Case Report

Replantation after extended dry storage of avulsed permanent incisors: report of a case

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Kont Cobankara F, Ungor M. Replantation after extended dry storage of avulsed permanent incisors: report of a case.

Abstract – A 15-year-old boy lost his maxillary right and left central incisor teeth in a bicycle accident. He was referred to our clinic 1 week after the injury. The crown-root integrities of both the teeth were not damaged. Although the teeth were stored under dry conditions for 1 week, reimplantation of the teeth was planned to retain the teeth in the mouth for as long a period as possible because of the patient's age. Following the debridement and sterilization of root surfaces in 2.5% NaOCl, root canals were prepared and filled with calcium hydroxide. Then, about 2 mm of the apexes were resected to ensure that the roots easily seated in the alveolar socket and the prepared cavities in root ends were obturated with the amalgam. The teeth were placed into their respective sockets and splinted temporarily. The root canal therapy was completed 5 weeks later. Ankylosis was observed radiographically after 10 months. The patient is now 23 years old and he is still able to use both the central incisors functionally. However, there is a pink appearance on the cervical buccal surface of left central incisor because of progressive replacement resorption. In this case, the new treatment plan is to perform a permanent restoration with dental implants following the extraction of both teeth. Even though the long-term prognosis is uncertain, this treatment technique has provided an advantage for the patient in his adolescent period by maintaining the height of alveolar bone and making the provision of an aesthetically acceptable permanent restoration at a later age possible.

Key words: avulsion; dry storage; delayed replantation

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Oral trauma resulting in tooth avulsion creates special problems for the patient and the dentist. Avulsion accounts for 0.5–16% of traumatic injuries in the permanent dentition (1). Avulsion of permanent teeth can occur at any age, but is most common in young permanent dentitions. This is because the root is still not completely formed and the periodontium bone is very resilient (2).

Normally, treatment of avulsed teeth is by replantation of the avulsed tooth into its own socket. As an emergency procedure it is advisable to replace a traumatically avulsed tooth, but unfortunately it has a rather low long-term success ratio when compared with routine endodontic therapy. One cause for this poor rate is the lack of recognition that avulsed teeth are presented in the dental office under different conditions that require different treatments (3). The replantation of an avulsed tooth should depend on the specific clinical conditions associated with that particular avulsed tooth. These clinical factors include the physiologic status of the PDL, the stage of root development and the length

of extraoral time. For permutations of each of these factors, a different treatment may be indicated (3). As clinicians, it can be confusing as to which regime is the most appropriate treatment, as there are a variety of guidelines and treatment modalities. But for many years the recommendation of immediate replantation as the ideal emergency procedure has not changed (4). Essentially, replantation should be viewed as a last resort to retain alveolar bone and tooth-to-tooth relationships for a period, and replantation of an avulsed tooth, particularly for a child, must be carried out even if the prognosis is not good. The resorption that so frequently follows the procedure takes some time to initiate tooth mobility. Once this occurs, a temporary removable prosthesis, followed by a fixed partial denture, or dental implant may be constructed at the convenience of the dentist and the patient (5).

The purpose of this case was to report the clinical and radiographic conditions of replanted incisors because of the patient's age although the teeth were stored under dry conditions during 1 week after avulsion injury.

Fig. 1. Radiographic view at the first visit to our clinic.

Fig. 2. The avulsed teeth had been kept dry in a paper handkerchief during 1 week.

Case report

The patient, a 15-year-old boy, was referred to the clinic of the Department of Endodontics, Faculty of Dentistry, Selçuk University, for treatment of avulsed teeth in an afternoon session along with his family. He had had a bicycle accident a week earlier, and his maxillary right and left central incisor teeth had been avulsed. The patient and his parents had gone to a practitioner dentist 3 h after the accident but, unfortunately, the dentist had not replanted the teeth and had recommended a prosthetic restoration after wound healing. When the patient decided to come to our faculty, 1 week had passed and the avulsed teeth had been kept dry in a paper handkerchief after the injury.

The patient's medical history was unremarkable. All of the adjacent teeth showed positive response to the vitality test. Periapical radiography was obtained, and no other hard-tissue injury was detected in that region (Fig. 1). Examination of the avulsed teeth revealed that the roots had closed apex and the left central incisor's crown was intact, but the right central incisor had an enamel fracture. The patient had cleaned the remnants of the periodontal tissue by wiping (Fig. 2).

Reimplantation of the teeth was planned to retain the teeth in the mouth for as long a period as possible because of the patient's age, although the teeth were stored in extremely unfavourable conditions. As this case was a delayed replantation, endodontic treatment was started before replantation. Cleaning of the tooth surfaces was carried out by storing in 2.5% NaOCl solution for 20 min under clinical conditions. Conventional enlargement and cleaning of the root canals were performed. After the root canals were dried with sterile paper points (Hygenic, Akron, OH, USA), they were filled with calcium hydroxide paste. The paste was obtained by mixing calcium hydroxide powder with distilled water. Coronal root canal openings were coated with a provisional material (Cavit-G; ESPE, Dental-Medizin GmbH & Co., Seefeld, Germany). Then, about 2 mm of the apexes were resected to ensure that the roots easily seated into alveolar sockets and Class I cavities prepared in the centre of each root. All cutting procedures were accompanied by continuous but indirect flow of physiologic saline solution at room temperature. The apical preparations were dried with the cut end

of a sterile paper point and obturated with the amalgam by means of the amalgam carrier and then compacted into place. Then, the teeth were wrapped with moist gauze.

Local anaesthesia was administered. The sockets were gently curetted to remove any coagulum, granulation tissue and pathologic tissue and irrigated with physiologic saline solution.

The teeth were then replanted into their respective sockets. Once the teeth were properly seated, they were checked for alignment or occlusion and were splinted to the adjacent teeth with a 0.5 mm stainless steel round wire and acid-etch composite. Periapical radiography was obtained to confirm proper positioning of the replanted teeth (Fig. 3a and b). Oral hygiene instructions were given and chlorhexidine mouthwash was recommended. A 10-day course of systemic penicillin was prescribed.

The patient was seen again 3 weeks after replantation. There was slight percussion sensitivity but not spontaneous pain. The root canals were refilled with calcium hydroxide. In 5 weeks the teeth did not show any symptoms of deterioration. The splint was removed. At this stage the canals were obturated with gutta-percha (Diadent Group International Inc., Chongju City, Korea) and a calcium hydroxide-based sealer (Sealapex, Kerr Co., Romulus, MI, USA) using the cold lateral condensation technique (Fig. 4). Then, the teeth were restored with a dentin bonding system (Clearfil SE Primer and Bond Kuraray, Tokyo, Japan) and composite resin (Clearfil, Kuraray). For the restoration of the right central incisor, a dentin pin was also used. The patient had check-ups every 2 months. Ten months after replantation, a slight surface root resorption on the teeth was noticed (Fig. 5). The patient was then given a regular check-up every 6 months for radiographic assessment. The resorption gradually progressed with time (Fig. 6a–e), but there were no clinical symptoms such as mobility, periodontal pocket, colour change or sensitivity.

The patient is now 23 years old and an adult. Both central incisors are still in functional use. There are no pathological periodontal pockets, but there is a pink appearance on the cervical buccal surface of the left central incisor because of progressed resorptions (Fig. 7a and b). In this case,

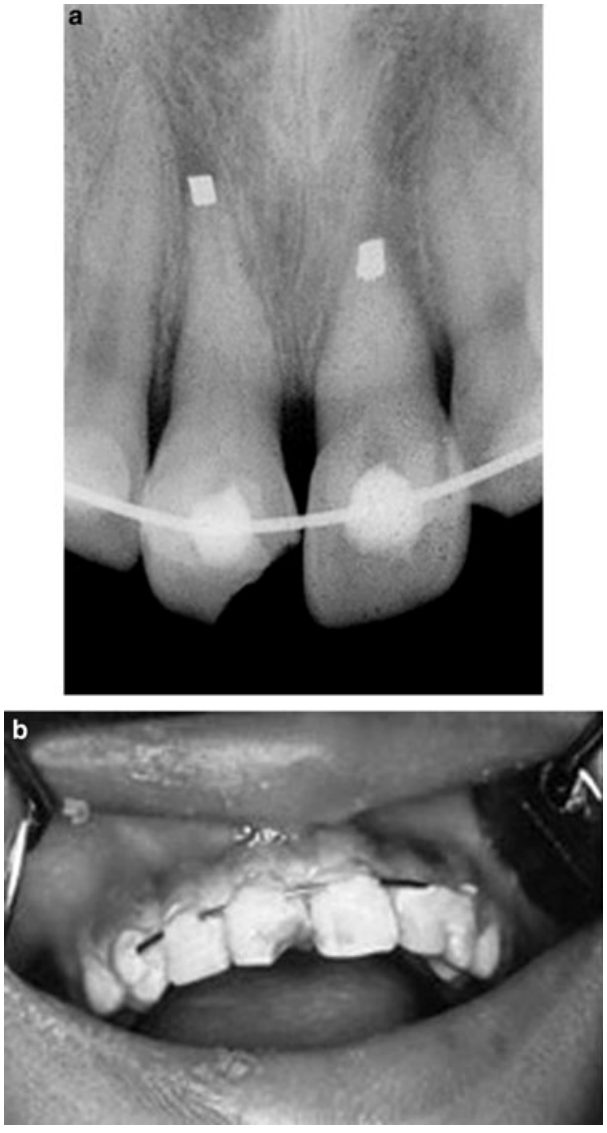

Fig. 3. Periapical radiograph (a) and clinical view (b) of avulsed teeth fixed using wire and composite resin.

Fig. 4. Root canal filling was carried out 5 months later.

Fig. 5. Ten months after injury, radiographic examination showing slight surface root resorption without clinical complication.

the new treatment plan is permanent restoration with implants following the extraction of both teeth.

Discussion

Immediate replantation of the avulsed tooth is widely accepted as the most appropriate treatment, however, this may not always be possible. The patient may have other injuries that could delay replantation of the avulsed tooth. Sometimes the tooth is not found for several hours or several days. It may be that the accident occurs in an area far from a convenient dental office (5). In our case, the patient and his parents had gone to a practitioner dentist 3 h after the bicycle accident. Unfortunately, the dentist had not replanted the teeth. He probably did not have adequate knowledge about treatment of avulsed teeth. When such events do occur, even if the treatment is delayed, considering the benefits that might result from the therapy, replantation should be attempted (5, 6). Therefore, we decided to

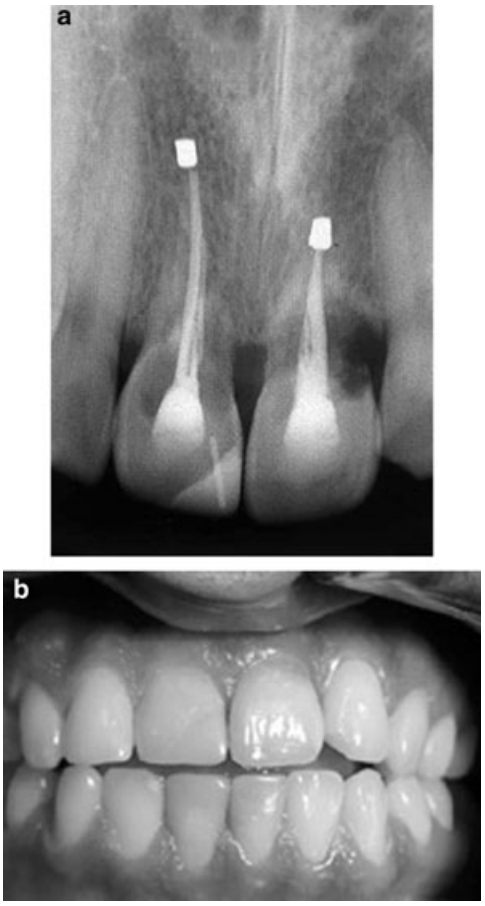

Fig. 7. After 8 years, radiographic examination has shown extensive root resorption (a) and there was a pink appearance on cervical buccal surface of left central incisor due to progressed resorption (b).

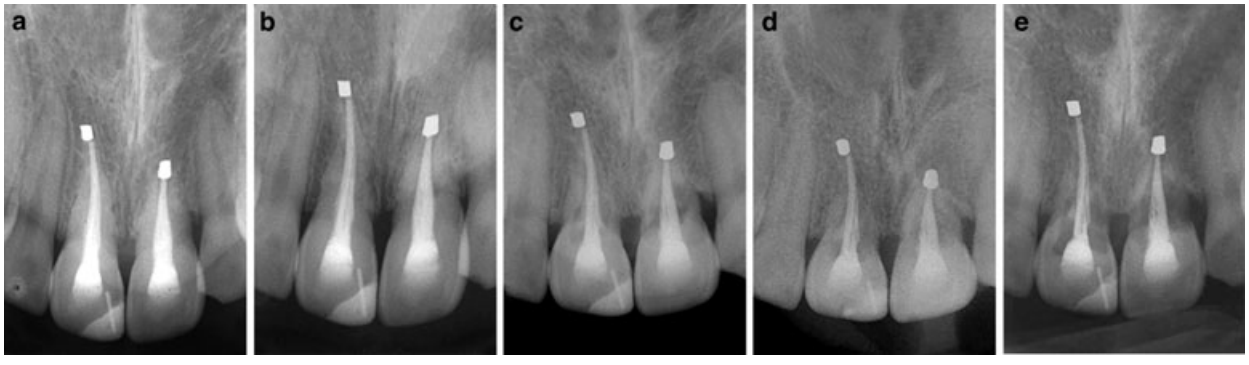

Fig. 6. Periapical radiographs taken at the advanced periods: 2 (a), 3 (b), 5 (c), 6 (d), 7 (e) years later.

replant the avulsed teeth in spite of extremely unfavourable conditions.

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. In the case presented here, the avulsed teeth had been air-dried for 1 week, so it was anticipated that there was no healing chance. As a result, the management of this case differed from the accepted replantation protocol. Considering the patient's age, our essential treatment objectives were to retain the avulsed incisors, to maintain aesthetic appearance and occlusal function, to achieve replacement root resorption and to save time for a permanent restoration. Therefore, the avulsed incisors were splinted to adjacent teeth with rigid wire for 5 weeks to facilitate rapid, solid ankylosis. The presented case is a delayed replantation. Therefore, endodontic treatment procedures were performed outside the oral cavity before the teeth was replanted. Calcium hydroxide dressing was used to aid asepsis of the root canal.

Massler suggested that cutting an apex is not necessary for an ideal reposition (7) but in our case the extra-alveolar duration was quite long (1 week), and complete removal of blood clots and granulation tissue from alveolar sockets was rather difficult. Therefore, the apexes of teeth were resected and obturated with amalgam to ensure that the roots easily seated into their respective sockets.

In cases of avulsed teeth with devital periodontal ligament, treatments with various agents such as tetracycline or dexamethasone before replantation have been suggested in the hope of slowing down the resorption process (8, 9). Bryson et al. suggested that immediate intracanal placement of Ledermix (a paste containing triamcinolone acitonide and demeclocycline) during emergency visits after avulsion injuries appears to decrease resorption and increase favourable healing (10). Andreasen and Andreasen recommended that after planning of the root to remove necrotic periodontal tissue, such teeth be soaked in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 min before extraoral root filling and replantation (1). However, these materials were not available in our clinic at that time; therefore, the avulsed incisors were replanted without any chemical treatment of the root surfaces. In order to make sure that the root surfaces were completely clean, the teeth were stored in 2.5% NaOCl solution for 20 min.

The mechanism of replacement resorption of a tooth is remodelling with osseous tissue and the speed of replacement resorption correlates to the remodelling speed of bone (fast in young people and slow in adults) (11, 12). Ebeleseder et al. found that replacement resorption of replanted mature teeth was more extensive and the overall prognosis was not good for children and adolescents when compared with adults. They also suggested that replanting avulsed teeth should be considered a temporary solution in children and adolescents (13). In these patients, the benefit of tooth replantation is mainly the time gained to establish an optimal treatment plan. In our case, when the teeth were avulsed, the patient was a 15-year-old pubescent. He retained his teeth for 8 years after replantation. This period was adequate to attain our aim. If the avulsed incisors had not been replanted or if there was no resorption of roots in a short time, another treatment option might have been a temporary prosthetic replacement of the missing incisors depending on the patient's age. However, this treatment plan is not as aesthetic as natural teeth, and thus it is necessary to change the treatment plan continuously depending on the situation. In this case, replantation treatment restored the patient's aesthetic appearance and occlusal function after the injury, and the replanted incisors remained functional for a period of 8 years. Now, the patient is 23 years old and an adult. Therefore, permanent restoration alternatives such as a dental implant or four unit bridge can be considered.

In conclusion, in cases of avulsed permanent teeth with extended (even several days) non-physiological storage, if the patient and his or her parents are aware of the outcome and request such treatment, even though the risk of progressive replacement resorption and subsequent tooth loss is high, the technique used in this case seems to have an advantage of seeing the patient through the period of growth as well as maintaining the height of alveolar bone, making the provision of an aesthetically acceptable permanent prosthesis at a later age possible.

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