

Replantation of Avulsed Maxillary Central Incisor: A Case Report

Abdulaziz Saad Abu-Melha*

Associate Professor, Department of Restorative Dental Sciences, King Khalid University College of Dentistry, Abha, Saudi Arabia

***Corresponding Author:** Abdulaziz Saad Abu-Melha, Associate Professor, Department of Restorative Dental Sciences, King Khalid University College of Dentistry, Abha, Saudi Arabia.

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Abstract

The present case report described the management of an avulsed maxillary central incisor tooth reported in a 14 years old boy, using the re-plantation method following the standard treatment guidelines. Success in the present case has been determined at follow-up visits about esthetics, maintenance of occlusion, and psychological and physiological trauma to the patient. The present case report provides an insight into the treatment protocol followed for replantation.

Keywords: *Avulsion; Extra-Oral Time; Maxillary Central Incisor; Replantation; Root Canal Treatment; Splinting*

Introduction

Dental traumatic injury is an unexpected, circumstantial, accidental, and sudden injury to the teeth and surrounding tissues, requiring emergency attention [1]. The main etiological factors causing traumatic injuries are fights, falls, automobile accidents, and sports injuries [2]. Traumatic dental injuries are more prevalent in childhood and early adolescence. The most severe form of traumatic injuries is tooth avulsion (exarticulation) [3].

Tooth avulsion is total tooth displacement out of its alveolar socket characterized by damage to the pulpal tissues, cementum, periodontal ligament, alveolar bone, and surrounding gingival tissues [4]. In permanent dentition, the prevalence of avulsion range from 1% to 16% of the total traumatic injuries [5], being more prevalent among 7 to 9 years old children, as the periodontal ligament is loose and the surrounding bone of the tooth is slightly mineralized. Maxillary central incisors are found to be more prone to avulsion injuries [6].

The main aim in managing an avulsed tooth is protecting and treating the supporting tissues and replanting the avulsed teeth. The success of replantation is dependent on the health of the patient, status of root maturation, extra-oral, and type of storage medium [7]. The period for which the tooth is out of its socket and type of storage medium are the primary deciding factors for the status of the PDL cells [8].

The critical decision for a dentist is whether to replant the avulsed tooth or not; that depends on various biologic considerations affecting the treatment outcomes. As avulsion has a profound impact on the psychological and social development of the child, thus it is necessary to talk with parents at the time of the injury regarding the treatment and its prognosis. The present case report is the management of an avulsed maxillary central incisor by replantation following endodontic treatment and splinting. It also describes the successful clinical and radiographic findings observed after one year of follow-up.

Case Presentation

A 14-year-old boy had a sports' injury and got his right maxillary central incisor avulsed. The tooth did not fall on the floor but was hanging out of the socket, and the patient removed it from the socket. His parents immediately took him to a hospital, from where he was referred to an Endodontist. The patient reported to the Endodontist with his parents a day after trauma with his avulsed tooth (right Maxillary central incisor {11}) wrapped in a dry gauze-piece. The tooth had a closed apex, was not stored in any solution and hence was dry, and extra-oral time was reported to be 16 hours.

The past dental and medical history was not relevant. The patient was in pain but was healthy, conscious, and alert with no signs and symptoms of cerebral involvement (with no reported headache, amnesia, unconsciousness, dizziness, vomiting, cognitive and visual impairments). Extra-oral examination revealed no soft tissue injuries, swelling, or asymmetry. No lymphadenopathy in the submandibular and neck areas was reported on clinical examination.

Intra-oral examination demonstrated a permanent dentition, with class I skeletal and dental relationship. Tooth 11 was avulsed with no remaining fractured teeth/bone fragments and no gingival or labial laceration. Adjacent teeth were normal and oral hygiene was also good. Periapical radiographs were done, showing a normal socket for tooth 11 with healthy adjacent teeth (Figure 1).



Figure 1: Pre-operative radiograph.

The parents were informed about two treatment options being non-surgical root canal treatment with splinting or dental implant. The patient wanted to retain his avulsed tooth. The treatment procedure and the expected prognosis were explained to the patient and his parents. Informed consent was taken from the patient before starting the treatment. The left maxillary central incisor did not respond to vitality tests, but it was decided to monitor it until the next visit, considering the transient reaction to trauma.

Non Surgical root canal treatment with a flexible splint in relation to tooth 11 was planned, based on the International Association of Dental Traumatology Guidelines [9] for avulsed permanent teeth with closed apex (as the extra-oral dry time was more than 60 minutes). Complete root canal treatment was done on tooth 11, extra-orally, using hand files and standard irrigation protocol. Canal obturation was done using vertical warm condensation followed by composite restoration. The tissue was scraped off the tooth surface using saline and immersed in 2% Sodium Fluoride for 20 minutes.

After administering the local anesthesia, the blood clot was removed from the tooth socket, and irrigation was done using saline. The avulsed tooth was repositioned and stabilized with a flexible splint for four weeks using a round wire (0.028 inches) and light-cure resin composite from the right maxillary second premolar to the left maxillary central incisor (Figure 2). Occlusion was checked, and a post-operative radiograph was taken. Voids were noticed in the obturation; thus, re-treatment was planned after splint removal. The post-operative instructions were given, 0.2% chlorhexidine mouth rinse and antibiotics were prescribed.



Figure 2: RCT and splint w.r.t 11.

On follow-up visit after a month, patient had a complaint of slight pain. Left maxillary central incisor was evaluated for pulp vitality and found non-vital. Non-surgical root canal treatment was planned for tooth 21, and re-treatment was done for tooth 11 (Figure 3 and 4). The patient was recalled postoperatively at 6 and 12 months (Figure 5 and 6) after replantation and then followed up every six months.



Figure 3: Follow up after 4 weeks.



Figure 4: Post-operative radiograph showing re-treatment wrt 11 and RCT wrt 12.



Figure 5: Post-operative radiograph after 6 months.



Figure 6: Post-operative radiograph after 1 year.

On follow-up, the replanted tooth was functional and esthetically acceptable. On clinical examination, the tooth was normal on percussion, with no significant tooth mobility. Post-operative radiograph revealed no inflammation or replacement root-resorption. The adjacent anterior teeth remained asymptomatic.

Discussion

The guidelines vary for treating the avulsed permanent teeth, but the consent on the ideal treatment for an avulsed tooth is replanting the tooth immediately. However, various situations do not allow it to be carried out immediately [10].

The best management of avulsed teeth is replanting them within 20 - 30 minutes after trauma and keeping them in a suitable storage medium till treatment to help preserve the viability of periodontal ligament cells, thus optimizing the healing of the socket with minimizing the root resorption [11]. The best storage media that keep the periodontal cells viable are Viaspan, HBSS (Hank's Balanced Salt Solution), milk, contact lens solution, saliva, etc [12].

If the extra-oral dry time is > 60 minutes, the periodontal ligament is not expected to survive because of irreversible damage to the cells, and upon replantation, an inflammatory response is elicited over a diffuse area on the root surface that causes loss of the tooth. For preventing the inflammatory response and increase the resistance to resorption, the necrotic periodontal tissue should be removed from the roots of avulsed teeth. To reduce the chances of replacement resorption, the tooth should be placed in a 2% stannous fluoride solution [13].

Thus, in the present case, we immersed the avulsed tooth in 2% stannous fluoride solution before replantation.

In the present case, the patient reported a dry tooth after 16 hours of the injury. As reported in various studies [7], if extraoral time exceeds 60 minutes, the chances of pulp space revascularization decrease and the periodontal ligament becomes necrotic; thus, it was decided to treat the root canals extra-orally before replanting the tooth back in the socket.

Besides restoring the esthetics, replantation also helps prevent resorption of the alveolar bone, maintaining the tooth in the alveolar arch until facial growth is completed, restoring the occlusion, and preventing physiological and psychological trauma [7,12,13].

Thus, the avulsed tooth was replanted after explaining the prognosis to the patient in the present case. Besides replantation, other treatment options that might have been considered were orthodontic space closure, implants, prosthetic replacement of the missing incisor, or auto-transplantation using another tooth in the socket [14].

In studies by Surekha., *et al.* [14] and Cho., *et al.* [15], successful results were observed after replantation of avulsed permanent teeth, even prolonged dry storage. Similar to these studies, we also observed success in the replantation even after a year of follow-up, with maintenance of alveolar bone and no evidence of replacement resorption and ankylosis. However, the patient is still under follow-up to determine the ultimate fate of the replanted tooth under all favorable and unfavorable oral conditions.

Thus, the present case revealed that replantation using ideal treatment protocols could be a good and effective treatment option for managing the avulsed teeth in children and adolescents.

Conclusion

Before planning the treatment for avulsed permanent teeth, both patient and parents should be made aware of the consequences and prognosis of such treatment. Replantation of avulsed permanent teeth should be planned after considering factors like extra-oral time, storage media type, and socket condition. The present case report provides an insight into the treatment protocol followed for replantation.

Conflict of Interest

None.

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