

Replantation of an Avulsed Permanent Maxillary central Incisor After Prolonged Dry Storage: A Case Report

Dr. Dhanya Kumar N. M., M.D.S.,
Professor & Head*
Email: dhanya2012@yahoo.co.in

Dr. Mukut Seal
Post Graduate Student*
Email: mukutseal@gmail.com

*-Department of Conservative Dentistry and Endodontics,
College of Dental Sciences & Hospital, DAVANGERE-577004, Karnataka, INDIA

ABSTRACT:

All of us as clinicians at one time or another have to attend to dental emergencies involving severely fractured or even lost or avulsed anterior teeth. Treating such cases is often difficult and there is always a time factor involved. Loss of anterior teeth can affect a patient psychologically and socially. This can be minimised by an immediate replacement or replantation of the lost or avulsed teeth. Definitive treatment planning and consultation with specialists is seldom possible at the time of emergency treatment. Replantation of the avulsed tooth can restore esthetic appearance and occlusal function shortly after the injury. This article describes the management of a young female with an avulsed maxillary permanent incisor that had been air-dried for about 72 hours. The replanted incisor retained its esthetic appearance and functionality 8 months after replantation, yet the long-term prognosis remains questionable.

Key Words: tooth avulsion; tooth replantation; incisor; dry storage

INTRODUCTION:

Tooth avulsion is defined as total displacement of the tooth out of its alveolar socket. It accounts for 0.5% to 16% of traumatic injuries in the permanent dentition.¹ Avulsion of permanent teeth occurs most often in children 7 to 9 years old, an age when the relatively resilient alveolar bone provides only minimal resistance to extrusive forces, and the maxillary central incisors are the teeth most commonly affected.¹ Management of avulsion of the permanent dentition often presents a challenge. Healing with a normal periodontal ligament (i.e., regeneration) after replantation will occur only if the innermost cell layers along the root surface are vital.¹ Clinical studies have shown that the prognosis is best for teeth replanted within 5 minutes after avulsion,² yet such optimal treatment is not always possible.

Prolonged non-physiological storage of avulsed teeth before replantation results in total necrosis of the periodontal ligament, and healing by replacement root resorption (i.e., repair) becomes the only option.³ In this situation, the periodontal ligament, as well as the root surface of the replanted tooth, is resorbed and replaced by the surrounding alveolar bone, a process that results in ankylosis.¹ If the resorption process exposes dentinal tubules and root canals that contain infected necrotic tissues, inflammatory root resorption may also occur. Nevertheless, if managed properly, avulsed teeth with avital periodontal ligament can be replanted and will remain functional for some years.⁵ This article describes the management of a young female patient with an avulsed maxillary permanent incisor that had been air-dried for about 3 days.

CASE REPORT:

The patient, a 21-year-old female, reported to the department of Conservative Dentistry and Endodontics, College of Dental Sciences, Davangere for emergency treatment during an afternoon session. She reported of domestic violence, a medicolegal case was registered and her tooth 11 had been avulsed. The avulsed tooth had been left dry covered in a handkerchief after the injury. The patient's medical history was unremarkable, but she was due for an antitetanus booster. On examination, the patient did not show any signs or symptoms of neurological injury. Slight edema of upper lip and ecchymosis over the mental region was seen on extraoral examination. The intraoral examination revealed permanent dentition with mild spacing in upper anterior regions. In occlusion, she showed incisal overjet of 4 mm and class I molar relationships. Oral hygiene was fair, and no carious lesions were detected clinically. Tooth 11 was avulsed, and a blood clot was found in the alveolar socket. No other oral injury was detected clinically. All of the adjacent teeth showed positive response to a vitality test. A maxillary occlusal radiograph was obtained, and no other hard-tissue injury was detected in that region. Examination of the avulsed tooth revealed that the crown was intact and that the root had a closed apex, but the root surface was covered with dried remnants of periodontal tissue. It was estimated that the avulsed tooth had been kept dry for about 72 hours. The available treatment options were explained to the patient, and it was decided to replant the avulsed incisor as an intermediate treatment. Local anesthetic was administered and the blood clot removed from the socket. The root of the avulsed tooth was planned to remove the necrotic periodontal tissue and was then filled with gutta-percha points and sealer. The tooth was then replanted into its

socket and was splinted to the adjacent teeth with stainless steel rectangular wire and composite. Another maxillary occlusal radiograph was obtained to confirm proper positioning of the replanted incisor (Fig. 8), and the splint was left in place for 6 weeks. A 7-day course of systemic penicillin was prescribed, and the patient was referred to the medical practitioner for an antitetanus booster. The patient was seen again at 2, 6 and 12 weeks after replantation and then half-yearly. The tooth remained functional and was esthetically acceptable (Fig. 3). All of the adjacent anterior teeth remained symptomless and showed no sign of pulp death or root resorption.

The patient was informed about orthodontic treatment for correction of the mild spacing but she refused as she felt it was not a major esthetic problem. She was informed that the tooth could ankylose and in future it would complicate the orthodontic treatment plan.

In the optimal scenario, the avulsed tooth should be replanted immediately or should be stored in a physiological medium such as saline for only a short period before replantation.⁶⁻⁷ The replanted tooth should be splinted flexibly to the adjacent teeth for 7 to 10 days to enhance periodontal healing.⁷ If the tooth apex is closed or almost closed, prophylactic root canal treatment should be carried out on the day of splint removal to prevent the onset of inflammatory root resorption.^{1,7}

In the case presented here, the avulsed incisor had a closed apex and had been air-dried for a prolonged period, so it was anticipated that the chance of pulpal and periodontal healing would be extremely low. As a result, the management of this case differed from the accepted replantation protocol. The treatment objective was to retain the avulsed incisor to maintain esthetic appearance and occlusal function, to prevent inflammatory root resorption and to



Fig.1- Extra-oral pre-operative view



Fig.2- Avulsed tooth



Fig.3- Intra-oral pre-operative view



Fig.4- Pre-operative radiograph



Fig.5- Extra-oral root canal preparation



Fig.6- Avulsed incisor reimplemented



Fig.7- Avulsed tooth Splinted



Fig.8- Immediate post operative radiograph



Fig.9- 8 month post operative radiograph



Fig.10 post operative photograph

DISCUSSION:

Relative to other tooth injuries, avulsion is a more serious assault on the gingiva, the periodontal ligament and the pulp. In clinical studies, teeth replanted within 5 minutes after avulsion had the best prognosis and the chance of pulpal and periodontal healing was inversely related to the stage of root development and the period of dry storage.³

achieve periodontal healing with replacement root resorption. Therefore, the avulsed incisor was splinted to the adjacent teeth with rigid wire for 6 weeks to facilitate rapid, solid ankylosis.^{1,8} The root of the avulsed incisor was also filled extraorally. Given that replacement root resorption was inevitable after the prolonged period of dry storage, it was thought that further drying and handling of

the root surface was unlikely to worsen the prognosis.^{1,10}

Systemic antibiotics are often recommended after replantation, but their effectiveness in preventing root resorption is questionable.⁶ Andreasen and others,³ in their prospective study, showed that systemic antibiotics had no effect on periodontal healing clinically. In cases of avulsed teeth with avital periodontal ligament, treatment with various agents such as tetracycline before replantation have been suggested in the hope of slowing down the resorption process.⁸ Andreasen and Andreasen¹ recommended that, after planing of the root to remove necrotic periodontal tissue, such teeth be soaked in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 minutes before extraoral root filling and replantation.

Also according to Bjorvatn K et al teeth should be soaked in acid for 5 minutes to remove all remaining periodontal ligament and thus remove the tissue that will initiate the inflammatory response on replantation. These teeth should then be soaked in 2 % stannous fluoride for 3 minutes and then replanted.⁹ Thus in the current study a similar protocol was followed.

The long-term prognosis for the replanted incisor in the case presented here is questionable. Teeth replanted after 60 minutes of dry storage become ankylosed and are resorbed within 7 years in young patients, whereas teeth replanted under similar conditions in patients older than 16 may remain functional for considerably longer periods.¹⁰ Ebeleseder and others⁴ also found that replacement resorption of replanted mature teeth was more extensive and the overall prognosis worse for children and adolescents than for adults. It has been suggested that the more rapid resorption of teeth in children is related to the higher rate of bone remodelling in children than in adults.⁶

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. However, definitive treatment planning and orthodontic consultation with a specialist are seldom possible at the time of emergency treatment. Replantation can restore the patient's esthetic appearance and occlusal function shortly after the injury. Nevertheless, replantation is usually not recommended if the avulsed tooth has a very immature root and has been air-dried for a prolonged period or if the patient's medical condition contraindicates replantation.⁷

In conclusion, in cases of avulsed permanent teeth with prolonged non-physiological storage, replantation should be performed if the patient is aware of the outcomes and request such treatment, although the risk of progressive

replacement resorption and subsequent tooth loss is high. It was observed that, when there are no periodontal ligament remnants and contamination is under control, replacement resorption and ankylosis are the best results and that, although these events will end up leading to tooth loss, this will happen slowly with no loss of the alveolar ridge height, which is important for future prosthesis planning.

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