CASE REPORT

Eastern Journal of Medicine
East J Med 23(4): 350-354, 2018
DOI: 10.5505/ejm.2018.86158

# Five-Year Follow-Up of a Delayed Reimplanted Avulsed Tooth: Case Report

**Esin Özlek[1*], Burak Ak[2], Elif Akkol[2]**

[1]*Department Of Endodontics, Yüzüncü Yıl University, Van, Turkey*
[2]*Department Of Periodontology, Mersin University, Mersin,turkey*

**ABSTRACT**

This case involves the reimplantation of an avulsed mandibular central tooth that occurred two hours after an accident. A nine-year old girl had visited nearest dental health care center complaining of an avulsed mandibular central tooth two hours after her bicycle accident. The avulsed tooth had been kept in milk in for those two hours. It was reimplanted and referred to a dentistry faculty with a composite splint. The patient presented to our clinic three days later. The non-hygienic composite splint was removed and gingivoplasty procedure was performed by a periodontologist. The new splint was applied using polythene fiber post. Clinically normal periodontal tissues were detected after two weeks, and endodontic treatment was begun. Root filling of the clinically asymptomatic tooth was performed after 30 days, and coronal restoration finished using composites. The tooth is still functional now after five years. The long-term prognosis for the replanted tooth is unclear. During this growth period, however, the height of the alveolar bone has been preserved and is aesthetically satisfying.

**Key Words:** Avulsed tooth, external root resorption, MTA, splint

## Introduction

Avulsion is a very serious dental injury that most frequently happens to the maxillary anterior teeth in children between the ages of seven and nine years. The ideal treatment for permanent tooth avulsion is immediate reimplantation into the socket (1-11). The purpose of permanent tooth reimplantation is to keep the teeth in place until the development of the face and the alveolar bone is complete because early permanent tooth loss can lead to loss of the existing space and shifting of the middle line (2).

The clinical success of reimplantation depends on several factors: periodontal damage, intact alveolar socket, extra-alveolar period, the maturity of the root, type of cleansing procedure following contamination of the root surface, duration of splinting, and the use of antibiotics (3-6). It is known that the tooth was left out of the mouth. The long-term prognosis for delayed reimplantation is poor. As the extra-oral period increases, so the possibility of root surface resorption also increases. The periodontal ligament will be necrotic and not expected to heal. Sader et al. reported that periodontal ligament cells did not survive when the extra oral time of the teeth is more than two hours. Andreasen (1975) also reported that very few live cells remained after 60 minutes of dry storage, and no live cells remained after 120 minutes (7). According to Mathewson's study, if the duration of the extra oral period is less than 30 minutes, success is 90%; it is 43% when the duration is between 30 and 90 minutes, and when it is more than 90 minutes, the success rate falls to 7%. In these cases, although inflammatory and replacement resorption is usually observed one to two months later, root surface resorption can only be detected after 12 months (8).

Different materials are used in the repair of root resorption. Until today, the repair materials used are amalgam, gutta percha, glass ionomer cements, composite resins, compomers, super EBA, Intermediate Restorative Material (IRM), polycarboxylate cements, diacetate, and dentine bonds. However, none of these materials can provide the ideal conditions. Endodontic studies suggest use of mineral trioxide aggregate (MTA) for root resorption treatment. MTA is a bio-inductive material that allows cementum development and restructuring in periodontal

***Corresponding Author:** Dr.Öğr.Üyesi Esin Özlek, Van Yüzüncü Yıl Üniversitesi, Diş Hekimliği Fakültesi, Endodonti Anabilim Dalı, Kampüs/VAN
E-mail: esin_ozlek@hotmail.com, Phone: 0(530) 520 00 59, Fax: 0(432) 225 17 47/23004
**Received:** 09.07.2018, **Accepted:** 30.07.2018

**Fig. 1.** In the clinical examination the gingiva seemed mobile and hyperemic

**Fig. 2.** Radiological examination showed that tooth had a closed apex, and no fracture was detected

**Fig. 3.** The non-hygienic composite splint was removed and gingivoplasty procedure was performed by a periodontologist

ligament cells. It also has the advantages of sealing ability, alkalinity, biocompatibility, antibacterial effect, and it can be set up in the presence of blood (9-11).

The purpose of this case report is to make a radiological and clinical evaluation of an avulsed tooth that had been reimplanted late, five years after the reimplantation.

## Materials and Methods

A nine-year old girl had visited the nearest dental health care center complaining of an avulsed mandibular central tooth two hours after her bicycle accident. The avulsed tooth, which had been kept in milk for those two hours, had been reimplanted and referred to a dentistry faculty with a composite splint. The patient arrived at our clinic three days later. In the clinical examination the gingiva seemed mobile and hyperemic (fig 1.) Radiological examination showed that tooth had a closed apex, and no fracture was detected in either the alveolar bone or the adjacent teeth (fig 2). The non-hygienic composite splint was removed and gingivoplasty procedure was performed by a periodontologist (fig 3). The new splint was applied using polythene fiber post (Ribbond) Ribbond Inc., Seattle, WA, USA) (fig 4).

Antibiotics (Augmentin-BID Fort Oral Suspension 400/57, 2*5 ml), analgesics (Calpol 6-Plus Suspension, 3*125 mg), and chlorhexidine gluconate mouth rinse were prescribed for one week. In addition, oral hygiene instructions and advice about a soft diet were given. The patient was also referred for a tetanus booster. Clinically normal periodontal tissues were detected after two weeks, and endodontic treatment was begun. The endodontic access cavity was opened and the pulp tissue completely removed. The working length was determined by periapical radiography. The root canal was prepared using ProTaper rotary

**Fig. 4.** The new splint was applied using polythene fiber post

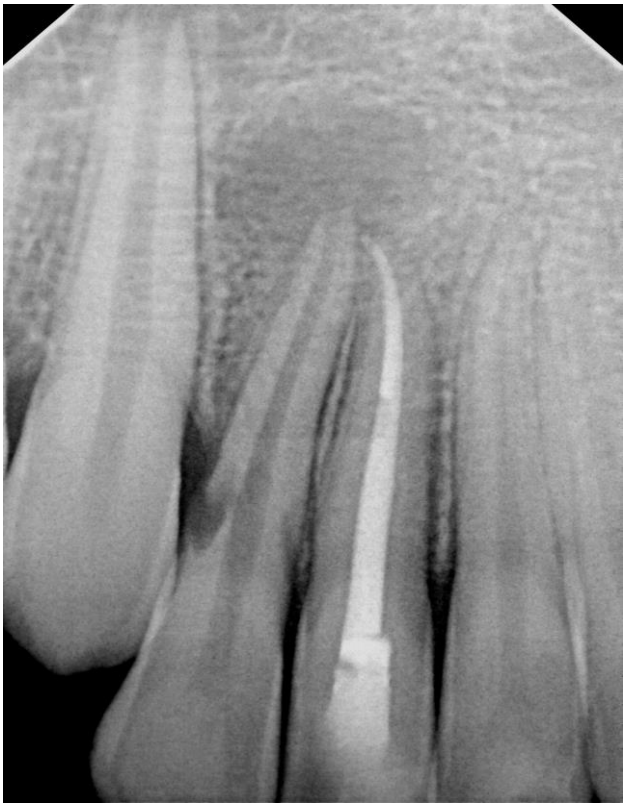

**Fig. 5.** Radiological examination showed external resorption in the apical and coronal 1/3rd in the root of the adjacent tooth, and a wide radiolucent lesion despite the absence of pathological signs in the reimplanted tooth

files (Dentsply Maillefer, Ballaigues, Switzerland) up to F3 size. The root canal was irrigated with 2 mL 5.25% sodium hypochlorite during instrumentation using a NaviTip FX (Ultradent Products Inc, South Jordan, UT) needle. At the end of the session, the root canal was dried with Protaper paper point (Dentsply Maillefer, Ballaigues, Switzerland), and calcium hydroxide was added.

**Fig. 6**. The area of resorption was reached with a mucoperiosteal flap

**Fig. 7.** MTA was placed in the perforation zone

The root canal was kept in calcium hydroxide for one month because the extra oral period of the avulsed tooth was greater than 60 minutes (6). After 30 days, in the second session, the tooth was clinically asymptomatic. After the temporary filling was removed, irrigation was performed using 2 mL of 5.25% NaOCI, 2 mL of 17% EDTA and 5 mL of distilled water in order to remove the calcium hydroxide. Root canal filling was done with ProTaper gutta percha (Dentsply Maillefer, Ballaigues, Switzerland) and AH Plus sealer (Dentsply, D- Trey, Konstanz, Germany), and the coronal restoration was finished with composites.

The patient did not come to her later checkup dates but she did visit our clinic after two years without any dental complaints. However, her radiological examination showed external resorption in the apical and coronal 1/3rd in the root of the adjacent tooth, and a wide radiolucent lesion despite the absence of pathological signs in the reimplanted tooth (fig 5). In the session in which endodontic treatment was completed after

**Fig. 8.** The mucoperiosteal flap was affixed in place and sutured

10 days of calcium hydroxide dressing (7), the area of resorption was reached with a mucoperiosteal flap (fig 6). Granulation tissue was curetted and MTA (Angelus White, Londrina, PR, Brazil) was placed in the perforation zone (fig 7). The mucoperiosteal flap was affixed in place and sutured (fig 8). The sutures were removed after seven days. Clinical and radiological examinations performed 36 month later showed that the tooth was asymptomatic (fig 9).

## Discussion

Root resorption is the greatest danger for trauma injuries. There are external, cervical, internal, external and idiopathic varieties of root resorption that occur in post-trauma teeth. Resorption is a common sequel of orthodontic treatment that leads to the loss of pulp and periodontal ligament in significant quantities due to acute trauma effect. The survival of PDL cells is important to prevent the root resorption because PDL cells helps with regeneration, attachment, and prevent resorption (13-16). Inflammatory resorption and replacement resorption are generally diagnosed after one to two months. However, surface resorption can be diagnosed after 12 months (17).

Properly reimplanted teeth have been shown to require splinting to prevent increased mobility. Thus, the lateral forces acting on the teeth are transformed into vertical forces. For healing , it is desirable that the traumatized socket is slightly forced and the teeth move in a controlled manner (13). Splinting is recommended for two weeks in cases where the root and alveolar bone are not fractured. Studies have shown that root resorption is less common in the teeth stabilized with a semi-rigid splint, whereas rigid splinting can cause ankylosis (6). Composite splint, titanium trauma splint, titanium ring splint, bracket splint and Ribbond are the most commonly used splint types in the clinic. Ribbond fiber splint was used in this case due to its good properties of elasticity, translucency, adaptability, adherence, and resistance to traction and impact (6). In delayed reimplantation cases, it is suggested that the ideal time for root canal treatment is seven to 10 days after reimplantation and that calcium hydroxide should be used for one month as an intracanal medication (6-9). For this reason, we started the canal treatment in this case two weeks later. Resorption signs were only noticed two years later because the patient had not

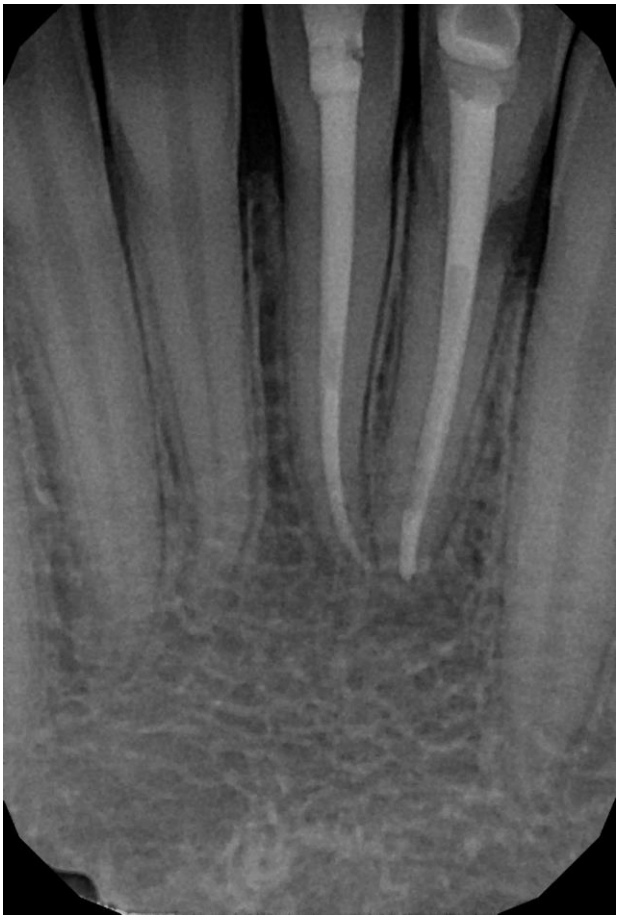

**Fig 9.** Clinical and radiological examinations performed 36 month later showed that the tooth was asymptomatic

come to follow-up sessions. It has been reported that it is necessary to remove the granulation tissue in order to expedite the healing. We elevated the flap and curetted the granulation tissue. The perforation area between the pulp channel space and the periodontal tissue was successfully closed using MTA. The main reason why we choose MTA as a permanent repair material is that it induces hard tissue formation and inhibits osteoclastic bone resorption (10-12). This five-year follow-up case showed that the teeth affected by trauma were clinically asymptomatic. Radiographic examination showed that the periapical lesion was completely surrounded by the growth of new hard tissue, and that external root resorption was absent.

Despite a prolonged extra-alveolar dry storage time, teeth with delayed reimplantation can be retained in a stable and functional position in the dental arch with the appropriate treatment procedures. In addition, this case report shows that the use of MTA in trauma-related external root resorption halted the resorption process.

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