

Delayed Reimplantation: A Case Report

Anoop Harris¹, J Reshmi², Sageena George³, Jyothi Sumi Issac⁴

Contributors:

¹Assistant Professor, Department of Pedodontics, PMS Dental College, Vattappara, Thiruvananthapuram, Kerala, India; ²Postgraduate Student, Department of Pedodontics, PMS Dental College, Vattappara, Thiruvananthapuram, Kerala, India; ³Professor, Department of Pedodontics, PMS Dental College, Vattappara, Thiruvananthapuram, Kerala, India; ⁴Associate Professor, Department of Pedodontics, PMS Dental College, Vattappara, Thiruvananthapuram, Kerala, India.

Correspondence:

Dr. Harris A. Department of Pedodontics, PMS Dental College, Vattappara, Thiruvananthapuram, Kerala, India. Phone: +91-9400364355, Email: dranoopharris1979@gmail.com

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Abstract:

A 12-year-old boy reported to the clinic with a history of trauma, whereas playing 1 day before. On examination it was noted that the patient had an avulsed tooth in relation to 11, Class III fracture in relation to 12 and Class II fracture in relation to 21. The avulsed tooth was brought by the patient wrapped in a newspaper. Although the tooth was in highly unfavorable storage condition, it was decided to reimplant the teeth since the patient was young and 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 in this growing period by maintaining the esthetics, by maintaining the height of alveolar bone and making the provision of an aesthetically acceptable permanent restoration at a later age if prognosis becomes poor.

Key Words: Avulsion, citric acid, delayed reimplantation, fluoride, trauma

Introduction

Tooth avulsion, one of the most seen case of all traumatic injuries, with 0.5-16% range in permanent dentition, in conjunction with dental injuries can exist frequently at any time of life.¹ Avulsion is most commonly seen in young ages due to the fact that periodontium and bone are very resilient and roots are not completely formed.² Avulsion not only leads to loss of function, but also will result in a negative impact on quality of life, producing psychological and social discomfort leading to lowered self-esteem, embarrassment upon smiling and difficulty in relating with others.³

The ideal treatment for an avulsed permanent tooth is its immediate reimplantation into the socket, which can yield

the reestablishment of esthetics and function.⁴ Even though there are various factors influencing the clinical success of reimplantation, duration of extra oral storage is identified as critical for functional healing.^{5,6} For best prognosis, reimplantation should be done within 5 min^{6,7} and according to Andersen, reimplantation of tooth beyond 5 min is delayed reimplantation.⁶ Reimplantation within 20-30 min after the injury or keeping the tooth in an appropriate storage media has also shown to produce good prognosis.⁶⁻⁸

As the duration of extra oral time increases, the likelihood of root surface damage also increases which invariably leads to necrosis of the pulp tissue, cemental and periodontal ligament tissue leading to external root resorption and eventually loss of reimplanted teeth.^{7,9,10} In these cases surface resorption is generally diagnosed after 12 months, and inflammatory resorption and replacement resorption are usually observed after 1 and 1-2 months, respectively.¹¹

The purpose of this paper is to report the clinical and radiographic condition of an incisor after 2 years, which was reimplanted after 36 h, and stored in unfavorable conditions.

Case Report

A 12-year-old boy reported to the out-patient department, with a chief complaint of fracture and loss of teeth in relation to upper front tooth region. Patient gave a history of the fall, while playing 2 days prior. He was taken to a nearby dental clinic where preliminary treatment was given. On examination, patient showed Ellis Class III fracture in relation to 12, Ellis Class V in relation to 11 and Ellis class II in relation to 21 and 13 (Figure 1). There was no fracture with respect to the nasomaxillary complex.

Case record revealed pulp protection performed on 21 and 12. Patient did not have the avulsed tooth with him that time, so was asked to report immediately with the tooth, but patient didn't go for further treatment. Patient brought the avulsed tooth wrapped in newspaper to our department. From history it was understood that trauma occurred around 36 h prior. The available treatment options were explained to the parents, and it was decided to reimplant the avulsed incisor as an intermediate intervention. Composite build-up was decided on 13 and 21 and endodontic treatment with fiber post and crown build-up in relation to 12. It was noted that tetanus prophylaxis had been administered, and antibiotics and analgesics was prescribed for 5 days.

Examination of the avulsed tooth revealed dentinal fracture also. Roots were completely closed, and root surface was covered with dirt and dried remnants of necrotic periodontal tissue. Tooth was thoroughly washed in saline, and the root surface planned to remove necrotic periodontal tissues. Cleaning of the tooth surface was carried out by storing in 2.5% NaOCl for 20 min and later conditioned with citric acid for 5 min. Since extraoral time exceeded 2 h it was decided to complete the root canal treatment extra orally.

Local anesthesia was administered, and socket was gently curetted to remove any coagulum, granulation or pathologic tissue and then irrigated with physiologic saline solution. Prior to reimplantation, root surface was immersed in 2% acidulated phosphate fluoride gel for 5 min. 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 a stainless steel wire and composite (Figures 2 and 3).

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. Splint was removed after 14 days, and composite build-up done on 13, 11 and 21. Fiber post was placed in 12 and composite build-up was performed (Figure 4). Patient was regularly kept under follow-up every 6 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.

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. In the present case, the patient was seen by a dental practitioner but had not reimplanted the tooth as the patient didn't have the avulsed tooth with him that time. Under such circumstances, even if the treatment is delayed, considering the benefits that may result from the therapy, reimplantation need to be attempted.^{11,12} In this case, the avulsed incisor had been air dried for a prolonged period. Hence it was anticipated that the chance of pulpal and periodontal healing would be extremely low. The treatment objective was to retain the avulsed tooth to maintain esthetic appearance and occlusal function, to prevent inflammatory root resorption and to achieve periodontal healing with replacement resorption.

When a tooth remains out of the oral cavity for more than 60 min, all the surface periodontal cells die.¹³ If excessive drying occurs before reimplantation, the damaged periodontal ligament cells will elicit a severe inflammatory response over a diffuse root surface area. 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.¹⁴ Hence the tooth was thoroughly planned to remove all necrotic periodontal ligament cells.

After planning, tooth was immersed in sodium hypochlorite for 5 min. NaOCl has the capacity to dissolve connective tissue as



Figure 1: Pre-operative photograph showing avulsion irt 11, Ellis Class III irt 12, Ellis Class II irt 21 and 13.



Figure 2: Reimplanted 11 stabilized by composite splint.



Figure 3: Intraoral periapical radiograph taken after reimplantation of 11 and composite splint.

well as being bactericidal. 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.¹⁵ It has been observed that root surface treated with citric acid showed large areas of ankylosis and replacement resorption.¹⁵⁻¹⁷

As the extra oral time was prolonged and no immediate reimplantation was necessary, it was decided to perform endodontic treatment extraorally. Furthermore, when endodontic treatment is carried out on avulsed tooth before reimplantation, it improves the chance of retention and prevention of replacement resorption.¹⁸

Before reimplantation tooth was soaked in acidulated fluoride solution for 5 min. Andreasen and Andreasen recommends that the tooth should be soaked with 2.4% acidulated sodium fluoride solution for 20 min before replantation.¹⁹ 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.²⁰ Fluoride directly acts on the bone tissues, cementum and dentin, by converting hydroxyapatite into fluorapatite. It has been demonstrated that application of acid or alkaline solutions for the treatment of root surfaces does not yield good results. Treatments employing alkaline substances, followed by use of acidic solutions seem to provide more favorable results.²¹

It has been shown that a splinting technique that allows physiologic movement of teeth during healing, and that is in place for a minimal time period results in a decreased incidence of ankylosis.²² In this case, splinting was done with composite and arch wire. The advantage of this technique is that it is much less stressful to the injured area because forces needed to apply are much less stressful than other techniques.

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.²³ In the case presented here after 2 years the tooth was asymptomatic, firm and radiographically no signs of resorption or infection was observed. The presence of intact lamina dura suggested a favorable healing (Figure 5).

Conclusion

Reimplantation ensures adequate space maintenance in the arch, aesthetic function, and prevents psychological trauma,



Figure 4: Post-operative photograph after composite build-up of 13, 12, 11 and 21.



Figure 5: Post-operative radiograph at the end of 24 months.

which may be associated with a missing anterior tooth. It can be concluded that by proper pre-treatment of the avulsed tooth we can successfully achieve the objectives of replantation even if reimplanted in unfavorable conditions.

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