

## Case Report: Delayed Replantation of Avulsed Tooth

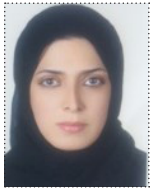
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### ABSTRACT

This is a case of delayed replantation of avulsed maxillary central incisor after an extended dry extra-alveolar period. A 10-year-old boy presented with avulsed maxillary central incisor after a fall that resulted in dental trauma, occurring 18 hours earlier. Treatment guidelines for avulsed mature permanent teeth with prolonged extraoral time were carried out for the teeth and the extraoral endodontic treatment was completed. After having been repositioned, the tooth was stabilized for 6 weeks and prophylactic antibiotic was prescribed. Clinical and radiographic controls were done during the next 12 months. During the follow-up period, the tooth remained in a stable, functional position but revealed clinical initial replacement resorption and ankylosis.

### 1. Introduction

**T**ooth avulsion is a complete displacement of a tooth from its socket and is seen in 0.5% to 3% of all dental injuries [1-3]. The prevalence of avulsion cases in children increases between the ages of 7 and 9 years due to incomplete root development and minimal resistance of the alveolar bone/periodontal ligament

(PDL) against extrusive forces during the eruption period of the teeth [1, 3].

The etiology of tooth avulsion varies according to the type of dentition. Avulsion in primary dentition is typically a result of hard objects hitting the teeth, whereas avulsion in permanent dentition is generally a result of falls, fights, sport injuries, automobile accidents, and child abuse [4-6].

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In permanent and primary dentition, avulsion generally occurs in the maxilla, and the most commonly affected teeth are the maxillary central incisors. Increased overjet and incompetent lips were identified as potential etiological factors in such avulsion cases [2, 4, 7]. Although avulsion usually involves a single tooth, tooth-supporting tissue injuries, lip injuries, and multiple avulsions have also been documented [8, 9].

The primary goal in treating an avulsed tooth is to preserve and treat the supporting tooth tissues and replant the avulsed teeth. The success of replantation depends on the patient's general health, the maturity of the root, the time the tooth is out of its socket, and storage medium [10–13]. The period of extra-oral time and the storage medium have the most critical effect on the status of the PDL cells [11–13]. This report aimed to present a case of delayed replantation of avulsed maxillary central incisor after an extended dry extra-alveolar period.

## 2. Case Report

A 10-year-old boy was referred from Bahonar Hospital to the Department of Pediatric Dentistry, University of Medical Sciences, Kerman, Iran after a fall that resulted in his dental trauma. The trauma occurred 18 hours before the admission while the child was playing in the playground in last evening.

The patient's medical and family history was non-contributory for the pertinent findings. On examination, the patient did not show any signs or symptoms of neurological or extraoral injury. His parents had let the avulsed tooth dry in a piece of paper and brought it to the clinic. The intraoral examination revealed that the maxillary left permanent central incisor (tooth 21) was avulsed (Figure 1). Examination of the avulsed tooth revealed that the crown had an enamel fracture, the root

had a closed apex, and the labial mucosa had lacerated (Figure 2). In a vitality test, the adjacent teeth gave a positive response. The patient had permanent dentition. No carious lesions were detected clinically, and his oral hygiene was fair.

After the examination, the treatment guideline for avulsed permanent teeth with closed apexes and prolonged extraoral time for avulsed teeth were followed [3]. The root canal treatment was completed at this appointment extraorally, and the root filling was done with gutta-percha and sealer.

Glass ionomer cement and composite were used to restore the access cavity. The necrotic and dried remnants of periodontal tissue were carefully removed from the root surface of the tooth. Local anesthetic was administered, and the empty socket was thoroughly irrigated with sterile saline. After removing coagulum from the socket, the tooth was replanted using light pressure. A periapical radiograph was taken to ensure that the tooth had been correctly positioned in the socket (Figure 3). The permanent restoration of the fractured tooth crown was completed with resin composite (Figures 5-7).

The tooth was stabilized using a flexible splint (0.7 inch wires) and the acid-etch composite resin technique (Figures 3, 4). Moreover, oral hygiene instructions and advice about a soft diet and the need to use a chlorhexidine 0.12% mouth rinse during the stabilization period were provided at this time. Prophylactic antibiotic therapy with penicillin VK 250 mg QID was prescribed for one week. The patient was also referred for an anti-tetanus booster. The parents were informed about the importance of regularly returning for clinical and radiographic follow-up. The patient was examined after 2 and 4 weeks, and no clinical or radiological pathological changes were detected. The patient was seen again



Figure 1. Avulsion of the left upper incisor.



Figure 2. Enamel cracking and fracture in avulsed tooth.



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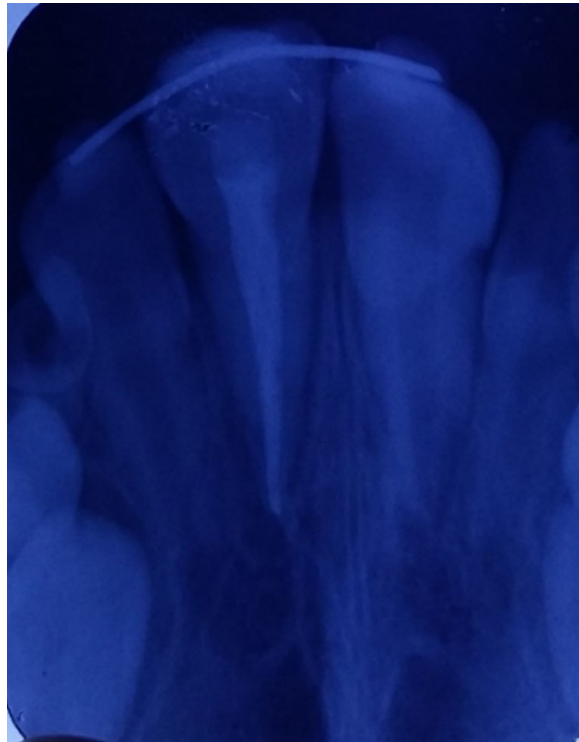
**Figure 3.** Splinting of the avulsed tooth with orthodontic wire and composite resin.

6 weeks after replantation, and the splinting wire was removed at this appointment.

### 3. Discussion

The guidelines for the treatment of avulsed permanent teeth vary, but the consensus is over the immediate replantation of the avulsed tooth [3, 4]. However, it cannot always be carried out immediately.

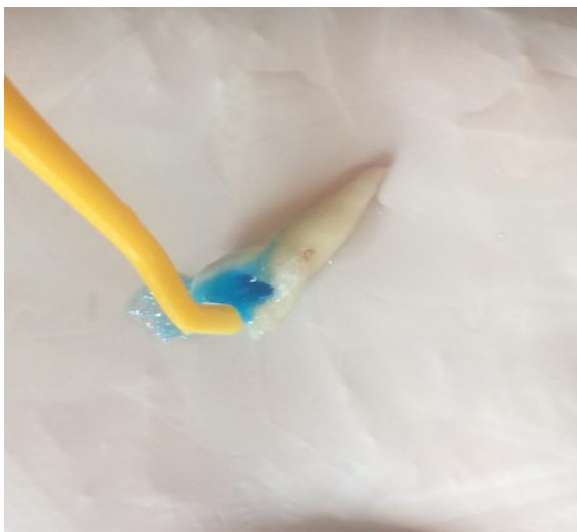
The treatment decision regarding avulsed teeth relates to the maturity of the root apex (open or closed) and the condition of the PDL cells. The condition of PDL cells depends on the storage medium and the time the tooth has been out of the mouth [10, 11, 14–16]. The extraoral period significantly affects the outcome and directly correlates with the survival of PDL cells. Clinical stud-



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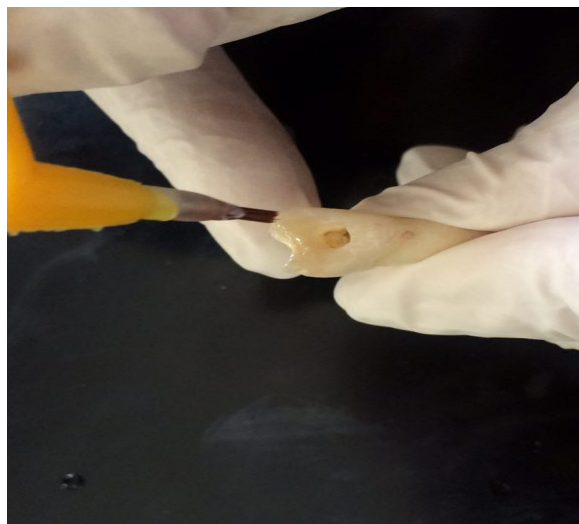
**Figure 4.** Periapical radiograph after replantation of avulsed tooth.

ies have indicated that teeth replanted within 5 minutes after avulsion have the best prognosis [17]. After a dry time of 60 minutes or more, all PDL cells are nonviable [3, 4]. The storage and transport media during the extraoral time are also of vital significance. In patients with a prolonged extraoral time, the tooth should be maintained in a suitable media, such as HBSS, saline, milk, or saliva until it is replanted by a dentist [18, 19].



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**Figure 5.** Acid-etch technique.



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**Figure 6.** Bonding and composite resin.





**Figure 7.** Final restoration and polished.

In the present case, the tooth was kept in dry pieces of paper, and the extraoral dry time was more than 60 minutes (18 hours). The management of this case was in accordance with the accepted replantation protocol described by the International Association of Dental Traumatology [3]. It is indicated that if the tooth has been dried for more than 60 min before replantation, the root canal treatment may be done extraorally prior to replantation or later. Because there were no chances of obtaining pulp space revascularization and the periodontal ligament would be necrotic and not expected to heal, it was decided to treat the root canals extraorally. The pulp was extirpated and the root canal obturated with gutta percha and a sealer. The tooth was then placed in a 2.4% solution of sodium fluoride (acidulated to pH=5.5) for 20 min and before replantation tooth was placed in hypochlorite 5% about 5 minutes, then irrigated with normal saline and repainted.

According to traumatology guidelines and articles on delayed replantation cases, PDL cells will be necrotic following delayed replantation, resulting in a poor long-term prognosis [1, 3, 4, 20]. Most avulsion trauma occurs before completion of the patient's facial growth. Preventing resorption of the surrounding bone and maintaining the tooth in the arch space are critical until facial growth is completed. Replantation can restore the patient's esthetic appearance and occlusal function and prevent physiological trauma, which may be associated with a missing anterior tooth. If the avulsed incisor had not been replanted in the present case, other treatment options might have included prosthetic replacement of the missing incisor, space closure with orthodontic treatment, or autotransplantation of another tooth to the empty space.

Replanted teeth must be monitored carefully and clinical/radiographical findings should be recorded. In children and adolescents, ankylosis is frequently associated with infraposition of the replanted tooth. The replanted teeth of both cases presented here showed signs of ankylosis.

Despite an extended extra-alveolar dry storage time, teeth with delayed replantation might be retained in a stable and functional position in the dental arch. In patients for whom growth has not ceased, using the replanted tooth to maintain the surrounding bone for a few years until the patient is a viable implant candidate can be considered a suitable therapeutic option.

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### Conflict of Interest

The authors of this paper declared no conflict of interest in this study.

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