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Immediate self-replantation of an avulsed permanent mandibular incisor – a case report

CASE REPORT

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Abstract – *Background*: Approximately 50% of children under the age of 15 years are subjected to various kinds of injuries in the orofacial region. In the permanent dentition, the most severe dental injury affects the surrounding alveolar bone structure and leads to loss of the tooth. The current literature emphasizes that the awareness of appropriate triage procedures following dental trauma is unsatisfactory and that delay in treatment is the single most influential factor affecting prognosis. *Results*: This case report presents the immediate self-replantation of a right lateral mandibular incisor of a 12-year-old male patient following a traumatic avulsion. The same patient had earlier, aged 10 years, experienced a trauma leading to the loss of all four maxillary incisors. The missing incisors were replaced by a removable acrylic denture. Having the requisite experience from the earlier accident, the child performed on himself an immediate replantation of the tooth at the site of the accident. After avulsion, the tooth was not splinted timely nor was an endodontic procedure carried out and no antibiotics were prescribed. The first dental examination after the trauma was performed 6 months later and since then, radiographic follow-up has been introduced. One year after the trauma, following the late endodontic treatment performed 6 months after reimplantation, the tooth is asymptomatic and stable. *Conclusions*: Immediate self-replantation of an avulsed tooth is the best treatment choice, even without any other proceeding treatment. However, the healing process should be followed up to allow for the treatment of the early signs of pulpal necrosis and/or root resorption.

During last few decades, traumatic dental injury has evolved into a major public health problem. The prevalence of injured teeth presented in the literature varies from 10% to 51% (1, 2). It is well known that dental trauma can have serious consequences that are not only physical, but also economic, social and psychological. Tooth avulsion is a complex injury affecting supporting tissues and the vasculo-nervous structures and requires prompt and appropriate management to improve prognosis significantly (3). The longer the time elapsed between tooth avulsion and replantation, the greater the risk of pulp necrosis, replacement resorption and/or inflammatory root resorption (4, 5). Although it would be desirable for most lay people to know that avulsed teeth can be reimplanted with relative ease, the literature shows that this is not common knowledge (6–10).

The aim of this report is to describe the follow-up of an avulsed permanent mandibular lateral incisor after immediate self-replantation without any other treatment.

Case report

In May 2007, a 10-year-old boy had an accident during a bicycle excursion. All four permanent maxillary incisors were avulsed. The patient presented himself to the Dental Surgery Department of the Medical University of Gdansk. The avulsed teeth brought in by the parents had been out of the mouth for several hours, transported dry and had not been reimplanted. However, according to the International Association of Dental Traumatology (IADT) recommendations, those teeth should have been considered for reimplantation allowing their rigid preservation. An orthopantomogram examination was performed (Fig. 1). The healing process was monitored at the Dental Surgery Department and after 1 month, the boy was directed to the Prosthetic Department for prosthetic restoration of the missing maxillary incisors.

In April 2009, the same patient, but now 12 years old, was playing with his dog in the house yard and knocked out his mandibular right lateral incisor. There were no other injuries during this accident. On his return home, he briefly informed his mother about what had happened. Having earlier experienced a similar accident, she called the family dentist who instructed her to find the tooth and, after washing, to reimplant it gently. The boy ran back to the place of the accident and found the tooth in the grass where he had been playing. The mother rinsed the tooth with tap water and the boy reimplanted his own tooth. All of this took place within a 20-min period. The collision took place on a Friday evening therefore visiting the dentist did not even cross the mother's mind. For the first few days, the child avoided biting with that tooth to protect it. The boy did not complain and the tooth stayed

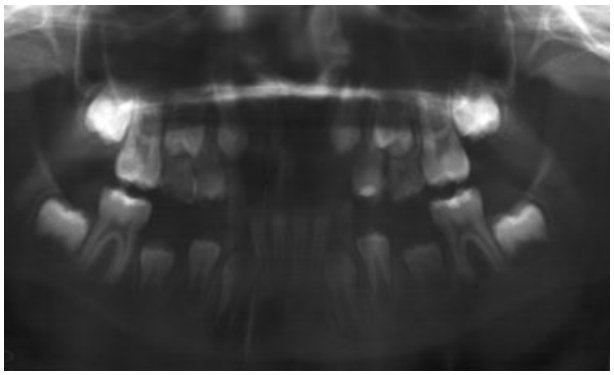

Fig. 1. OPG after first trauma - June 2007.

in place therefore the family quickly forgot about the accident. The boy has not visited any dentist since the accident, so we do not have an initial X-ray examination and the recommended early endodontic treatment was not performed. There was no dental consultation, no splinting and no antibiotic therapy.

In October 2009, 6 months later, the boy returned to the Prosthetic Department of the Medical University of Gdansk, where he had previously been treated, to receive his new denture to replace the missing maxillary incisors. During the examination, the dentist noticed class I mobility and a 1-mm extrusion of the right lateral mandibular incisor. The tooth was in occlusal interference with the upper removable acrylic denture, thereby being overloaded. The mother explained the incident. On the same day, the patient was referred to the Peadiatric Dentistry Department of the Medical University of Gdansk where an X-ray examination was performed (Fig. 2a). A periapical radiograph taken at the time showed the extrusion displacement of the tooth, a radiolucent area at the root apex and a small localized root resorption at the central wall of the root. The percussion test caused a significant pain reaction and there was a prolonged response to the cold test. There was no sound difference in the percussion test of all the mandibular incisors. The reactions of the adjacent teeth to the vitality and percussion tests were correct. Endodontic treatment was performed under local anaesthesia. Through coronal access, manual cleaning and shaping with irrigation using 2% sodium hypochlorite and a sterile saline solution were performed. It was noted that the dental pulp, which was removed, was partly vital with chronic inflammation. Following this, the root canal was dried and a calcium hydroxide dressing material (ApexCal, Ivoclar Vivadent) was inserted into the root canal. The tooth crown was slightly shortened to adjust the occlusion. The root canal dressing remained for the total period of 4 weeks and was refreshed after 2 weeks. In November 2009, the traumatized tooth was asymptomatic without any mobility. Definitive root canal obturation with gutta-percha/sealer (Gutta Percha, SybronEndo/Apexit Plus, Ivoclar Vivadent) was performed and the access opening was filled with a composite resin restoration (Tetric EvoCeram, Ivoclar Vivadent). As seen from the radiograph (Fig. 2b,c), the root canal filling was not completely removed from the coronal pulp chamber. To avert crown discoloration, the root canal filling should be removed from the pulp chamber and packed below the cementoenamel junction. A periapical radiograph showed the partial healing of the radiolucent area at the root apex (Fig. 2b) compared with the initial X-ray examination in October 2009 (Fig. 2a). At the end of March 2010, the boy was invited for his usual periodic follow-up visit to confirm the healing process i.e. 12 months after the accident (Fig. 3). At the same time as the first follow-up performed 6 months from treatment initiation, the tooth was asymptomatic and the periapical radiograph showed apical healing. The small area of external root resorption had not changed since the last examination and seemed to be stable (Fig. 2c). No sound difference or sensitivity reaction was noted in the percussion test. The adjacent teeth reacted normally to the vitality test. Replacement root resorption could be one of the undesirable complications in such a case, but in this case, until now there is no evidence of it. The radiograph showed a normal periodontal ligament with the exception of a small area of external root resorption. Normal percussion sound was obtained and the tooth is not in infraocclusion. This tooth had now been maintained for 1 year and with endodontic treatment, is expected to serve the patient for a long time.

Discussion

An avulsed permanent tooth is one of the few real emergency situations in dentistry. According to current

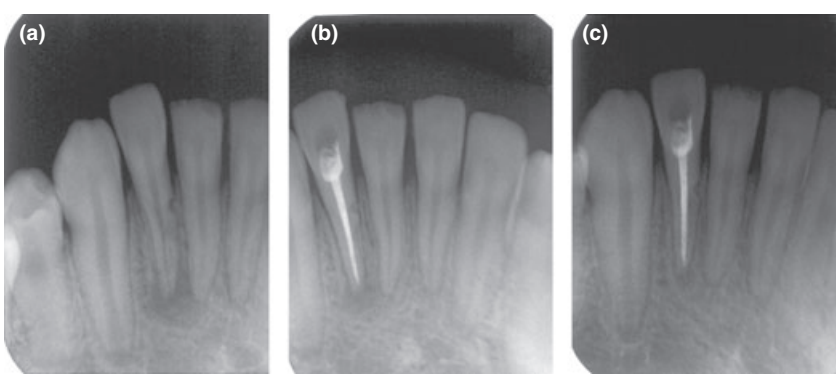

Fig. 2. Periapical radiograph: (a) October 2009; (b) November 2009; (c) March 2010.

Fig. 3. Lower right lateral incisor one year after self-replantation.

treatment guidelines for avulsed teeth, if the tooth has been self-replanted, the patient should seek emergency dental treatment immediately (11). The dentist should verify the normal position of the replanted tooth both clinically and radiographically, apply a flexible splint for up to 2 weeks and administer systemic antibiotics (11). Root canal treatment should be initiated 7–10 days after replantation and before splint removal (11). Calcium hydroxide should be used as an intra-canal medicament until the root canal is filled. The patient should be placed on a soft diet for 2 weeks, should brush their teeth with a soft toothbrush after each meal and use a chlorhexidine (0.1%) mouth rinse twice a day for 1 week (11). The healing process should be followed up once a week for 1, 3, 6 and 12 months following the avulsion and yearly thereafter (11). In this case, none of these treatment procedures was followed. The boy performed self-replantation and then presented at the dentist 6 months later.

It is well known that immediate replantation is the best treatment option after tooth avulsion. It allows the viability of the periodontal ligament responsible for proper reattachment to the alveolar bone to be maintained. After avulsion, pulp tissue can become necrotic and stimulate inflammatory resorption (12, 13). Inflammatory resorption can be treated with calcium hydroxide, but it can be prevented by the early removal of necrotic pulp and dressing the root canal with calcium hydroxide followed by gutta-percha/sealer obturation. An evidence-based study of 236 replanted avulsed permanent teeth concluded that the likelihood of successful periodontal healing was improved by pulpal extirpation within 14 days of replantation because this decreased the risk of the development of inflammatory resorption (14). In this case report, it seems that the pulp might have undergone necrosis at an earlier stage after injury. Root canal treatment was performed 6 months later, which was too late to prevent inflammatory root resorption. However, this study shows that even such late endodontic treatment allowed healing and the reduction of root resorption to be optimized. Current guidelines recommending flexible splinting for up to 2 weeks should reduce ankylosis. In this case, the traumatized tooth was not splinted and the patient did not take any special dietary precautions. The physiological forces of masticatory stimulation and physiological movements of the tooth might have reduced the extent of ankylosis.

Immediate self-replantation or replantation performed by a lay person at the site of an accident is widely recommended, but it is important to seek dental advice as soon as possible to check the positioning of the tooth and allow the dentist to perform the recommended treatment. This case showed that if the tooth had been properly repositioned and splinted within a short period after self-replantation, it would not have stayed extruded. The extrusion and unbalanced occlusion might have been the cause of the class I mobility because the masticatory force was too large for a single tooth.

There are only a few reports in the literature presenting self-replantation (15–17). They have all reported that self-replantation allowed avulsed teeth to be maintained for a long period of time. This case report also demonstrated that immediate self-replantation, followed by normal masticatory function, even without any other treatment, can help improve prognosis. This case report once again highlights the unique healing and regenerative capacity of oral tissues.

Although this case should be regarded as a success, we are aware that the follow-up procedure, as recommended by IADT, should be performed once a year up to 5 years after the accident. We should remember that complications such as further external inflammatory or replacement root resorption, ankylosis or, as the end result, tooth loss can occur at any time. That is why to prevent such undesirable complications, a strict follow-up plan should be complied with.

It should be stressed again that the short follow-up time sets a provisional limitation on our case report. Nevertheless, it has to be noted that this reimplanted tooth has already served our young patient for 12 months and that should be regarded as a success.

Conclusions

The scarce knowledge of first-aid procedures in the case of dental injuries in all child-related environments makes the introduction and continuation of education on a wide-ranging scale vital. Instructions for caregivers should be short and comprehensible. The message to everybody involved in orofacial accidents should be as follows: once the tooth is out of the mouth, wash and replant it immediately, otherwise immediately place the tooth into a container with physiological medium, keeping it wet at all times and visit a dentist as soon as possible.

Immediate self-replantation of an avulsed tooth is the best treatment choice, even without any other proceeding treatment. However, the healing process should be followed up to allow for the treatment of the early signs of pulpal necrosis and/or root resorption.

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