

CASE REPORT

Delayed Replantation of Avulsed Incisor with Prolonged Extraoral Dry Storage

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ABSTRACT

Trauma to the anterior teeth mainly affects children and adolescents. Tooth avulsion has become a common dental injury, that can occur at any age with maxillary anteriors being commonly affected. It affects the esthetics and psychological well being of both the child and the parent. Management of tooth avulsion in the permanent dentition often presents a challenge to the dental professional. Definitive treatment planning and consultation with specialists is seldom possible at the time of emergency treatment. Replantation of the avulsed tooth is an immediate procedure, which can restore the esthetics, function and create positive impact on patient if carried out under ideal conditions. This article describes the management of a patient with an avulsed maxillary permanent central incisor, that had been stored in unfavorable conditions for about 48 hours. Adequate space maintenance, esthetics and functional requirements of the patient were totally met till a long-term treatment is planned, when the patient finishes his pubertal growth.

Keywords: Avulsion, Delayed replantation, Maxillary central incisor.

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INTRODUCTION

Avulsion of teeth results from traumatic injuries in the orofacial region. The term avulsion implies total displacement of the tooth out of the socket. It accounts for 0.5 to 16% of traumatic injuries in the permanent dentition.¹ Maxillary anterior teeth are usually the most affected. Avulsion of permanent teeth occurs most often

in children 7 to 9 years old, when the alveolar bone is relatively resilient and provides only minimal resistance to extrusive forces.¹ The most preferable treatment option is replantation of the avulsed tooth, which can restore occlusal function and esthetic appearance shortly after trauma. In replantation the main objective is to reestablish the vitality of periodontal fibers after the treatment. The prognosis of replantation depends on the maintenance of vitality of the periodontal ligament (PDL) cells on the root surface.² Clinical reports have indicated that the prognosis is best for teeth replanted within 5 minutes of avulsion.³⁻⁶ Most often replantation is not done immediately, because of injury circumstances. Extended non-physiological storage of avulsed teeth before replantation results in necrosis of the PDL and consequent healing by replacement root resorption.⁶ Degeneration of the PDL depends on factors, such as extra-alveolar period, storage medium used and management of the root. The tooth replantation procedure can be either successful or it will contribute to the normal development of jaw in growing patients as time is gained to establish a definitive treatment plan, when growth is completed.⁷ So, clinicians should be in a better position to minimize the incidence of complication associated with replantation. This article describes the management of mature avulsed maxillary central incisor with an extra-alveolar dry storage of 48 hours.

CLINICAL REPORT

A 14-year-old boy reported to the department of pedodontics and preventive dentistry, with the chief complaint of avulsed upper anterior tooth and lip laceration following a road traffic accident. Extraorally, there was moderate swelling and ulcer with crust formation on the upper lip. Clinical examinations revealed an Ellis class V fracture of upper right central incisor and Ellis class III fracture of left central incisor (Fig. 1). The avulsed tooth was retrieved from the site of the accident and was kept dry in a plastic container for 48 hours. Examination of avulsed tooth revealed, that the root had closed apex and the tooth crown had an enamel fracture (Fig. 2). The root surface was covered with dried remnants of periodontal tissue. The patient's medical history was unremarkable. All the adjacent teeth

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Fig. 1: Preoperative intraoral photograph showing avulsion irt 11 and class III fracture irt 21



Fig. 2: Avulsed tooth

showed positive response to the vitality test except #21. Radiological examination, revealed empty socket with no other hard-tissue injury and a panoramic radiograph confirmed no maxillary or mandibular fractures. Clinical and radiographic examination, revealed no foreign objects in the soft-tissue. The available treatment alternatives were explained to the parent, and it was decided to replant the avulsed tooth as an intermediate treatment. The main objective was to retain the tooth in the mouth for as long a period as possible, because of the patient's age, although the tooth was stored in extremely unfavorable conditions. The avulsed tooth was rinsed gently with normal saline and root planing was done to remove the necrotic PDL cells. The tooth was then placed in 1% sodiumhypochlorite solution to dissolve PDL remnants. The tooth was then soaked in 2.4% acidulated sodium fluoride solution for 20 minutes prior to replantation. Since, there was prolonged extraoral time, root canal therapy was completed extraorally and

filled with gutta-percha points and access cavity was filled with composite. Under local anesthesia, the socket was gently curetted to remove any coagulum and induced fresh bleeding, and irrigated with physiologic saline solution in order to achieve the proper placement of the tooth. The labial and the palatal cortical plates were pressed to provide proper approximation. An intraoral periapical radiograph was taken to check for the proper placement of the replanted incisor. Etching was done with 37% phosphoric acid from maxillary canine to canine. All the teeth were then rinsed with the avulsed tooth still under pressure. Bonding agent was applied and light cured. A stainless steel ligature wire was used to splint the teeth along with composite (Figs 3 and 4). Root canal treatment of the tooth #21 was completed. Antibiotic and anti-inflammatory drugs were advised for 7 days. The patient was referred to the hospital for an anti-tetanus booster. The patient was advised to avoid biting with the splinted teeth and was put on soft diet for 2 weeks.



Fig. 3: Replanted 11 stabilized by splinting

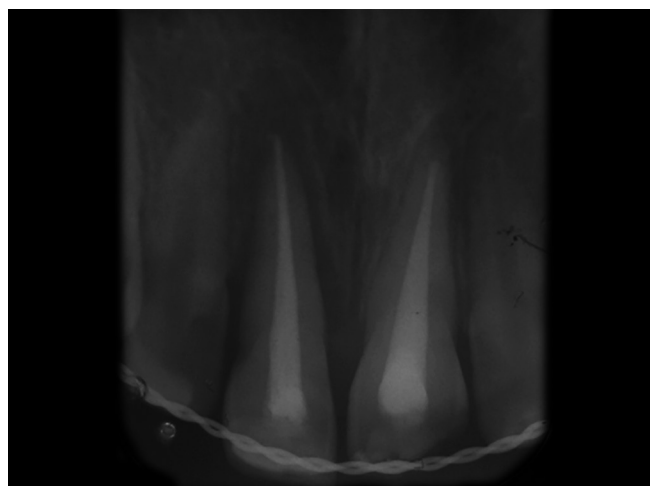


Fig. 4: Intraoral periapical radiograph taken after replantation of 11 and wire composite splinting

Oral hygiene instructions were given and chlorhexidine mouthwash was recommended. Postoperative recall was performed after 1 week of replantation. As the tooth was not completely firm in the socket even after 7 days, it was decided to continue the splinting for 7 more days. The splint was removed after 14 days. The patient did not show any signs and symptoms like mobility, any type of root resorption after replantation. Composite build-up was done on 11 and 21 (Fig. 5). The patient was seen after 1, 3, 6 months and 1 year after replantation. Follow-up radiograph after 24 months intraoral periapical radiograph (IOPA) revealed showed no signs of resorption or ankylosis (Fig. 6). The patient is still under review. During the follow-up period, the patient was asymptomatic. Even if replacement root resorption occurs later, the replanted incisor will be replaced later with a prosthesis when its root will be totally resorbed. Long-term treatment may also include prosthodontic replacement with an implant when the patient finishes his pubertal growth.



Fig. 5: Postoperative photograph after composite build-up of 11 and 21



Fig. 6: Intraoral radiograph at the end of 24 months

DISCUSSION

The prognosis of an avulsed tooth is proportional to the extraoral time, which is a direct correlation of the status of the PDL cells.⁴ The storage and transport media during extraoral time of vital significance. The commonest transport media are Hank's balanced salt solution (HBSS), milk, saline, and saliva (Buccal vestibule). In the present case, the avulsed tooth had been in extremely unfavorable condition for 48 hours. It was anticipated for poor prognosis as the chance of pulpal and periodontal healing would be extremely low. Considering the patient's age and benefits of esthetics and function, replantation was attempted.

According to Donaldson and Kinirons⁸ extraoral dry time is the most crucial factor associated with the development of postreplantation root resorption. Andreason⁹ claimed that replacement resorption occurred if the extraoral dry time was more than 60 minutes, and no cell remained vital beyond 120 minutes of dry time on the root.⁹ As the extraoral dry time was more than 60 minutes, root canal treatment was performed outside the oral cavity. This seems to prevent inflammatory root resorption caused by pulpal infection.

Root planing of the tooth was done to remove all necrotic PDL to limit the degree of surface inflammation on the root surface. Tooth was then immersed in sodium hypochlorite to dissolve connective tissue remnants. Pretreatment of a delayed replanted tooth, prior to its replanting, will render it more resistant to resorption.¹⁰ Andreasen and Andreasen¹ recommends that the tooth should be soaked with 2.4% acidulated sodium fluoride solution for 20 minutes, before replantation.¹ The use of fluoride solutions in different forms and concentrations have been recommended to treat the root surfaces in case of delayed tooth replantation assuming that demineralized dentin surface would be more prone to fluoride incorporation and might become more resistant to resorption.¹¹ Fluoride acts on the bone tissues, cementum and dentin, by converting hydroxyapatite into fluorapatite which is more resistant to resorption.

Of late Iqbal and Bamaas¹² showed that extracted dogs' teeth air-dried for periods up to 60 minutes benefited from surface treatment with an enamel matrix derivative gel before replantation. Periodontal healing was greater for the treated teeth than for control teeth, and there was less replacement resorption. Chemical treatment of root surface with various agents have been tried, but more data is required to support the clinical effectiveness.

Splinting technique should allow physiologic movement of teeth during healing. The chances of

ankylosis is decreased, if the splint is kept for a minimal period. The wire-composite splint has been thereby used to stabilize avulsed tooth, because it allows good oral hygiene and are well tolerated by the patient. Ankylosis of the incisors in young patients can result in infraocclusion as the patients grow.¹³ Severe infraocclusion can cause esthetic problems.

Systemic antibiotics are often recommended after replantation, but their effectiveness in preventing root resorption is questionable.¹⁴

In this case, patient's esthetic and functional demands were totally met by the treatment. Although, there has not been any evidence of root resorption and ankylosis within a short period, it does not assure a good long-term prognosis of the tooth. Long-term follow-up is required to understand the possible outcome of the treatment.

SUMMARY

Replanting should be considered as an intermediate treatment option in children and adolescents in cases of avulsed permanent teeth with prolonged non-physiological storage. There will be preservation of alveolar bone by successful replantation of an avulsed tooth. If the replanted tooth is a failure afterwards (replacement resorption and tooth loss), the improved alveolar development will provide better permanent treatment considerations in later life. There is also a need to create awareness among general public and members of sports team regarding emergency management of an avulsed tooth.

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