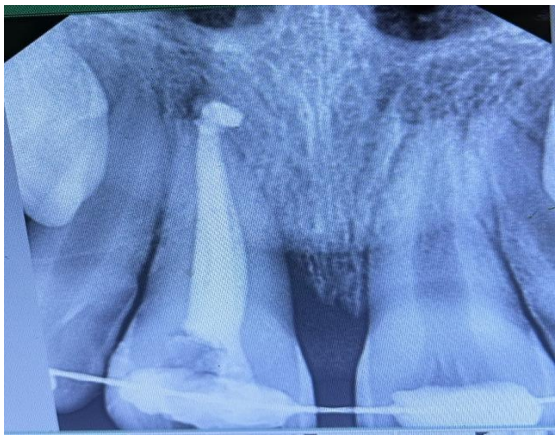
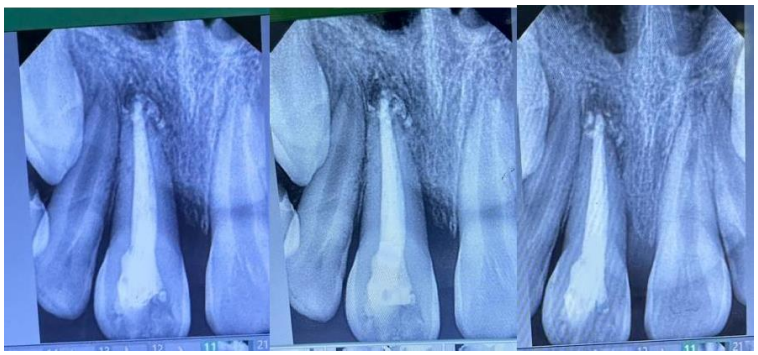


Figure 8

Figure 9



A B C

Figure 10: Clinical and radiographic images (A)Radiograph at three months follow-up. (B)Radiograph at six months follow-up. (C) Radiograph at 12 months follow-up.

At the one-month follow-up, clinical assessments showed the replanted tooth had regained normal physiologic mobility and had normal probing sulcular depths. Radiographic evaluations displayed a normal periapex without periapical radiolucency, intact lamina dura, and a uniform periodontal ligament (PDL) space around tooth 11, with no signs of resorption. These outcomes remained consistent during subsequent follow-ups at three, six, and twelve months.

Discussion

The replantation of an avulsed tooth represents a critical intervention that can significantly influence long-term outcomes both functionally and aesthetically. This case report underscores the complexity of managing avulsed teeth, particularly when factors such as extra-oral time and the choice of storage medium play pivotal roles in the survival of periodontal ligament (PDL) cells. The decision to replant the tooth, despite a two-hour delay post-avulsion, was based on best practices and existing literature that highlight the protective effects of suitable storage media—like milk—on PDL cell viability[7]. Milk's balanced pH and presence of essential nutrients and growth factors, including epithelial growth factor, help sustain the vitality of avulsed teeth during unforeseen delays before dental intervention.

The use of 1.23% acidulated phosphate fluoride (APF) gel for treating the root surface before replantation was a strategic choice aimed at inhibiting resorptive processes, which are a common complication in delayed replantations[8]. This approach aligns with research indicating that fluoride treatment can mitigate the resorption of roots by altering the biochemical environment at the dentin-PDL interface.

The use of 1.23% acidulated phosphate fluoride (APF) gel for treating the root surface before replantation was a strategic choice aimed at inhibiting resorptive processes, which are a common complication in delayed replantations[8]. This approach aligns with research indicating

that fluoride treatment can mitigate the resorption of roots by altering the biochemical environment at the dentin-PDL interface.

Splinting, as per the International Association of Dental Traumatology (IADT) guidelines, was another crucial aspect of treatment, ensuring the stability of the tooth to facilitate the healing of the PDL[9]. The duration of splinting was kept to two weeks, optimal for restoring a significant percentage of the PDL's mechanical properties post-injury, although the guidelines allow for flexibility based on the degree of initial trauma.

Furthermore, initiating root canal therapy within a week post-replantation and the use of calcium hydroxide as an intracanal medicament leveraged its antimicrobial properties and its ability to facilitate the repair and regeneration of periapical tissues[10]. This proactive endodontic treatment helps prevent the spread of necrosis and the exacerbation of resorptive processes, thereby enhancing the prognosis

Conclusion

Replantation remains the gold standard in managing avulsed teeth, primarily when executed within a framework that considers timely intervention, appropriate biological handling of the avulsed tooth, and adherence to established dental trauma guidelines. In this case, despite the extended extra-oral duration, the comprehensive management involving immediate storage in milk, APF treatment, proper splinting, and timely endodontic therapy contributed to a favorable outcome. The success observed here reaffirms the importance of patient education on emergency responses to avulsion and highlights the need for regular follow-up to monitor for any long-term complications.

This case also illustrates the critical balance between immediate emergency care and ongoing post-replantation management, emphasizing that even with delays in replantation, a structured treatment protocol can lead to successful outcomes, maintaining the tooth's function and aesthetics, and preserving alveolar bone integrity for potential future prosthetic needs.

References

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

2. 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, 2022:1-6.

3. 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.

4. Fouad AF, Abbott PV, Tsilingaridis G, et al.: International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. Dent Traumatol. 2020, 36:331-42.

6. Savas S, Kucukyilmaz E, Akcay M, Koseoglu S: Delayed replantation of avulsed teeth: two case reports. Case Rep Dent. 2015, 2015:1-5.

7. Poi WR, Sonoda CK, Martins CM, Melo ME, Pellizzer EP, de Mendonça MR, Panzarini SR: Storage media for avulsed teeth: a literature review. Braz Dent J. 2013, 24:437-45.

8. Petrovic B, Marković D, Peric T, Blagojevic D: Factors related to treatment and outcomes of avulsed teeth .Dent Traumatol. 2010, 26:52-9.

9. Panzarini SR, Gulinelli JL, Poi WR, Sonoda CK, Pedrini D, Brandini DA: Treatment of root surface in delayed tooth replantation: a review of literature. Dent Traumatol. 2008, 24:277-82.

10. Trope M, Yesilsoy C, Koren L, Moshonov J, Friedman S: Effect of different treatment protocols on periodontal repair and root resorption of replanted dog teeth. J Endodon. 1992, 18:492-6.