

**CASE REPORT ON MANAGEMENT OF AN AVULSED PERMANENT ANTERIOR TOOTH: A DELAYED REPLANTATION APPROACH**

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ABSTRACT Avulsion is a severe traumatic dental injury that necessitates a complicated and urgent treatment. Clinicians often face difficulties while replanting the avulsed tooth. Avulsed tooth needs to be immediately replanted for the optimal results as delayed management could reduce the efficacy of treatment. This case report emphasizes on the treatment protocols for an avulsed right permanent maxillary central incisor (#11) in a 27-year-old male patient with an extraoral time of 12 hrs with no clinical symptoms. Extraoral endodontic management was performed followed by root-end filling using mineral trioxide aggregate. Splinting was done using composite resin after repositioning of the tooth into the empty socket. Regular follow-up done at 3 weeks, one, three and six months revealed no signs of resorption on radiographs with no clinical signs. Thus, irrespective of prolonged extra-alveolar dry storage, proper management of an avulsed tooth can lead to an acceptable level of functionality and stability in a tooth.

KEYWORDS : Avulsion, Delayed replantation, Dental trauma, Splinting

INTRODUCTION

Dentoalveolar trauma leads to injury of the teeth, periodontium, and surrounding tissues.^[1] It may vary from minimal loss of enamel to complex fractures which affects the pulp tissue and even leads to loss of entire tooth structure.^[2] Avulsion is considered as one of the rarest and most devastating dental injury amongst the permanent teeth, accounting for 0.5% - 16% of all dento- alveolar injuries.^[3] It corresponds to dislodgement of entire tooth structure out of alveolar bony socket. In such case, majority of cells of periodontal ligament (PDL) remain on the surface of root due to tearing of the ligament. These cells need to be kept hydrated for maintaining the durability and to encourage healing of the tooth structure while reducing the incidence of resorption. Also, when extraoral period lengthens; inflammatory resorption might result due to drying of the periodontal ligament.^[3] Nevertheless, teeth which are avulsed with a vital periodontal ligament can be replanted and will remain functional for some years if treated appropriately.^[4]

Present case report emphasizes on the management of an avulsed permanent anterior tooth in spite of an extended extra-oral period of 12 hours.

CASE REPORT

A male patient aged 27 reported to the Department of Conservative Dentistry and Endodontics at our dental institute with avulsed permanent maxillary right central incisor (#11) after a motorcycle accident that occurred 12 hrs before. Following 6 hours of injury, the tooth was found to the patient, till then the tooth was placed in a dry open plastic container. The patient did not suffer from any neurological injury and had a non-contributory medical history. Examination of patient was done to assess any extraoral signs of injury which revealed swollen upper lip and a slight abrasion across the nose. Also, upon examination of the avulsed tooth, the entire crown of tooth was intact with closed root apex. Tooth was then rinsed immediately with normal saline solution (0.9%, Amanta) along with 0.5% diluted povidone iodine (BETADINE, G.S. Pharmabutor Pvt Ltd.) to remove debris or any other surface contaminants and placed in 2.4% acidulated sodium fluoride solution. Intraoral examination revealed empty alveolar socket with right maxillary central incisor and fractured right

maxillary lateral incisor (#12).



Figure 1: Avulsed tooth and Pre-operative intraoral frontal photograph of before replantation showing empty socket with #11

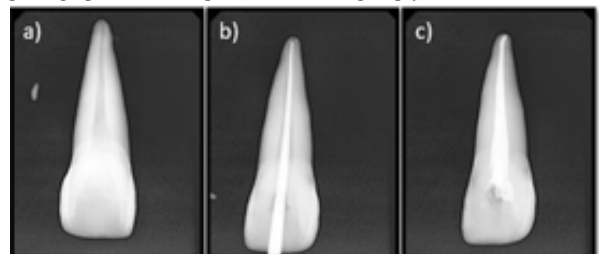


Figure 2: Extra-oral Root Canal Treatment with #11: Pre-operative X-ray(a), Master cone selection(b), Obturation(c)

Radiovisiograph (RVG) was taken to confirm the empty alveolar socket with respect to right maxillary central incisor. A diagnosis was made for a case as an Ellis class V and class III fracture in relation to #11 and #12 respectively. The patient was explained about available treatment alternatives with the possible poor treatment outcome as a result of long extraoral dry time of 12 hrs and the lack of ideal management. Avulsed tooth was decided to reposition and replant into the socket after obtaining written informed consent from the patient. Pre-operative RVG was taken before initiating extraoral endodontic treatment on the tooth (#11). Preparation of access cavity was completed followed by working length determination, thorough

biomechanical preparation using #10-55 hand K-files (Mani Inc., Utsunomiya, Tochiji, Japan) along with continuous irrigation with 5.25% sodium hypochlorite (PRIME Dental Products, Pvt. Ltd.), 17% ethylenediaminetetraacetic acid (RC Help, PRIME Dental Products, Pvt. Ltd.) and normal saline solution. Master cone gutta percha was selected after drying of canal with absorbent paper points (SureEndo, SureDent Corporation, Korea). Lastly, Gutta percha cone (SureEndo, SureDent Corporation, Korea) coated with calcium hydroxide-based sealer (Sealapex, Sybron-Kerr, USA) was used to complete obturation.

Further, 3mm of root end was resected using tapered diamond point (Mani Inc., Utsunomiya, Japan) followed by root end cavity preparation. Retrograde filling was done in a prepared cavity using mineral trioxide aggregate (MTA Angelus, Brazil) with the help of amalgam carrier and finger plugger (Mani Inc., Utsunomiya, Japan).



Figure 3: Root resection and retrograde filling procedures:

Root end cavity preparation using tapered diamond point(a), Prepared root end cavity on avulsed tooth (b), X-ray showing root end cavity(c), Retrograde filling with MTA(d), X-ray showing retrograde filling of MTA(e)

The empty socket was then curetted and cleaned under local anesthesia (Lignocaine 2%, 1:200000 Adrenaline: Cadila Pharmaceuticulas Ltd.) using normal saline. Endodontically treated tooth (#11) was grasped and replanted into the socket with gentle finger pressure. Radiograph was taken to verify the correct position of tooth. Splinting was done immediately from left maxillary lateral incisor to right maxillary lateral incisor with the help of 0.4- mm diameter stainless wire and acid-etch compositeresin to stabilize replanted tooth.

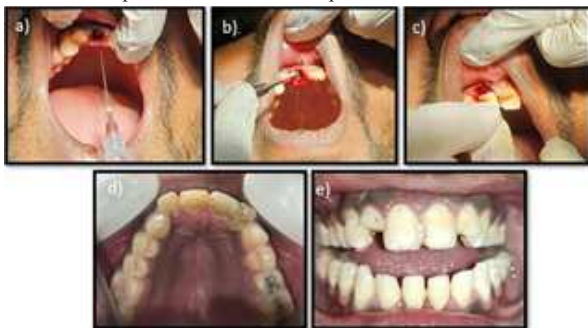


Figure 4: Replantation and splinting: Local anesthesia into empty socket(a), Curettage(b), Replantation of avulsed tooth #11 into socket(c), Splinting of tooth(d), Clinical photograph of splinted replanted tooth(e)

Postoperative instructions were given to the patient. Antibiotics and analgesics were prescribed for a period of five days. A soft- bristled toothbrush and 0.2% chlorhexidine mouthwash (FreshZex 2, Zeelab Pharmacy Pvt Ltd.) were recommended for oral hygiene maintenance along with two-week soft diet. Postoperative RVG was taken after replantation. Subsequently, patient was advised to visit the physician for evaluation of necessity of an anti- tetanus booster.



Figure 5: Follow-up: 3 weeks follow-up (a), 1 month follow-up (b), 3 months follow-up(c), 6 months follow-up(d)

Patient was recalled after 3 weeks and conventional endodontic treatment of fractured right maxillary lateral incisor was completed.

Periodic follow-up was done after 1, 3 and 6 months. Upon

examination, tooth showed no mobility and was not tender to percussion. Uniform periodontal ligament space with no signs of root resorption were seen on radiograph. At follow-up visits, these findings remained unchanged.

DISCUSSION

Avulsion or exarticulation is considered as a serious traumatic dento-alveolar injury which results from direct impact on the teeth and supporting periodontal ligament in the alveolar socket leading to destruction of neurovascular vessels.^[5,6] It is seen in 0.5%–16% of all dental injuries amongst permanent teeth.^[7] Various treatment protocols are available for the management of avulsed permanent teeth still prompt and correct emergency management is essential for attaining the best results. But immediate replantation of an avulsed tooth is considered as the ideal treatment option.^[8] However, it is not always possible to provide an immediate treatment.^[8] Andreason et al.^[9] reported 95% chance of external root resorption if tooth has been dried for more than 2hrs.^[10] According to Kinirons et al.^[11] there was significant rise in the risk of resorption after 5 minutes of dryness, with the probability of resorption increasing by 29% for each additional 10 minutes of dryness.

Replantation may save the tooth, but its crucial to understand that not all of the teeth which are replanted will survive over time and may eventually need to be extracted. However, conserving the tooth should be tried as not attempting to save a tooth is an irreversible decision.^[7] In this regard, present case has shown the successful delayed replantation of avulsed permanent right maxillary central incisor with prolonged dry storage period of 12 hours.

The media used for storage and transport of tooth during the extra-oral time are also crucial. The avulsed should be kept in an appropriate media, such as milk, saline, HBBS or saliva when extra- oral time is prolonged.^[8] In our case, the tooth was kept in a dry open plastic container. Thus, avulsed tooth was rinsed with betadine and normal saline to remove debris and other surface contaminants. Moreover, according to guidelines of International Association of Dental Traumatology (IADT), when the tooth has been dried for longer than 60 minutes, endodontic therapy needs to be carried out extra-orally prior to its replantation or later. Since there were less chances of achieving pulp space revascularization because of necrotic PDL, extra-oral endodontic treatment was done prior to replantation in our case.^[8]

Massler^[10] proposed that root end resection is not required for ideal repositioning of the tooth. However, the extra-alveolar period in this instance was very lengthy. Even with prompt endodontic treatment, inflammation and/or resorption might cause rapid dental hard and/or bone tissue destruction, which could result in the integration of gutta-percha into the bone tissue.^[12] Thus, in present study MTA retrograde filling was done after root- end resection on avulsed tooth, as it induces proinflammatory and pro-wound healing environment.^[10]

Moreover, splinting is essential for maintaining the tooth in a correct position and it protects pulpal and periodontal tissues if the tooth suffers slight mobility.^[13] According to guidelines of IADT, a splinting period of 4 weeks is generally recommended for delayed replantation (more than 60 min).^[14] In present case, replanted tooth was stabilized with a flexible splint made of stainless- steel wire and composite resin. The splinting was maintained for the period of 3 months as the prognosis was guarded due to prolonged extra- oral time. Also, the splint was placed palatally so the aesthetics were not compromised. This type of splint allows stimulation of the PDL during healing hence reducing the phenomenon of ankylosis.^[14]

Regular clinical and radiographic assessment is advised at 2weeks, 4weeks, 3months, 6months, 1 year, and yearly thereafter for at least 5years. Also, periodontal reactions to replantation can occur in various ways of healing such as healing with normal PDL, surface resorption, replacement resorption or with inflammatory resorption.^[15]

Thus, in our case replanted tooth (#11) was evaluated regularly till 6 months. Even though the case had poor prognosis and healing was not anticipated, the treatment is considered successful till now and thereafter yearly follow- ups will be conducted for an average of five years to avoid any associated complications.

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Conflicts Of Interest

There are no conflicts of interest.

REFERENCES

- Antipovienė A, Narbutaitė J, Virtanen JI. Traumatic Dental Injuries, Treatment, and Complications in Children and Adolescents: A Register-Based Study. *Eur J Dent* 2021;15:557-62.10.1055/s-0041-1723066.
- Patidar D, Sogi S, Patidar DC, Malhotra A. Traumatic Dental Injuries in Pediatric Patients: A Retrospective Analysis. *Int J Clin Pediatr Dent* 2021;14:506-11.10.5005/jp-journals-10005-2004.
- 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;16:2081684.10.1155/2022/2081684.
- Desai P, and Patel S. Delayed Replantation of Avulsed Tooth- A Case Repor *Int. J. Adv. Res* 2022;10:730-7.10.21474/IJAR01/14098.
- Andina Widyastuti, Lukita Wardani, Diatri NariRatih, Prisca Bernadeti Sri Widayanto, Antonius Surya, Wignyo Hadriyanto. "Replantation of Anterior Avulsed Teeth: A Case Report" in *The International Online Seminar Series on Periodontology in conjunction with Scientific Seminar. KnE Medicine* 2022;200-7.10.18502/kme.v2i1.10852.
- Abuhaimeid T. Delayed management of avulsed mandibular incisor teeth: 4-year follow-up. *Saudi Endod J* 2017;7:199-203.10.4103/sej.sej_96_16.
- Fouad AF, Abbott PV, Tsilingaridis G, Cohenca N, Lauridsen E, Bourguignon C, O'Connell A, Flores MT, Day PF, Hicks L, Andreassen JO, Cehreli ZC, Harlamb S, Kahler B, Oginni A, Semper M, Levin L. International Association of Dental Traumatology guidelines for the management of traumatic dental injuries: 2. Avulsion of permanent teeth. *Dent Traumatol* 2020;36:331-42.10.1111/edt.12573.
- Savas S, Kucukyilmaz E, Akcay M, Koseoglu S. Delayed replantation of avulsed teeth: two case reports. *Case Rep Dent* 2015:197202.10.1155/2015/197202.
- Khalilak Z, Shikholislami M, Mohajeri L. Delayed tooth replantation after traumatic avulsion: a case report. *Iran Endod J* 2008;3:86-9.
- Agrawal V, Agrawal A, Srikumar GP, Sharma V, Hans MK. Success of delayed replantation of an avulsed tooth: A case report. *J Int Oral Health* 2016;8:1039-42.10.2047/jioh-08-11-09.
- Kinirons MJ, Gregg TA, Welbury RR, Cole BO. Variations in the presenting and treatment features in reimplanted permanent incisors in children and their effect on the prevalence of root resorption. *Br Dent J* 2000;189:263-6.10.1038/sj.bdj.4800740.
- Müller DD, Bissinger R, Reymus M, Bücher K, Hickel R, Kühnisch J. Survival and complication analyses of avulsed and replanted permanent teeth. *Sci Rep* 2020;10:2841.10.1038/s41598-020-59843-1.
- Lopes LB, Botelho J, Machado V. Severe Case of Delayed Replantation of Avulsed Permanent Central Incisor: A Case Report with Four-Year Follow-Up. *Medicina(Kaunas)* 2020;56:503.10.3390/medicina56100503.
- Ines K, Nabiha D. Delayed tooth replantation after traumatic avulsion resulting in complete root resorption. *J Pediatr Dent* 2016;4:18-23.10.4103/2321-6646.174929.Rai A, Koirala B, Dali M, Shrestha S. Delayed replantation of avulsed permanent maxillary central incisor: Case report with 6-year follow-up. *Clin Case Rep* 2024;12:e8487.10.1002/ccr3.8487.
- Rai A, Koirala B, Dali M, Shrestha S. Delayed replantation of avulsed permanent maxillary central incisor: Case report with 6-year follow-up. *Clin Case Rep* 2024;12:e8487.10.1002/ccr3.8487.