

Delayed reimplantation of avulsed tooth with 15-hours extra oral dry storage time

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ABSTRACT

A 27-year-old man reported to the department with a history of trauma. On examination it was noted that the patient had an avulsed tooth in relation to 21, Ellis Class I fracture in relation to 11 and 22. The avulsed tooth was brought by the patient wrapped in a paper. Although the tooth was in highly unfavorable storage condition, it was decided to reimplant the teeth, to relieve him from psychological, cosmetic and functional trauma. Now after 24 months, the tooth is, functional, firm and free of symptoms with minimal signs of resorption. Even though the long-term prognosis is uncertain, this treatment technique has proven to be an advantage for the patient by maintaining the height of alveolar bone and making the provision of an aesthetically acceptable permanent restoration.

Keywords: delayed reimplantation, avulsion, replacement resorption.

INTRODUCTION

Traumatic injuries to erupted permanent anterior teeth accounts for 0.5-16% of the cases.¹ Avulsion is defined as a complete separation of a tooth from its alveolus following a traumatic injury which results in extensive damage to the pulp and periodontal tissues.^{1,2} Reimplantation refers to the insertion and temporary fixation of completely or partially avulsed teeth that have resulted from traumatic injury.³ Amongst the various factors influencing the clinical success of reimplantation, duration of extra oral storage is identified as critical for functional healing. For best prognosis, reimplantation should be done within five minutes and according to Andersen, reimplantation of tooth beyond five minutes is delayed reimplantation. Reimplantation within 20-30 min after the injury or keeping the tooth in an appropriate storage media has also shown to produce good prognosis.¹⁻³ As the duration of extra oral time increases, the likelihood of root surface damage increases which leads to necrosis of the pulp tissue, cemental and periodontal ligament tissue leading to external root resorption and eventually loss of reimplanted teeth.^{4,5} The aim of this case report is to present a case of delayed replantation of avulsed maxillary central incisor after an extended dry extra-alveolar period.

CASE REPORT

A 27 years old man reported to the out-patient department, with a chief complaint of fracture and loss of tooth in relation to upper front tooth region. Patient gave history of injury due to fall from bicycle 15hrs ago, he had brought the knocked out tooth rolled in a paper. Intraoral examination revealed Ellis Class I fracture in relation to

11, 22 and avulsed 21 (Figure 1). There was no fracture with respect to the nasomaxillary complex in radiographic examination (Figure 2).

Oral hygiene was fair, no other intraoral injury was detected clinically. Adjacent teeth elicited positive response to vitality test. The available treatment options were explained, and it was decided to reimplant the avulsed incisor after doing root canal treatment extra orally. Composite build-up was planned for 11 and 22. Patient was advised for tetanus prophylaxis; antibiotics and analgesics were prescribed.

Examination of the avulsed tooth revealed that the crown was intact and the root had closed apex (Figure 3), but the root surface was covered with dried remnants of periodontal tissue. Tooth was thoroughly washed in saline, and the root surface planned to remove necrotic periodontal tissues. Root canal treatment was completed with gutta-percha points and MTA based sealer extra orally (Figure 4). Surface treatment of the root was done with citric acid and consecutively 2% sodium fluoride application was done on the root surface for five minutes and then rinsed with saline. Local anesthesia was administered, and socket was gently curetted to remove granulation tissue and irrigated with chlorhexidine gluconate and saline. Prior to reimplantation, doxycycline was coated over the root surface. Tooth was reimplanted into the socket using finger pressure. Once the tooth was properly seated, it was checked for alignment and occlusion and then splinted to the adjacent teeth with orthodontic wire and composite resin (Figures 5 and 6).

Patient was prescribed 0.12% chlorhexidine gluconate

mouth wash for maintaining the oral hygiene. Splint was removed after 14 days, and composite build-up done on 11 and 22 (figures 7 and 8). Patient was regularly kept under follow-up every six months. After 24 months, the tooth was asymptomatic, and no mobility noted. Periapical radiograph at the last visit showed no signs of resorption or ankylosis (figures 9 and 10).



Fig.1: Pre-operative photograph showing avulsion of tooth 21

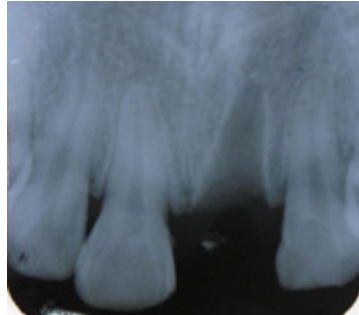


Fig.2: Preoperative intraoral radiograph showing empty alveolar socket



Fig.3: Avulsed tooth



Fig.4: Extra-oral endodontic treatment



Fig.5: Splinting of the avulsed tooth with orthodontic wire and composite resin

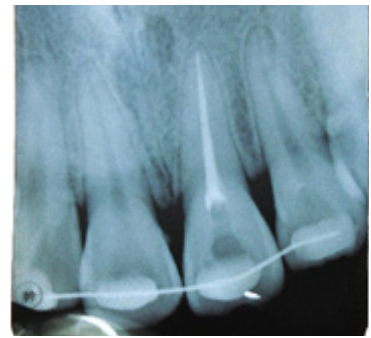


Fig.6: Periapical radiograph after immediate replantation of avulsed tooth



Fig.7: Four weeks follow-up intraoral photograph of stabilized teeth



Fig.8: One year follow-up intraoral photograph



Fig.9: One year follow-up intraoral radiograph



Fig.10: Follow-up radiograph at the end of 24 months.

DISCUSSION

Immediate reimplantation of the avulsed tooth is widely accepted as the most appropriate treatment. However, this may not always be possible due to various reasons, under such circumstances, even if the treatment is delayed, considering the benefits that may result from the therapy, reimplantation need to be attempted.^{3,6,7} In this case, the avulsed incisor had been in dried state for a prolonged period. Hence it was anticipated that the chance of pulpal and periodontal healing would be extremely low. Treatment objective was to retain the avulsed tooth to maintain esthetics and occlusal function, to prevent inflammatory root resorption and to achieve periodontal healing.

When a Tooth has an extra-oral dry time of greater than 60 min, the periodontal ligament is not expected to survive. Pre-treatment of such a tooth, prior to its replantation, will render it more resistant to resorption.⁶ If excessive drying occurs before replantation, the damaged periodontal ligament cells will elicit a severe inflammatory response over a diffuse area on the root surface. The prognosis of reimplanted avulsed tooth appears directly related to the severity and surface area of inflammation on the root surface, and the resultant damaged surface must be repaired. Hence the tooth was thoroughly planned to remove all necrotic periodontal ligament cells.⁷

As the extra oral time was prolonged and no immediate reimplantation was necessary, it was decided to perform endodontic treatment extra orally. MTA among other Bioactive cements demonstrated better performances, when applied to reimplanted teeth in preventing the progression of replacement resorption.⁸

Tooth was treated with citric acid so as to expose the collagen fibers on root cementum and promote a contact surface for re-attachment of periodontal ligament collagen fibers. The citric acid was used to demineralize the root surface and expose the collagenous matrix of the hard tissues of the root surface, which acts as a substrate for mesenchymal cells as well as inhibit bacterial adhesion.^{3,9}

Before reimplantation, the tooth was soaked in sodium fluoride solution for five minutes. Andreasen and Andreasen recommends that the tooth should be soaked with 2.4% acidulated sodium fluoride solution before replantation.² Several authors have recommended the use of fluoride solutions in different forms and concentrations to treat the root surfaces in case of delayed tooth reimplantation assuming that demineralized dentin surface would be more prone to fluoride incorporation and might become more resistant to resorption. Fluoride directly acts on the cementum and dentin, by converting hydroxyapatite into fluorapatite.¹⁰

In an avulsed tooth, recommended procedure is to coat the

root surface with topical doxycycline before reimplantation. Doxycycline, a derivative of the tetracycline family, has an antibacterial effect and anti-inflammatory qualities, and is effective in reducing inflammatory and replacement resorption following dental trauma. Treating the root surface of an avulsed closed apex tooth is a rational and recommended procedure.¹¹

It has been shown that the splinting technique which allows physiologic movement of teeth during healing, and which is in place for a minimal time period results in decreased incidence of ankylosis.³ In this case, splinting was done with composite and wire as recommended in literatures. The advantage of this technique is that it is much less stressful to the injured area than other techniques.⁵

Both inflammatory resorption and replacement resorption may be diagnosed within 2-6 months of reimplantation. If resorption is not detected within 2 years, the risk of resorption is considerably reduced.³⁻⁵ In the case presented here after two years the tooth was asymptomatic, firm and radiographically no signs of resorption or infection was observed.

CONCLUSION

Replantation of avulsed tooth is the treatment of choice in permanent dentition. Replantation can restore the patient's esthetic appearance and occlusal function and prevent physiological trauma, which may be associated with a missing anterior tooth. According to the presented case, replantation can be advised for avulsed tooth with prolonged extra-oral time, but the risk of resorption at long time should be considered.

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.



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