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REPLANTATION OF AN AVULSED CENTRAL INCISOR WITH A ONE-YEAR FOLLOW-UP: A CASE REPORT

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ABSTRACT

Surgical replantation of an avulsed permanent maxillary central incisor is the subject of this case study. A 15-year-old male patient arrived with a traumatic dental injury from a sudden fall that affected the anterior maxillary tooth region. An avulsed tooth 21 with an empty alveolar socket and an intact lamina dura was found during the clinical examination, proving that no additional damage or fractures had been sustained by other teeth or alveolar structures. Following the root canal procedure, splinting was used for replantation. Radiographic interpretation revealed no resorption and no clinical signs or symptoms in follow-ups conducted at regular intervals of one, three, six, and twelve months. To establish in detail the procedures and the methods adopted for replantation plays a major role in long standing prevention of root resorption and replantation failures.

Keywords: Dental injuries, Tooth avulsion, Tooth replantation, Root resorption

INTRODUCTION:

Accidental falls, hits and RTA can cause damage to the teeth and the structures around them, which may result in a variety

of conditions including the total loss of the tooth from its socket. Injuries to the dentition caused by trauma are common in children aged 7 to 11. The bulk of these

injuries are caused by accidental falls, which are followed by injuries sustained in various sports, auto accidents, and physical assaults [1]. One of the most severe dental injuries is a tooth avulsion, which is the complete removal of a tooth from its alveolar bone socket. It happens when the pulp's blood supply falls off, leaving the cells of the periodontal ligament exposed to the external environment [2]. Avulsion typically occurs in the maxilla in both permanent and primary dentition, most frequently affected teeth is maxillary central incisors [3]. Avulsion of permanent teeth is one of the rarest and most severe dental injuries, ranging from 0.5% to 16% of all traumatic injuries. In avulsion of teeth after successful replantation may cause infection, root resorption, and subsequent failure of the procedure. This could have an impact on the course of treatment, the survival rate, and the prognosis of the affected teeth [4]. during the extra-oral period, the media used for storage and transportation are equally essential. When a patient has a prolonged duration of extra oral time, the tooth should be kept in an appropriate medium until a dentist replants it, such as HBSS, saline, milk, or saliva [5].

A catastrophic dental injury that can have a major effect on a patient's quality of life is tooth avulsion. Avulsed central incisor replantation is an intricate procedure that necessitates careful evaluation of a number of variables, such as the patient's general oral health, storage conditions, and the tooth's extraoral dry time. Successful results can result from timely replantation and appropriate follow-up treatment. This case study highlights the significance of prompt intervention and all-encompassing comprehensive therapy by describing the replantation of an avulsed central incisor with a one-year follow-up.

CASE REPORT:

The following describes a case study of a male patient, age 15, who visited our dental clinic on January 8, 2023, presenting with chief complaint of injury to the left anterior maxillary tooth region as a result of an earlier fall. During the examination, the patient was attentive and responsive, and he had no relevant medical history. A laceration of the marginal gingiva in the affected region and the loss of the left maxillary central incisor (tooth 21) were found during the intraoral examination. (Figure 1A).

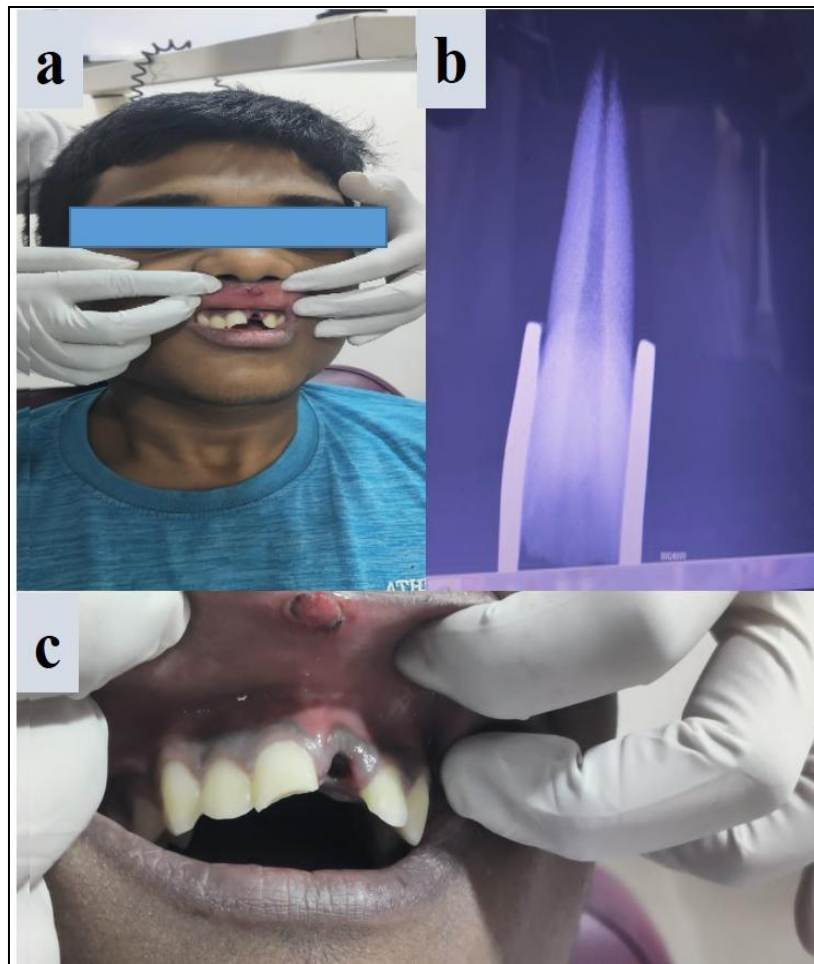


Figure 1: a) Patient came with a traumatic injury, b) Pre-op radiographic image of avulsed teeth, c) Intra oral view shows lip abrasion and missing tooth

A dento-alveolar fracture is defined as a fracture in the bone around the teeth that does not extend to the mandibular or maxillary basal bones. A dento-alveolar fracture was ruled out due to an accidental fall in the left anterior maxillary tooth region. The avulsed tooth was brought after 24 hours to the clinic and was stored in milk for assessment this case was identified as an Ellis class V fracture. After a thorough examination following radiovisiography (RVG) was taken around the region of tooth 21 showed an intact lamina dura and an empty alveolar socket

indicating that no more damage or fractures had occurred to other teeth or alveolar structures (**Figure 1B**). Intraorally the patient presented with lip laceration and completely avulsed missing 21 (**Figure 1C**).

The patient was made aware of the possible risks involved in replacing an avulsed tooth and was out of the mouth for about 24 hours. The choice to realign and replant the tooth was made after receiving consent. With an open apex and a well-formed root, the avulsed tooth was managed (**Figure 2A**). After thoroughly rinsing the root

surface with regular saline, sodium hypochlorite concentration of 0.5% and ethylene diamine tetra-acetic acid

concentration of 17% solutions were applied.

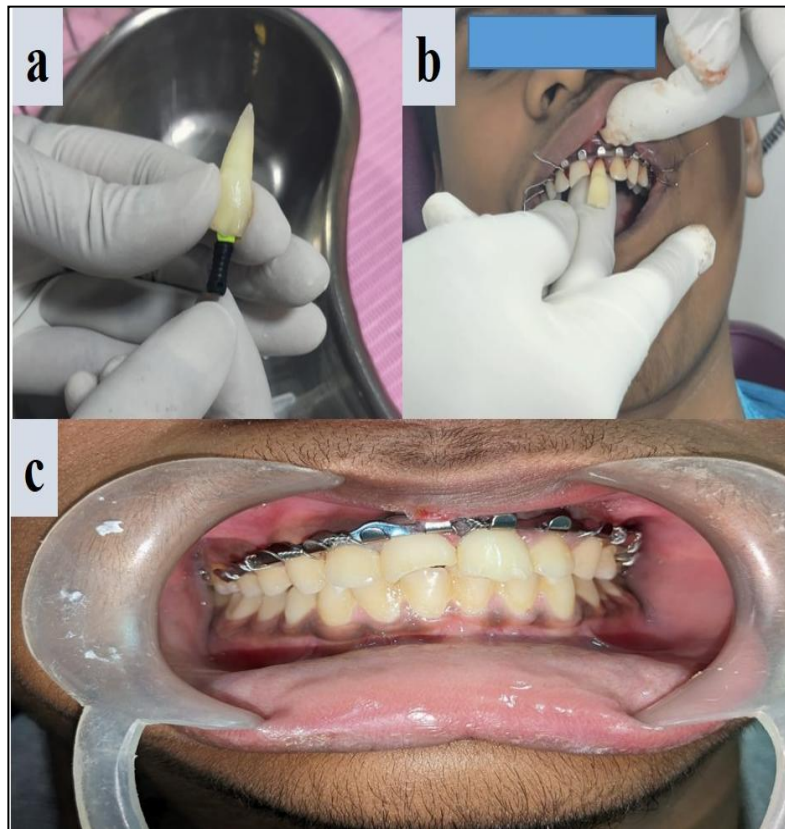


Figure 2: a) RCT of the avulsed teeth b) Replanting the avulsed tooth in socket c) an arch bar splint was used to immobilize the replanted tooth in the maxilla

Access opening was performed extra orally and Calcium hydroxide intra-canal medicament was placed, and the access cavity was temporarily filled. Before starting the treatment procedures oral administration of amoxicillin 1g was given-ray analysis revealed an open apex in tooth 21, followed by thorough cleaning, shaping, and obturation. Additionally, an apex sealer was utilized to seal the apex of the tooth during the RCT process. (**Figure 2B**) While tooth 11 found to have Ellis Class IV fracture. Root canal treatment was

done for 11 as well. Before reinserting the dislodged tooth into its socket, an arch bar splint was secured to provide stabilization. An arch bar splint was used to immobilize the replanted tooth in the maxilla to facilitate the reconnection of damaged ligament fibers. After 6 weeks post-operatively the arch bar splint is removed (**Figure 2C**).

The intra-canal medication was removed two weeks after the transplant, and gutta-percha and epoxy-resin sealant were used to cover the root canal. In the access cavity,

a composite resin restoration was placed. When the adjacent teeth were tested for vitality, the replanted tooth's mobility dropped to grade I, and a good response was obtained. With the replanted tooth, the

one-month follow-up revealed normal physiologic mobility and sulcular probing depth. A radiographic examination revealed no evidence of resorption and normal periapical findings (**Figure 3**).



Figure 3: Post op radiographic image

The previously mentioned favorable results persisted in the three, six, and 12-

month follow-up visits. **Figure 4** confirms the 1-year follow-up OPG.



Figure 4: Post op radiographic image of 1 year

DISCUSSION:

With a 17.5% prevalence, dental avulsions primarily afflict children and adolescents.

More men than women have it [6]. Tooth avulsion occurs when a tooth is entirely displaced from its socket. This type of

injury is not uncommon, and it affects 0.5 to 3% of all dental injuries. Children between ages 7 and 9 are more susceptible to avulsion as their roots are not yet fully developed, and their alveolar bone and periodontal ligament (PDL) offer little resistance against extrusive forces during the teeth eruption period [7].

The cause of tooth avulsion varies depending on the type of dentition. In primary dentition, avulsion is mainly caused by the result of a hard object hitting the teeth, while permanent dentition it is more often caused by falls, fights, sports injuries, automobile accidents, and child abuse [8]. Following tooth dislodgement, careful handling is paramount to avoid damaging the roots. Rinsing the tooth gently with saline or milk to remove debris is advised. Ideally, immediate reinsertion into the socket is preferred if the tooth remains intact; otherwise, storing it in a solution like Hanks' balanced salt solution, saline, or milk is recommended. Replantation should occur promptly to prevent PDL cell death due to prolonged extra-oral exposure.

Initiation of root canal treatment within two weeks after replantation helps prevent resorption, with calcium hydroxide serving as an intracanal agent to disinfect and reduce the risk of root resorption. Additionally, fluoride treatment post-replantation can help prevent complications

such as root resorption. Regular follow-up visits over one year are vital to monitor dental health and address any potential issues promptly. The success of treatment is closely linked to the duration the tooth spends outside the mouth, with optimal results observed within 20 minutes. To avoid future problems, endodontic therapy should be done to a tooth that has developed roots. Revascularization of the pulp may happen in immature teeth when the apex is open, but during the first three months, monthly follow-up appointments should be made [9]. Despite the challenges, preserving natural teeth can yield satisfactory aesthetic and functional outcomes until further intervention is necessary. Numerous clinical factors in our case, including the 60-minute extra-alveolar dry period, the patient's young age, the immature tooth with open apices, poor oral hygiene, and the use of a rigid metal splint for two days following the avulsion, significantly influenced the prognosis for the long-term outcome and indicated a high likelihood of complications.

METHODS OF MANAGING AVULSED TOOTH:

To improve tooth survival, an effective treatment plan and proper management of an avulsed tooth during the first 30 minutes is necessary. The initial goal of treatment is to keep the tooth alive, or to keep it in its alveolar socket, to prevent growth

retardation of the alveolar bone, this will be necessary when placing a dental implant in the future [10].

Pre-replantation Procedures:

- **Storage Media:** Milk is a recommended storage medium for avulsed teeth due to its appropriate pH, osmolality, and nutrient content [10].
- **Anti-resorption therapy** involves soaking the tooth in an antibacterial solution can help prevent inflammation from necrotic cells and contamination. Different regimes, such as using doxycycline and dexamethasone, have been suggested.
- **Tooth Replantation:** Aligning and replanting the tooth with firm pressure into the socket is crucial. Success rates decrease significantly after 30 minutes of dry time.

Post-replantation Procedures:

- **Splinting:** Splinting keeps the implanted tooth immobile and permits the fibres of the injured periodontal ligament to re-establish contact with the cementum followed by alveolus [11].
- **Systemic Antibiotics:** Prescribing antibiotics like doxycycline or amoxicillin is advisable to prevent infection [12].

- **Follow-up:** After two weeks, the splint needs to be taken off so that the tooth may be radiographically and clinically observed. The pulp vitality should be tested, ideally via electric testing or pulse oximetry, once the splint has been removed. The tooth's mobility should also be assessed [13].
- In cases where the dry time exceeds 60 minutes, further procedures, such as removing leftover ligament and maybe following root canal therapy, would be required. Complications like resorption can be managed with appropriate disinfectants and systemic antibiotics. To prevent permanent tooth damage, primary teeth should not be replanted, however, doxycycline increases the risk of revascularization in immature teeth.

CONCLUSION:

After an avulsion, transplantation is the recommended course of treatment. In addition to satisfying the patient's functional and aesthetic needs, it also aids in preserving the surrounding bone for prosthetic rehabilitation in the event that replantation fails. Replanting an avulsed tooth can have a positive result even though it takes a long time outside of the mouth as

long as all the suggested procedures and instructions are followed.

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Nil

CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest related to this case report.

REFERENCES

- [1] Alotaibi S, Haftel A, Wagner ND. <https://www.ncbi.nlm.nih.gov/books/NBK539876/> Treasure Island (FL): StatPearls Publishing; 2023. Avulsed Tooth.
- [2] Muzzamil M, Pervez H, Naz I, Raza S. The status of knowledge, attitude and practice towards emergency management of avulsed tooth among dental students: A single center cross-sectional study. *J Pak Med Assoc* 2022; 72(4):721-24.
- [3] Souza BDM, Dutra KL, Kuntze MM, Bortoluzzi EA, Flores-Mir C, Reyes-Carmona J, Felipe WT, Porporatti AL, De Luca Canto G. Incidence of Root Resorption after the Replantation of Avulsed Teeth: A Meta-analysis. *J Endod* 2018; 44(8):1216-27.
- [4] Andreasen JO, Andreasen FM Examination and diagnosis of dental injuries. In *Textbook and Color Atlas of Traumatic Injuries to the Teeth*, J. O.Andreasen and F. M. Andreasen. Eds, Mosby, Copenhagen, Denmark 1994; 195–217.
- [5] Barrett EJ, Kenny DJ. Avulsed permanent teeth: a review of the literature and treatment guidelines. *Endod Dent Traumatol* 1997; 13(4):153-63.
- [6] Mazur M, Marasca R, Ottolenghi L. et al., “Different resorp-tive patterns of two avulsed and replanted upper central inci-sors based on scanning electron microscopy and stereomicroscopic analysis: a case report,” *Applied Sciences* 2020;10:10 3551.
- [7] Andersson L, Andreasen JO, Day P, Heithersay G, Trope M, Diangelis AJ, Kenny DJ, Sigurdsson A, Bourguignon C, Flores MT, Hicks ML, Lenzi AR, Malmgren B, Moule AJ, Tsukiboshi M; International Association of Dental Traumatology. 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.
- [8] Kinirons MJ, Sutcliffe J. Traumatically intruded permanent incisors: a study of treatment and outcome. *Br Dent J* 1991 23; 170(4):144-6.
- [9] Moule AJ, Moule CA. The endodontic management of traumatized permanent anterior teeth: a review. *Aust Dent J*. 2007; 52(1 Suppl):S122-37.

- [10] Kostka E, Meissner S, Finke CH, Mandirola M, Preissner S. Multidisciplinary treatment options of tooth avulsion considering different therapy concepts. *Open Dent J* 2014; 22; 8:180-3.
- [11] Kahler B, Hu JY, Marriot-Smith CS, Heithersay GS. Splinting of teeth following trauma: a review and a new splinting recommendation. *Aust Dent J* 2016; 61 Suppl 1:59-73.
- [12] Pohl Y, Filippi A, Kirschner H. Results after replantation of avulsed permanent teeth. II. Periodontal healing and the role of physiologic storage and antiresorptive-regenerative therapy. *Dent Traumatol.* 2005; 21(2):93-101.
- [13] Gopikrishna V, Tinagupta K, Kandaswamy D. Comparison of electrical, thermal, and pulse oximetry methods for assessing pulp vitality in recently traumatized teeth. *J Endod.* 2007; 33(5):531-5.