



The Use of Triple Antibiotic Paste and Mineral Trioxide Aggregate for Management of Inflammatory Root Resorption in Dental Avulsion: A Case Report

Rooholah Behroozi¹, Zahra Khosravi^{2*}

Abstract

Tooth avulsion is described as complete displacement of a tooth from its socket due to trauma impact. Severe damage to the pulp and periodontal tissues could lead to severe root resorption and tooth loss. This case report will describe the use of triple antibiotic paste and mineral trioxide aggregate for management of inflammatory root resorption in two avulsed maxillary central incisors.

Keywords: Triple antibiotic paste, Mineral trioxide aggregate, Tooth avulsion, Root resorption

*Correspondence to

Zahra Khosravi
Tel: +98-9183191425,
Fax: +98-8138354220,
Email:
zahrakhosrav@gmail.com

Received Feb. 12, 2019

Accepted Mar. 23, 2019

ePublished Mar. 30, 2019

Citation: Behroozi R, Khosravi Z. The use of triple antibiotic paste and mineral trioxide aggregate for management of inflammatory root resorption in dental avulsion: A case report. Avicenna J Dent Res. 2019;11(1):37-40. doi: 10.34172/ajdr.2019.07.

Background

Tooth avulsion, the most severe dental trauma, refers to complete displacement of a tooth from its socket due to trauma impact (1). The prevalence of dental avulsion among all dental injuries affecting permanent dentition has been reported 0.5%-3% (2).

Avulsion in permanent dentition generally occurs after trauma due to car accidents, sports, falling, and fighting. Maxillary central incisors are the most commonly affected teeth in permanent dentition (3).

Preserving periodontal ligament cells viability is the most important factor effective on teeth survival. Immediate replantation within 20 minutes is the preferred treatment in the management of avulsed teeth. If an avulsed tooth is not replanted immediately, it should be kept in appropriate storage medium until replantation. The damage of periodontal ligament cells is related to dry time, storage medium, and stage of root development (4).

The most common complication after dental avulsion is root resorption. Extended extraoral time or non-physiologic storage medium are associated with replacement root resorption and lower long-term survival rate. Inflammatory root resorption is possible in the presence of an infected necrotic pulp or root surface contaminations (5). With careful management and follow-up, an avulsed tooth can remain functionally and aesthetically acceptable for years (6).

This article will describe the management of a 20-year-old man with avulsed maxillary central incisors that showed delayed inflammatory root resorption.

Highlights

- ▶ This article emphasizes long-term follow-up of traumatized teeth, as the risk of different root resorption may remain.
- ▶ Triple antibiotic paste is useful in treatment of root resorption following dental trauma.
- ▶ Mineral trioxide aggregate is useful for obturation of resorbed root and can help to cease the resorption process.

Case Presentation

A 20-year-old man with avulsion of both maxillary central incisors due to fighting was referred from the hospital to the department of endodontics, School of Dentistry, Tehran University of Medical Sciences. According to the patient's medical file, he was taken to the hospital in less than one hour after the trauma with avulsion of both maxillary central incisors that were partially attached to the palatal gingiva. Laceration of the upper lip and swelling of the chin were also visible (Figure 1A). The emergency treatment was done in the hospital, the teeth were rinsed with physiological saline, replanted in their original positions and fixed to gingival tissue with sutures, with no evidence of neurological or skeletal injuries, foreign body or alveolar fracture. The patient's medical history was unremarkable. Amoxicillin (500 mg, TID, 7 days) and an anti-tetanus booster were prescribed for the patient.

Nine hours later, the patient was visited at the department of endodontics. On oral examination, swelling of the upper lip, oozing from laceration and

¹Assistant Professor, Department of Endodontics, School of Dentistry, Hamadan University of Medical Sciences, Hamadan, Iran. ²Assistant Professor, Department of Pediatric Dentistry, School of Dentistry, Hamadan University of Medical Sciences, Hamadan, Iran.

displacement of maxillary central incisors were visible (Figure 1B). Both replanted teeth showed tenderness to percussion with grade II mobility, all other anterior teeth in both dental arch responded positively to vitality tests with normal mobility and no tenderness to percussion. Before treatment, 0.12% chlorhexidine mouthwash was administered for 30 seconds. The laceration of the upper lip was sutured, replanted teeth were repositioned in their original position with gentle pressure and were splinted from canine to canine with 0.4 mm stainless steel round wire (3M Unitek, Monrovia, CA, USA) and acid-etch composite (Clearfil Majesty Esthetic, Kuraray, Tokyo, Japan) (Figure 1C).

The patient was informed about the importance of regular clinical and radiographic follow-up. Seven days later, replanted teeth underwent root canal treatment. After proper cleaning and shaping with ProTaper Universal (Dentsply-Maillefer, Ballaigues, Switzerland) and 5.25% sodium hypochlorite, calcium hydroxide paste (Dentaflux, Madrid, Spain) was placed and left in the canal for four weeks (Figure 2C).

Two weeks after trauma (Figure 1D), no clinical or radiographic signs were detected and the splint was removed. The patient was re-examined four weeks later, calcium hydroxide was removed with copious irrigation of 1% sodium hypochlorite (Cerkamed, Stalowa Wola, Poland), and smear layer was removed with one-minute irrigation of 17% EDTA solution (Cerkamed, Stalowa Wola, Poland). The canals were obturated with gutta-percha/AH Plus sealer (Dentsply Maillefer, Ballaigues, Switzerland) using lateral compaction technique (Figure 2D) and the follow-up sessions were scheduled. In the

3, 6 and 9-month follow-up sessions, there was no sign and symptom of pathologic root resorption in avulsed teeth and the adjacent teeth remained vital. However, at 12-month follow-up, radiographic signs of inflammatory root resorption were evident on the root tips of replanted teeth (Figure 2E). Replanted teeth underwent non-surgical root canal retreatment, gutta-percha was removed with ProTaper Universal retreatment kit (Dentsply-Maillefer, Ballaigues, Switzerland), and the canals were irrigated with 1% sodium hypochlorite and passive ultrasonic technique. The canals were dressed with triple antibiotic paste (TAP) containing minocycline, metronidazole, and ciprofloxacin at 1:1:1 ratio and the accessible cavities were temporized with IRM (Dentsply Int., Milford, DE, USA). In the second session, the canals were irrigated with 10 mL of 17% EDTA and dried. The canals were obturated with Mineral Trioxide Aggregate (MTA) (ProRoot, Dentsply Maillefer, Ballaigues, Switzerland), wet cotton pellet placed over MTA and access cavities were temporized with IRM. The setting of MTA was checked seven days later and the access cavities were restored with acid-etch composite resin technique (Filtek Z350 XT, 3M ESPE, Minnesota, USA) (Figure 2F). Three months later the patient was recalled for follow-up, replanted teeth had normal mobility and radiographic examination revealed no progression in the pathologic resorption process. In the 24 and 36-month follow-up sessions, there was no sign of replacement resorption and the avulsed teeth retained normal mobility, apical root resorption was completely ceased and normal lamina dura could be traced radiographically (Figure 2G and 2H). All adjacent teeth remained vital during the follow-up period.



Figure 1. Clinical Management of Avulsed Maxillary Centrals. (A) Avulsion of maxillary incisors, upper lip laceration and chin swelling are visible; (B) Ten hours after emergency treatment, displacement of replanted teeth is visible; (C) Wire-composite splint was placed for two weeks; (D) Soft tissue healing is visible in splint removal session; (E) One-year follow-up; (F) Two-year follow-up; (G) Three-year follow-up.

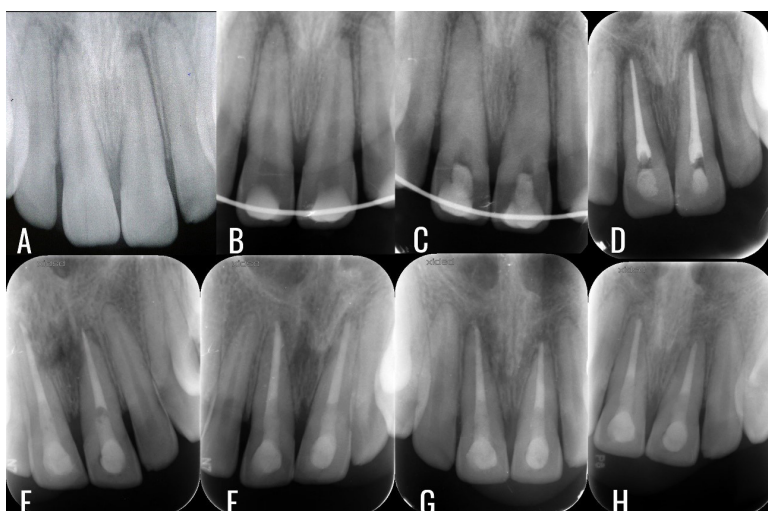


Figure 2. Endodontic Management of Avulsed Maxillary Centrals. (A) Baseline radiograph of replanted teeth; (B) Periapical radiograph after splint placement; (C) Calcium hydroxide was placed as intra-canal medicament; (D) Post-obturation radiograph; (E) Root resorption was evident at one-year follow-up; (F) Mineral Trioxide Aggregate obturation radiograph; (G) Two-year follow-up; (H) Three-year follow-up.

Discussion

Dental avulsion, the most dramatic dental injury requires tooth replantation as soon as possible. The management of avulsed teeth is complex and the prognosis is often questionable. A common complication of dental avulsion is root resorption that could progressively lead to tooth loss. In the present case, the teeth were kept in oral cavity while attached to gingival tissues and replanted within almost one hour. The patient was managed according to dental trauma guideline of the International Association of Dental Traumatology. As the guideline emphasizes, avulsed teeth with mature root had no chance for pulp revascularization and root canal therapy should initiate within 10 days (7). Therefore, in order to prevent root resorption, after complete cleaning and shaping of root canal system, calcium hydroxide was placed in the canals for one month. In the present case, radiographic signs of inflammatory root resorption were evident one year after replantation. To complete elimination of bacteria from root canal system, the intracanal medicament is mandatory after chemomechanical preparation. Although calcium hydroxide is usually used as an intracanal dressing, its antibacterial efficacy against persistent microorganisms is compromised (8) TAP is an effective mixture of antibiotics for eliminating bacteria from root canal system (9). In the present case, to overcome this problem, TAP was used as an intracanal medicament. The pH of MTA is initially 10.2 and then rises to 12.5 within three hours after mixing. This alkaline pH is responsible for the antibacterial activity of MTA against persistent bacteria (10). In this case, MTA was used as the obturation material due to its biocompatibility, excellent sealing ability and potential for peri-radicular tissue healing (11). In the present case, the resorption process stopped and was stable over the 36-month follow-up period, the periodontal ligament space was traceable in the radiographic examination and

the patient was asymptomatic; therefore the treatment was considered successful.

Conclusions

It seems that use of TAP and MTA is beneficial for the management of inflammatory root resorption in avulsion dental trauma.

Authors' Contribution

All authors contributed equally to this work.

Ethical Statement

Informed consent was obtained from the patient for publication of this study.

Conflict of Interest Disclosures

The authors declare that they have no conflict of interests.

References

1. Kenny DJ, Barrett EJ, Casas MJ. Avulsions and intrusions: the controversial displacement injuries. *J Can Dent Assoc.* 2003;69(5):308-13.
2. Glendor U, Halling A, Andersson L, Eilert-Pettersson E. Incidence of traumatic tooth injuries in children and adolescents in the county of Vastmanland, Sweden. *Swed Dent J.* 1996;20(1-2):15-28.
3. Tzigkounakis V, Merglova V, Hecova H, Netolicky J. Retrospective clinical study of 90 avulsed permanent teeth in 58 children. *Dent Traumatol.* 2008;24(6):598-602. doi: [10.1111/j.1600-9657.2008.00674.x](https://doi.org/10.1111/j.1600-9657.2008.00674.x).
4. Poi WR, Sonoda CK, Martins CM, Melo ME, Pellizzer EP, de Mendonca MR, et al. Storage media for avulsed teeth: a literature review. *Braz Dent J.* 2013;24(5):437-45. doi: [10.1590/0103-6440201302297](https://doi.org/10.1590/0103-6440201302297).
5. Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors. 4. Factors related to periodontal ligament healing. *Endod Dent Traumatol.* 1995;11(2):76-89.
6. Ram D, Cohenca N. Therapeutic protocols for avulsed permanent teeth: review and clinical update. *Pediatr Dent.*

- 2004;26(3):251-5.
7. 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(2):88-96. doi: [10.1111/j.1600-9657.2012.01125.x](https://doi.org/10.1111/j.1600-9657.2012.01125.x).
 8. Taneja S, Kumari M. Use of triple antibiotic paste in the treatment of large periradicular lesions. *J Investig Clin Dent.* 2012;3(1):72-6. doi: [10.1111/j.2041-1626.2011.00082.x](https://doi.org/10.1111/j.2041-1626.2011.00082.x).
 9. Mohammadi Z, Abbott PV. On the local applications of antibiotics and antibiotic-based agents in endodontics and dental traumatology. *Int Endod J.* 2009;42(7):555-67. doi: [10.1111/j.1365-2591.2009.01564.x](https://doi.org/10.1111/j.1365-2591.2009.01564.x).
 10. Parirokh M, Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review--Part I: chemical, physical, and antibacterial properties. *J Endod.* 2010;36(1):16-27. doi: [10.1016/j.joen.2009.09.006](https://doi.org/10.1016/j.joen.2009.09.006).
 11. Torabinejad M, Parirokh M. Mineral trioxide aggregate: a comprehensive literature review--part II: leakage and biocompatibility investigations. *J Endod.* 2010;36(2):190-202. doi: [10.1016/j.joen.2009.09.010](https://doi.org/10.1016/j.joen.2009.09.010).

© 2019 The Author(s); Published by Hamadan University of Medical Sciences. This is an open-access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.