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Delayed Replantation of Avulsed Tooth: A Case Report

[1]Fenu Dafaria, Post Graduate Student, Madhya Pradesh Medical Science University, Indore, India

[2]Bharath Bhushan A.K., Professor & Head of the Department, Madhya Pradesh Medical Science University, Indore, India

[3]Avani Gupta, Post graduate student, Sri Aurobindo College of Dentistry, Madhya Pradesh Medical Science University, Indore, India

[4]Dr. Abhilasha Manker, Senior lecturer, Sri Aurobindo College of Dentistry, Madhya Pradesh Medical Science University, Indore, India

[5]Dr. Khushboo Barjatya, Reader, Sri Aurobindo College of Dentistry, Madhya Pradesh Medical Science University, Indore, India

[6]Dr. Binti Rani Chand, Reader, Sri Aurobindo College of Dentistry, Madhya Pradesh Medical Science University, Indore, India

Corresponding Author: Fenu Dafaria, Department of Pediatric & Preventive Dentistry, Post graduate student, Sri Aurobindo College of Dentistry, Madhya Pradesh Medical Science University, Indore, India

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Abstract

This case report presents a case of delayed replantation of avulsed maxillary central incisor after an extended dry extra-alveolar period. 11 year old boy presented with avulsed maxillary central incisor due to trauma occurring 12 hours earlier. Treatment guidelines for avulsed permanent teeth with prolonged extra-oral time were carried out for the teeth and the endodontic treatment was completed. After having been repositioned, the teeth were stabilized for 4 weeks and prophylactic antibiotic was prescribed. Clinical and radiographic follow up was done till 2 years. During the follow-up periods the tooth reported in this case have remained in a stable, functional position but revealed clinical initial replacement resorption.

Keywords: Dental Injuries, Tooth Avulsion, Tooth Replantation Trauma.

Introduction

Tooth avulsion is complete displacement of a tooth from its socket and is seen in 0.5–3% 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].

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 to 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].

The aim of this case report is to present a case of delayed replantation of avulsed maxillary central incisors after an extended dry extra-alveolar period.

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

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 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 extra-oral period significantly affects the outcome and has a direct correlation with the survival of PDL cells. Clinical studies 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 extra-oral time are also of vital significance. In patients with a prolonged extra-oral 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].

Case Report

The patient, an 11-year-old boy, attended for emergency treatment at the Dept. of Pediatric & Preventive Dentistry during a morning session (Fig. 1). He had collided with a child while running in a garden the previous night, and his tooth 11 had been avulsed & 12 had been luxated.

His parents had let the avulsed tooth dry in a piece of paper and brought it to the clinic after 12 hours of extra-oral dry time. The patient's medical history was unremarkable, but he was due for an anti-tetanus booster. On examination, the patient did not show any signs or symptoms of neurological or extra-oral injury, and he presented with a class I skeletal relationship.

The intraoral examination revealed that the maxillary right permanent central incisor (tooth 11) was avulsed (Fig.2) & right permanent lateral incisor (tooth 12) was luxated & displaced palatally. Laceration of the palatal mucosa, was detected.

The patient had mixed dentition. Periapical radiographs revealed no alveolar bone wall fracture or other hard tissue injuries.

Examination of the avulsed tooth revealed that the crown was intact and that the root had a nearly closed apex, but the root surface was covered with dried remnants of periodontal tissue (Fig.3). It was estimated that the avulsed tooth had been kept dry for about 12 hours.

After informing the parents of the patient about possible risks, the socket of the tooth was gently rinsed with saline solution under local anesthesia. The root of the tooth was cleaned carefully to remove necrotic and dried remnants of periodontal tissue.

Tooth was soaked in 1.23% APF gel for 20 minutes followed by doxycycline solution for 15 minutes before replantation.

The tooth was replanted slowly, with slight digital pressure. The position of the replanted & luxated teeth were verified both clinically and radiographically (Fig.4). The tooth was stabilized using a flexible splint (23 gauge wire) from 54 to 22 for 4 weeks (Fig.5). Moreover, oral hygiene instructions were given, soft diet was adviced and chlorhexidine mouth rinse during the stabilization period were provided at this time. Prophylactic antibiotic therapy with amoxicillin at 3 divided doses of 750 mg/day was prescribed for 5 days. 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 reviewed every week, and no clinical or radiological pathological changes were detected. The patient was seen again four weeks after replantation. At this appointment an access opening & BMP was performed with 11, splint wire was removed & $Ca(OH)_2$ dressing given for a week.

The dressing was changed after 1 week with triple antibiotic paste. Obturation was done a week later (Fig.6). The patient was then recalled after 3 months, 6 months, 1 year & 2 years for follow up (Fig.7). The patient will be monitored till his growth is complete and appropriate treatment will be carried out if needed.

Discussion

In the present case, the tooth was kept in dry piece of paper, and the extra-oral dry time was more than 60 minutes (12 hours in this Case). The management of the case presented here 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 dry for more than 60 min before replantation, the root canal treatment may be done extra-orally prior to replantation or later.

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].

Ebeleseder et al. concluded that the main reason for a failure of a replantation of avulsed teeth is extended extraoral unphysiologic storage. [21]

Werder et al. in a study concluded that the use of a strict endodontic treatment protocol after replantation minimized the risk of infection-related root resorption. The occurrence of replacement resorption was mainly influenced by the duration of the non-physiologic extraoral storage time and storage medium. [22]

In an experimental study conducted by Selvig et al. where root surface treatment was done with SnF_2 followed by tetracycline resulted in complete absence of inflammatory resorption and ankylosis. [23]

In a similar experimental study by Selvig et al. where strength reduction of SnF_2 solution from 1% to 0.1% was done & found that it may result in less prevention of inflammatory resorption and ankylosis. [24]

Ma and Sae-Lim in an experimental study found that topical application of minocycline to the root surface

appeared to result in higher occurrence of complete healing. [25]

Kinirons et al. concluded that the prevalence of resorption in teeth with no visible contamination was 57.1%, for those with contamination which were washed clean it was 75%, in those rubbed clean it was 87.5%, and it was 100% for those re-implanted with visible contamination still present. [26]

Lima et.al concluded that delay in seeking treatment may damage the prognosis of severe luxation and replanted teeth. [27]

Most avulsion trauma occurs before the patient's facial growth is completed. Preventing resorption of the surrounding bone and maintaining the tooth in the space of the arch 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 incisors 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.

Conclusion

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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Legends Figure

Fig. 1: Extraoral view of patient at 1st visit

Fig. 2(a)

Fig. 2(b)

Fig.2 (a) & (b) Intraoral clinical pictures showing empty socket with 11 post avulsion & palatal luxation with 12

Fig. 3: Avulsed 11

Fig. 4: Radiographs showing socket a) before re-implantation & b) after re-implantation

Fig. 5 (a)

Fig. 5 (b)

Fig. 5 (a) & (b): Shows wire (23gauge) splint from 54 to 22.

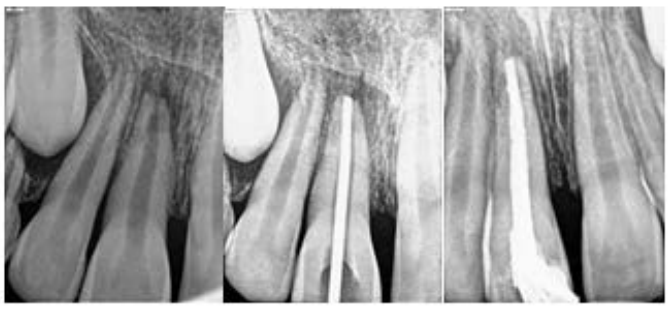

Fig. 6 a b c

Fig. 6: Radiographs showing a) socket after re-implantation b) master cone c) Post-obturation

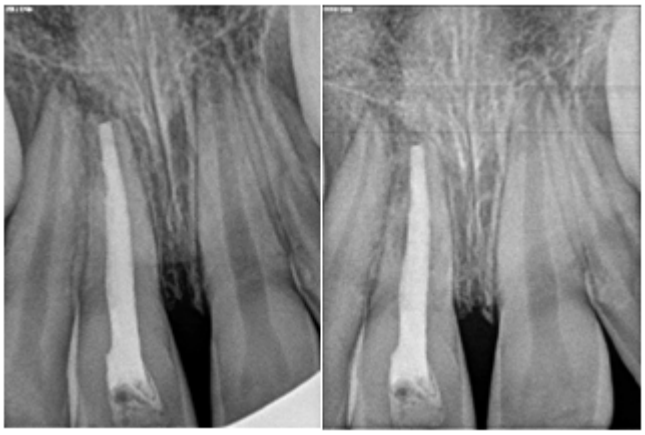

Fig. 7 a b

Fig. 7 c d

Fig. 7: Follow up pics at: a) 3 months b) 6 months c) 1 year d) 2 years