Case Report
Journal of Pierre Fauchard Academy (India Section), *Vol 36(3), DOI: 10.18311/jpfa/2022/29594, September 2022 p. 98-103*
ISSN (Print) : 0970-2199
ISSN (Online) : 2405-772X

Reimplantation of Tooth after Avulsion - A Case Report

Madhukar Yadav[1*], Sonal Gupta[2] and Shilpi Dutta[3]

[1]Postgraduate, Department of Pediatric and Preventive Dentistry, K.D. Dental College and Hospital, Mathura – 281001, Uttar Pradesh, India; dr.madhukar19888@gmail.com
[2]Head of the Department, Department of Pediatric and Preventive Dentistry, K.D. Dental College and Hospital, Mathura – 281001, Uttar Pradesh, India
[3]Postgraduate, Department of Pediatric and Preventive Dentistry, K.D. Dental College and Hospital, Mathura – 281001, Uttar Pradesh, India

Abstract

An avulsion is the most common of all dental injuries in a pediatric patient. Its prognosis depends on time management and a proper treatment plan. The most favoured treatment of choice after avulsion is reimplantation, but cannot always be carried out immediately. A case of reimplantation of maxillary central incisors which got accidentally avulsed in a 14-year-old boy is reported. The teeth were reimplanted back into the alveolar socket and splinting with 23 gauge stainless steel wire and composite was performed. Follow-up at 7 and 15 months of the interval was done. After 15 months of follow-up, no symptoms of pain or mobility of the teeth were seen. The reimplanted teeth were firm and there was no sign of infection, inflammation or resorption radiographically.

Keywords: Avulsion, Reimplantation, Root Resorption

1. Introduction

Injuries related to dental structures occur frequently and the most common among them is avulsion which ranges from 1-16% of all injuries related to dental structures. An avulsion is referred to as a traumatic injury that results in tooth loss from the alveolar socket. It is the most frequently occurring and serious of all dental injuries, with a range of 0.5-16% occurrence in permanent teeth[1].

Mostly, avulsion is noticed in young children between the age group 7 to 9 years old because at this time resiliency is seen in both the periodontium and bone and also roots are not completely developed. Maxillary central incisors are the ones that are most commonly affected. Avulsion not only leads to functional loss, but it can affect the psychological of the child and can cause social discomfort which may eventually lead to insecurity, self-consciousness, embarrassment while smiling, and may develop awkwardness in relating with others[2].

Management of the avulsed tooth is often challenging. It relies on the management taken immediately at the spot of an accident or the time right away after the avulsion. The best choice of treatment is reimplantation in case of the avulsion, but for avulsed primary teeth, reimplantation is not performed as it can injure the permanent tooth germ underlying[1]. Immediate reimplantation into the socket is the absolute management for a permanent tooth that has avulsed, which can reestablish esthetics and function[2].

Many factors influence the success rate of reimplantation out of which, is the extraoral storage duration is important for functional healing. Reimplantation done within 5 minutes gives the best result. Even reimplantation performed in less than half an hour after the injury or before reimplantation if the avulsed tooth is kept in any suitable storage media has produced a good prognosis[2]. If the extra-oral storage time of the avulsed tooth before reimplantation is prolonged, complete necrosis of the periodontal ligament takes place.

**Author for correspondence*

In such a situation, both, the surface of the root of the tooth that is reimplanted and the periodontal ligament are resorbed and will be replaced by the alveolar bone[3]. This will lead to ankylosis and in young patients ankylosis eventually leads to infra occlusion. However, if handled properly, reimplantation of avulsed teeth can remain useful for years[3].

This case report presents the treatment of avulsed maxillary permanent incisors in a child that had been kept extra-orally for more than 60 minutes.

2. Case Report

A boy of 14-year-old, visited the Pediatric and Preventive dentistry department of Dental College and Hospital, Mathura, Uttar Pradesh, for emergency treatment. He had met with an accident and fallen from the bike about 1 hour 15 minutes back before he was brought to the department and both of his maxillary central incisors i.e., teeth 11 and 21 had been avulsed (Figure 1(A)). The avulsed teeth were left dry for about 1 hour and 15 minutes and the transport media for the avulsed tooth was cotton. On examination, an extraoral lip laceration was seen. The intraoral examination revealed permanent dentition and molar relationship was Class I. Poor oral hygiene and stains were present on the tooth surfaces but no caries was detected clinically. Teeth 11 and 21 were avulsed, and the presence of a blood clot in the alveolar socket was found. A maxillary intraoral radiograph was obtained w.r.t 11 and 21(Figure 1(B)), which revealed no hard-tissue injury other than avulsion was noticed in that area. Both the avulsed teeth examination revealed that the crowns were undamaged and the roots had close apices.

Treatment preferences were explained clearly to the parents, and reimplantation of the avulsed incisors was decided as an intermediate treatment choice. The avulsed teeth were kept in doxycycline, after which it was kept in a saline paste for 5 minutes, followed by APF gel till reimplantation into the socket (Figure 2(A) and 2(B)). Extraoral and intraoral photographs were taken. A local anaesthetic was administered and both the sockets were rinsed with saline gently. Reimplantation of the avulsed teeth 11, 21 was performed into the tooth socket using pressure from the fingers gently. After the teeth were seated into the socket properly, it was checked for occlusion and alignment, followed by semi-rigid splinting w.r.t 11, 21 with 23 no. gauge stainless steel wire and Dentsply composite to the adjacent teeth (Figure 3(A)). Another maxillary intraoral radiograph was taken to check for proper placement of the incisors that were replanted (Figure 3(B)) and splinting was done which was left for 2 weeks in its place. Systemic antibiotics and an analgesics course for 7 days were prescribed and the patient was advised to get a tetanus toxoid injection. The patient was given postoperative instructions and was recalled after 2 weeks.

Even after 14 days, the teeth were not firm in the socket completely, so the decision was made to continue the splint for 7 more days. After 3 weeks, the splint was removed followed by root canal treatment and composite buildup w.r.t 11 and 21 (Figure 4(A), Figure 4(B)). Follow-ups for 7 months (Figure 5(A) and 15 months (Figure

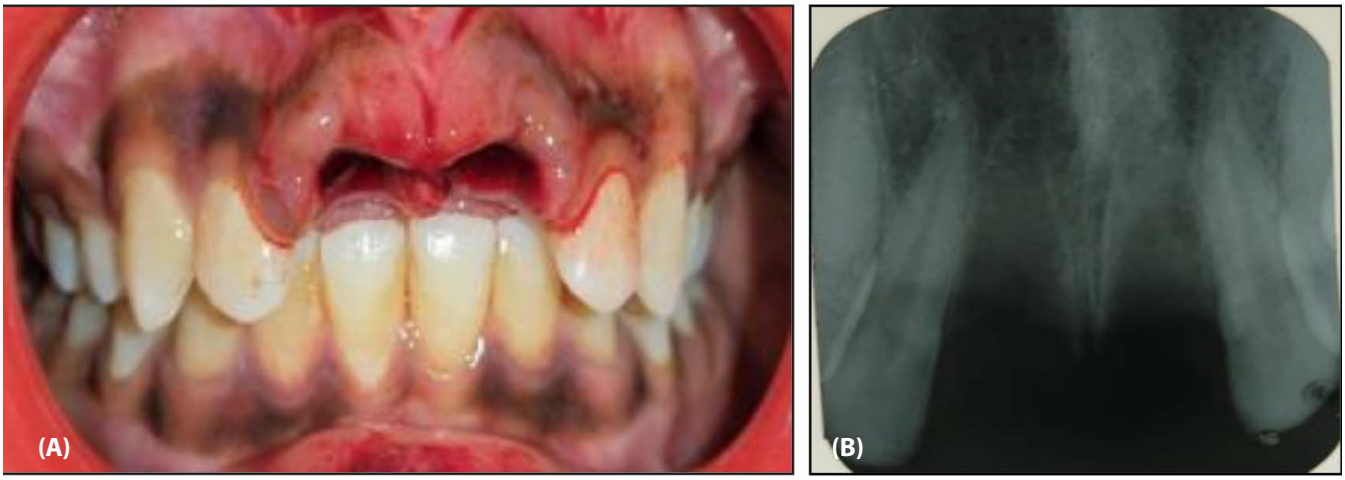


Figure 1. **(A)**. Pre-operative intraoral photograph. **(B)** Intraoral peri-apical radiograph depicting avulsed Tooth # 11 and 21.

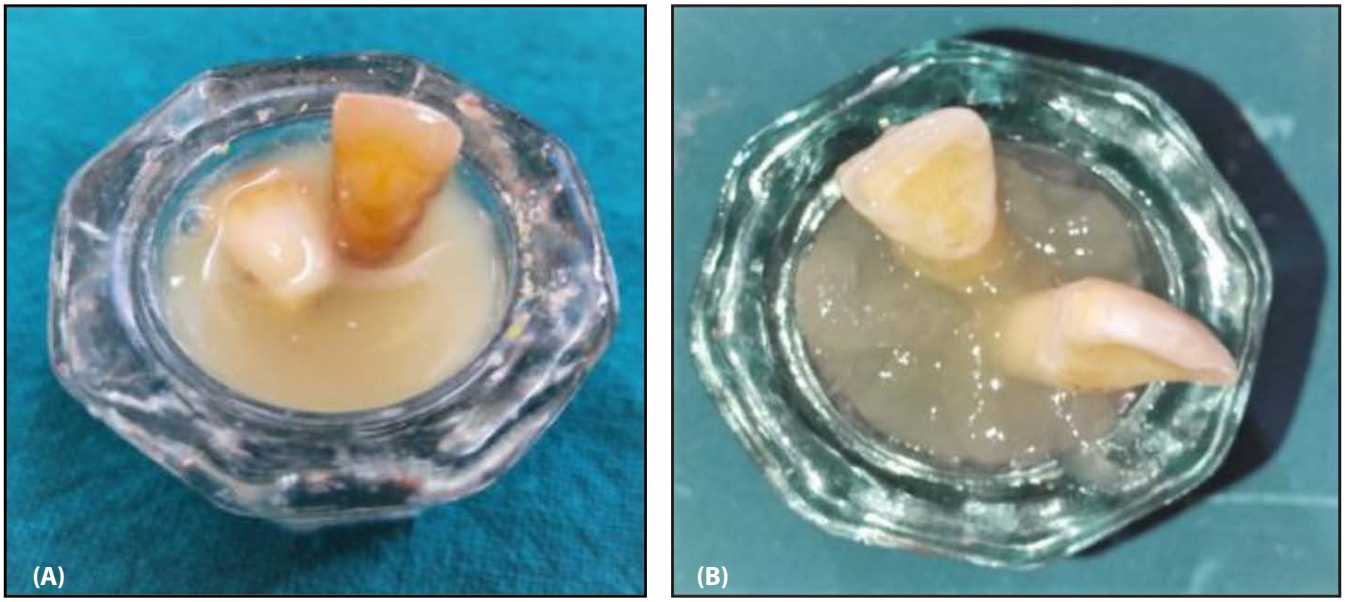
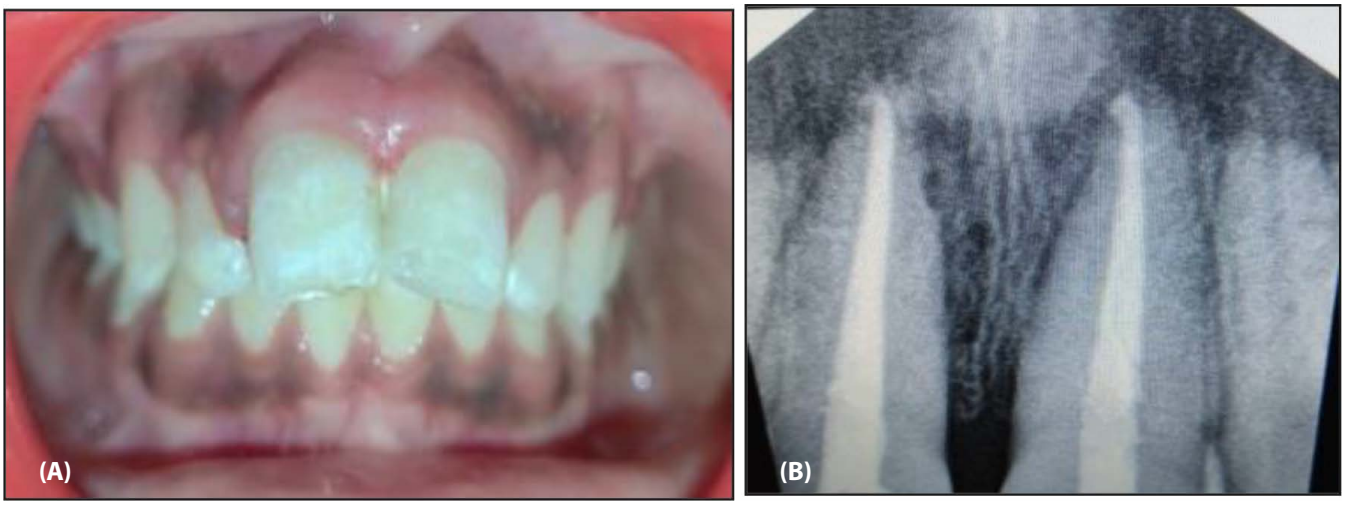


Figure 2. Avulsed teeth kept in. **(A)** doxycycline and saline. **(B)** APF gel.



Figure 3. **(A)** Splinting done from tooth #13-23 with 23-gauge wire. **(B)** IOPAR after splinting.



Figreu 4. **(A)** Splinting removed after 3 weeks followed by RCT w.r.t 11, 21. **(B)** Post- operative photograph.



Figure 5. **(A)** 7 months follow-up IOPAR. **(B)** 9-15 months follow-up IOPAR.

5(B)) were done. After 15 months, no mobility was noted and the teeth were asymptomatic. No signs of resorption or ankylosis were seen in the periapical radiograph at the last visit.

3. Discussion

An avulsion is one of the foremost serious types of dental injury affecting the gingiva, the periodontal ligament and the pulp. Managing an avulsed permanent tooth is often challenging. Immediate reimplantation is the most appropriate treatment that is widely accepted for an avulsed tooth. Healing with a normal periodontal ligament (i.e., regeneration) after reimplantation, is possible if the layer of cells existing in the innermost layer along the surface of the root is vital. Clinical case reports have reported that with reimplantation of avulsed teeth within 5 minutes, the prognosis is best[3].

Reimplantation must be done immediately or the avulsed teeth must be kept in some storage medium such as saline or milk just for a brief amount of time before reimplantation. For about 7 to 10 days, splinting of the reimplanted tooth must be flexibly done to the adjacent teeth to increase the healing of the periodontium[3]. In case of complete closure or almost closure of the tooth apex, treatment of the root canal must be performed immediately after removal of the splint to prevent initiation of root resorption due to the inflammatory process.

In our case, both the teeth that were avulsed had close apex and were brought wrapped in cotton. Extraoral time before reimplantation of the avulsed teeth was 1 hour and 15 minutes. The objective of treatment was to keep each of the incisors that were avulsed for maintaining esthetics and occlusal function so that resorption of the root is prevented due to inflammation and to achieve healing of the periodontium with replacement root resorption. Due to these reasons, the avulsed incisors were reimplanted back into the socket by applying finger pressure and splinted with the adjacent teeth.

Panzarini *et al.,* in their study, have revealed that the success of reimplantation was determined by an average range of time of reimplanted teeth which was in between 1 to 4 hours, and then by the medium of storage[4]. They mentioned that the chances of damage to the root surface increase by fold when there is delayed reimplantation or if no adequate medium was used for storage of the avulsed tooth[4]. In contrast, IzeIyamu and Saheeb in their study have demonstrated successful results of reimplantation where no adequate storage media was used for the transport of the avulsed tooth[5].

Before reimplantation both the teeth were kept in doxycycline, after which it was kept in the saline paste for 5 minutes, followed by APF gel before reimplantation into the socket. Andreasen and Andreasen recommended that for at least 20 min, the tooth that is avulsed should be kept in a solution of 2.4% acidulated sodium fluoride before reimplantation[2]. Different forms and concentrations of fluoride solutions have been recommended by several authors for treating root surfaces in case of reimplantation of the decayed tooth, presuming that the dentinal surface that is demineralized, might become somewhat resistant to resorption and may be more prone to the incorporation of fluoride[2].

Harris A *et al.,* in their study, have mentioned that as the extraoral time of the avulsed tooth was longer and no appropriate medium was used for transportation, before reimplantation of the avulsed tooth, root canal treatment was performed extra orally, as it prevents replacement resorption and increases the chance of retention[2]. In the present case, no endodontic treatment was done extra orally. Both the avulsed teeth were reimplanted back to their original position by applying finger pressure and then semi-rigid splinting was done.

Finucane D, Kinirons MJ in a study have shown that splinting allows teeth movement physiologically during healing, and there is reduced incidence of ankylosis[6]. In the present case, semi-rigid splinting with 23-gauge stainless wire for 3 weeks was done with Dentsply composite and archwire. The benefit of this technique is that stress is reduced in the traumatized area more than in other techniques[6]. Splinting removal was followed by root canal treatment and composite buildup of both the avulsed teeth.

In some studies, it is mentioned that within 2-6 months of reimplantation, resorption due to inflammation and replacement resorption may be seen[2]. Harris A *et al.,* had shown successful results after 2 years of reimplantation. It was seen that the tooth had no symptoms and there were no signs of resorption radiographically after 2 years of their study[3]. However, Cho and Cheng in a study had shown that the prognosis of replanted incisor for a long period was not good[5]. Ankylosis was seen to be prominent in teeth that were replanted after 60 minutes of extra-oral time and within 7 years reimplanted teeth

got resorbed in young patients, whereas in patients older than 16, when teeth were replanted under similar conditions, it may remain effective for a considerably prolonged period[5]. In the present case after 15 months of follow-up, no symptoms were seen in the tooth. Both the teeth were firm and no sign of infection or resorption was observed radiographically. Favourable healing was seen with the presence of intact lamina dura after 15 months of follow-up.

4. Conclusion

Reimplantation can maintain adequate space within the arch, and aesthetic, and averts both mental and emotional trauma of the child which can be related to a missing anterior tooth. Correct prognosis and timely management of avulsed teeth will yield good results in long-standing times.

Declaration of Patient Consent

The patient and his parents were informed about treatment and consent was obtained for publication of the photographs.

6. References

1. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F, Bourguignon C, DiAngelis A, Hicks L, Sigurdsson A, Trope M. Guidelines for the management of traumatic dental injuries. II. Avulsion of permanent teeth. Dental Traumatology. 2007 Jun; 23(3):130-6. https://doi.org/10.1111/j.1600-9657.2007.00605.x PMid:17511833
2. Harris A, Reshmi J, George S, Issac JS. Delayed reimplantation: A case report. J Int Oral Health. 2014; 6(5):104-7
3. Cho SY, Cheng AC. Replantation of an avulsed incisor after prolonged dry storage: A case report. Journal-Canadian Dental Association. 2002 May 1; 68(5):297-300.
4. Panzarini SR, Gulinelli JL, Poi WR, Sonoda CK, Pedrini D, Brandini DA. Treatment of root surface in delayed tooth replantation: A review of literature. Dental Traumatology. 2008 Jun; 24(3):277-82. https://doi.org/10.1111/j.1600-9657.2008.00555.x PMid:18410388
5. Ize-Iyamu IN, Saheeb BD. Reimplantation of avulsed dry permanent teeth after three days: A report of two cases. Nigerian Journal of Clinical Practice. 2013 Mar 12; 16(1):119-22. https://doi.org/10.4103/1119-3077.106784 PMid:23377486
6. Finucane D, Kinirons MJ. External inflammatory and replacement resorption of luxated, and avulsed replanted permanent incisors: A review and case presentation. Dent Traumatol. 2003; 19(3):170-4. https://doi.org/10.1034/j.1600-9657.2003.00154.x PMid:12752540