REPLANTATION OF AN AVULSED TOOTH AFTER PROLONGED DRY PERIOD: A CASE REPORT

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Abstract:
Avulsion is a serious injury showing prevalence varying from 1-16% of all dental injuries resulting in impaired dental and supporting structures, commonly involving the maxillary incisors. This case report presents a 10 year old child, who reported to the department of Pedodontics and Preventive dentistry with a history of fallen out upper right central incisor. The tooth had an open apex, was unclean and was kept in dry conditions for period of 42 hours before reporting. The tooth was replaced and splinted after being treated endodontically on the same day. Over a 2 year follow-up, post-operative dento-alveolar ankylosis along with replacement resorption was seen. In spite of the fact that, in children, replacement resorption leads to the loss of ankylosed teeth within 1-5 years, this tooth has remained in a stable, infraposition for 2 years in functional condition. Such cases can be considered for decoronation followed by permanent replacement options at the correct age.

Key Words: delayed replantation, avulsed tooth, splinting

INTRODUCTION
Tooth avulsion is defined as total displacement of the tooth out of its alveolar socket. It accounts for 0.5% to 16% of all traumatic injuries in the permanent dentition. Avulsion of permanent teeth occurs most frequently in children of 7 - 9 years age. The maxillary central incisors are the teeth most commonly affected due to their incompletely formed roots and resilient alveolar bone and periodontal structure.

Studies show that such injury is one of the most serious among dental injuries and the prognosis is very much dependent on the actions taken place at the site of accident and promptly after the avulsion. The most preferable management for the avulsed tooth is immediate replantation, within 20-30 min after injury or keeping in storage media until dental visit. Viability of the remaining periodontal ligament cell on the root surface of a replanted tooth is the most important factor in determining its prognosis. Total extra-alveolar time has less effect on the outcome provided when the tooth has been stored in a wet medium.

Replantation of avulsed tooth offers the advantage of preserving the alveolar ridge height. The purpose of this case report was

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to present the clinical and radiographic condition of an avulsed and replanted maxillary central incisor that was treated endodontically and splinted after an extended dry extra-alveolar period in a growing patient.

CASE REPORT:
A 10 year old male patient reported to the department of Pedodontics and Preventive dentistry, MDCRC with a chief complaint of loss of tooth following trauma in upper front tooth region 2 days back. Trauma was associated with bleeding followed by pain and swelling. Parents stored the tooth in dry condition and reported to the department after 42 hours.

On examination missing 11 with a stable clot within the respective socket was seen (figure 1). No extraoral soft tissue injuries were evident. Radiographic examination, showed no foreign hard tissue object within the socket. The tooth showed immature apex and was covered with dirt and blood.

The disto-incisal angle of the tooth was fractured (Ellis class II) and was not retrieved by the parents. Avulsed tooth was kept in saline (figure 2).

![Figure 2: Avulsed tooth in saline](image)

The root surface of the tooth was carefully cleaned with ultrasonic scaler to remove the dirt, blood and necrotic periodontal fibers (figure 3a). The tooth was first placed in 2.72% NaF solution for 20 minutes (figure 3b) followed by Doxycycline-saline solution.

![Figure 3: (a) Curettage of root to remove necrotic PDL (b) Tooth immersed in 2.72% NaF solution for 20 minutes](image)

An access opening for 11 was done on the same appointment, the necrotic pulp tissue was removed from the canal using broaches. Biomechanical preparation followed by thorough irrigation of the
canal with 5.2%, 20ml per canal Sodium Hypochlorite, and normal saline intermittently. The prepared canal was obturation with gutta percha outside the oral cavity. Coronal seal was obtained using composite restoration.

After completing the endodontic treatment, 3 mm of gutta percha was removed from the apex, the space thus created was filled with MTA in a retrograde manner.

Buccal infiltration of 1 ml 2% Lignocaine (Lignox) with 1:80000 adrenaline in the buccal vestibular region of 21 was administered to achieve local anesthesia. The empty socket was gently curetted with a curette to remove any coagulum, granulation tissue and pathologic tissue and gently irrigated with normal saline solution for 5 minutes. The avulsed tooth was then seated into the empty socket gently. Once the tooth was properly seated, it was checked for alignment and occlusion. The tooth was then splinted to the adjacent teeth (53, 12, 21, 22, 63) with a 0.5 mm stainless steel round wire and light cure composite (Ivoclar Vivadent) (figure 4a and b). After splinting, the tooth was evaluated clinically and radiographically to exclude any pathological mobility, sharp edges and occlusal disharmony. A 23 gauge wire flexible splint was placed from 53 to 63. The patient was prescribed tetanus toxoid and was kept on prophylactic antibiotic regimen doxycycline (2mg/kg body weight) for 7 days, and soft diet for 3 weeks.

Chlorhexidine mouthwash was prescribed for maintaining oral hygiene twice a day for one week. The patient was recalled after three weeks for removal of the splint and composite build-up for the fractured segment was done. On one month recall intraoral periapical radiograph showed no abnormal findings. The patient did not report any pain or discomfort (figure 5).

Figure 4: (a) Post-operative frontal view of splinted 11 (b) Intra-oral periapical radiograph after replantation and splinting of 11

Figure 5: Intra-oral periapical radiograph on 1 month recall showing no signs of periapical changes or resorption.

Tough the patient did not turn up at 12 month recall, at 24 month recall the tooth
was still asymptomatic, showed ankylosis, and was below the occlusal level as compared to contralateral tooth (figure 6). On intraoral periapical radiograph 11 showed replacement resorption on mesial aspect of root in middle and apical third region (figure 7).

![Figure 6: Infraocclusion of 11 seen at 24 months recall.](image)

Although dentin was seen surrounding the canal, the tooth was asymptomatic and considered for further observation.

**DISCUSSION:**

The guidelines for the treatment of avulsed permanent teeth vary as the treatment decision regarding avulsed teeth is related to the maturity of the root apex (open or closed) and the condition of the PDL cells.

The viability of PDL cells depends on the storage medium and the time the tooth has been out of the mouth. Factors such as patient’s age, injury severity, timely treatment and follow-up of the teeth can maximize the chances of success. Delay in replanting the tooth is often related to lack of knowledge of patients, their parents or who treated them. Dentists should always be prepared to give appropriate advice to the public about first aid for avulsed tooth.

![Figure 7: Intra-oral periapical radiograph showing root resorption on mesial surface 24 months post-replantation](image)

Periodontal inflammation, root resorption, and ankylosis can interfere with the success of re-implantation. Immediate replantation of avulsed tooth should be encouraged but when this is not possible (if patient is unconscious) the tooth can be stored in coconut, milk, water or any other suitable storage medium and reported to the emergency clinic.

The tooth can also be transported in the mouth, keeping it inside the lip or cheek, however not suitable for very young patients. According to Andreason, replantation of tooth beyond 5 minutes has been defined as delayed replantation and if the tooth has been out of the mouth for more than 2 hours, there is a 95% chance of external resorption.

Besides this, studies have stated that avulsed and replanted teeth may be lost as
early as 2 months or survive for many years after replantation. A complete resorption of the root substances have been reported in a period of 3–7 years in patients aged 8–16 years.\textsuperscript{7,9} In the present case, the injury occurred 42 hours earlier, and the avulsed right maxillary central incisor was kept under dry conditions.

Treatment of root surface with various agents such as tetracycline, dexamethasone, stannous fluoride and sodium fluoride have been suggested by various authors.\textsuperscript{10-12} Apart from these topical applications, systemic antibiotic therapy is recommended to avoid the onset of infection. Keller et al have showed the advantage of the use of Doxycycline 100 mg/day for 7 days (children=2 mg/ kg/day) in cases of avulsion.\textsuperscript{13,14}

Other treatment options in such cases could have been; prosthetic rehabilitation with the avulsed tooth by splinting it with Fibre Reinforced Composite or implants depending on the patient’s age. However, this treatment plan would result in depressed alveolar bone growth.

Replantation is the best resort to retain alveolar bone and dental harmony in a young child. Replantation, particularly for a child, must be carried out even if the prognosis is not good since it simulates physiological growth of bone and alveolar process. This in future aids the placement of prosthesis.

CONCLUSION:

Treatment of avulsed teeth should be considered an emergency situation that should be provided as soon as possible. Followed by definitive treatment based on the clinical and radiographic follow-up examination.

Crown restoration and sealing the endodontic access cavity should be performed as soon as possible to prevent infection of the root canal filling and strengthen the cervical area of the tooth. It has been demonstrated that coronal leakage and penetration of microorganisms through the crown may be one of the main reasons for endodontic failure. The survival of ankylosed teeth free of infection-related complications is primarily dependent on patient-related factors (growth pattern, attitude to esthetics) as well as operator dependent factors (individual guidelines for replantation and transplantation, operative options).

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