Tooth replantation after keeping the avulsed tooth in oral environment: case report of a 3-year follow-up

CASE REPORT

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Despite the recognized therapeutic value of immediate tooth replantation, clinical practice has shown that most avulsed teeth are replanted after an extra-buccal time that extrapolates the adequate conditions for maintenance of the integrity of periodontal ligament (PDL) cells (1). In such cases, wet storage is considered the best way to store avulsed teeth (1, 2). Some characteristics of the storage medium, i.e. pH, osmolarity and temperature (3, 4), should be compatible with the survival of PDL cells (2, 4).

Storage media such as milk, Hank's balanced salt solution and Viaspan have been proved to maintain cell vitality after long periods (5), whereas PDL cells stored in saliva remain viable for reportedly shorter periods (6, 7). Nevertheless, the availability of saliva at the moment of the accidental avulsion emphasizes its significance as a temporary storage medium until the tooth is replanted or a storage medium with more appropriate properties is obtained (7).

This article reports the case of an accidentally avulsed permanent incisor that was kept into the patient's oral cavity from the moment of trauma until its replantation, 90 minutes later. The successful clinical and radiographic findings observed after 3 years of follow-up are described.

Case report

A 30-year-old white female patient was referred to the Department of Surgery and Integrated Clinics of the Faculty of Dentistry of Araçatuba (UNESP, Brazil), after falling from a bicycle and sustaining a severe dental traumatism.

Routine protocol for management of trauma patients was carried out. On arrival, the patient was examined for extraoral signs of injury, including swelling and asymmetry of the face and head. Inspection of the facial bones revealed normal mouth opening. No areas of ecchymosis, crepitus or pain upon palpation were observed, which removed the suspicion of underlying fractures.

Intraoral examination revealed lateral luxation of the maxillary left lateral incisor and avulsion of the maxillary left central incisor, whose crown was lodged into the muscular tissue of the upper lip, on the right side (Figs 1 and 2). The root of the avulsed tooth remained completely exposed to the oral environment, in direct contact with saliva. The time elapsed from the moment of trauma until tooth replantation was 90 min.

The treatment consisted of repositioning of tooth 22 and gentle removal of the avulsed tooth 21 from the soft tissue with gauze soaked in saline (Fig. 3). Care was taken not to damage root surface. The tooth was kept in saline and replanted after meticulous inspection and irrigation of the alveolus with saline (Fig. 4). Splinting was carried out from tooth 23 to 12 using a 0.020 in orthodontic wire and resin composite (Fig. 5a,b), and the lacerated areas were sutured with 4.0 silk. Amoxicillin 500 mg was administered every 8 h for 7 days and



Fig. 1. Intraoral view showing the clinical conditions on the patient's arrival.



Fig. 2. Avulsed tooth 21 with the crown lodged into the muscular tissue of the upper lip.



Fig. 3. Removal of the avulsed tooth from the soft tissue with gauze soaked in saline.

0.12% chlorhexidine mouthrinses three times daily was prescribed for 7 days.

One week after replantation, sutures were removed and the root canals of teeth 21 and 22 were biomechanically prepared. A calcium hydroxide paste was used as intracanal dressing and was changed 14 days later, when



Fig. 4. Replantation was carried out after immersion of the avulsed tooth in saline for rehydration and preparation of the alveolar socket.

the splinting was removed. Radiographs were taken and the intracanal medication was changed at 30 and 60 days after replantation. Root canals of both teeth were permanently obturated at 90 days with gutta-percha points and a calcium hydroxide-based sealer (Selapex; Sybron Kerr, Sybron Endo, CA, USA).

The clinical and radiographic findings after 3 years of follow-up revealed absence of root resorption, ankylosis or abnormal mobility of the replanted tooth (Figs 6 and 7).

DISCUSSION

Saliva is used as a storage medium for accidentally avulsed teeth in very few situations (1), and therefore the case reported in this article is an exception in the clinical routine on management of tooth replantation after traumatic avulsion.

Lack of knowledge of the possibility of immediate replantation and unawareness of the ideal conditions and storage media for exarticulated teeth have contributed for a poor prognosis. Both length of extra-alveolar time and type of storage are significant factors that can affect the long-term survival of replanted teeth. It has been shown that immersion of the avulsed tooth in milk at room temperature preserves the viability of the PDL cells for up to 1 h, whereas storage in refrigerated milk is reported to maintain cell viability for additional 45 min (2, 8). Nevertheless, milk may not be readily available at the accident site and therefore saliva appears as an option to minimize the extra-alveolar dry storage period and keep the tooth hydrated, until a more appropriate storage medium is obtained (7).

Disadvantages of storage in saliva include its low osmolarity and the presence of bacterial products (7). *In vitro* and *in vivo* studies have reported that the vitality of PDL cells is maintained upon 30-min immersion in saliva and decreases remarkably after 60 min (1, 6, 7). Nevertheless, in the case presented in this paper, the 3-year clinical and radiographic controls showed maintenance of root integrity, intact lamina dura periradicularly and absence of abnormal mobility, which are indicative of successful replantation and suggest a



Fig. 5. (a) Intraoral view after replantation. Splinting with orthodontic wire and resin composite was carried out for 14 days. (b) Radiograph of replanted and splinted teeth.

positive influence of saliva, probably preventing a more severe desiccation of PDL remnants.

Some precautions were taken while planning the replantation procedure. The tooth was immersed in saline prior to replantation to eliminate cell lysis products resulting from the traumatic injury on root surface, as well as debris and bacteria from saliva (6, 9, 10). Systemic antibiotic therapy was administered and both teeth were endodontically treated to prevent inflammatory resorption (11).

It is important to emphasize that although root resorption and ankylosis of replanted teeth are most frequently observed in the first year post-replantation, these events may also occur after 4 or 5 years (1). Therefore, despite the positive results observed after



Fig. 6. Three-year control radiograph.



Fig. 7. Clinical condition 3 years after replantation.

3 years, clinical and radiographic follow-up of the tooth replanted under the conditions hereby described should be carried out for a longer period.

References

- Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. Replantation of 400 avulsed permanent incisors 4. Factor related to periodontal ligament healing. Endod Dent Traumatol 1995;11:76–89.
- Lekic P, Kenny HK, Moe E, Barrett EJ, Mccullocch CAG. Relationship of clonogenic capacity to plating efficiency and vital dye staining of human periodontal ligament cells: implications for tooth replantation. J Periodontol Res 1996;31:294–300.
- Blomlöf L, Otteskog P, Hammarström L. Effect of storage in media with different ion strengths and osmolalities on human periodontal ligament cells. Scand J Dent Re 1981;89:180–7.

- 4. Sigalas E, Regan JD, Kramer PR, Witherspoon LAO. Survival of human periodontal ligament cells in media proposed for transport of avulsed teeth. Dent Traumatol 2003;20:21–8.
- 5. Hiltz J, Trope M. Vitality of human lip fibroblasts in milk, Hanks balanced salt solution and Viaspan storage media. Endod Dent Traumatol 1991;7:69–72.
- Andreasen JO. Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. Int J Oral Surg 1981;10:43–53.
- Blomlöf L. Storage of human periodontal ligament cells in a combination of different media. J Dent Res 1981;60:1904–6.

- Blomlöf L, Lindskog S, Hammarström L. Periodontal healing of exarticulated monkey teeth stored in milk or saliva. Scand J Dent Res 1981;89:251–9.
- 9. Löe H, Waerhaug J. Experimental replantation of teeth in dogs and monkeys. Arch Oral Biol 1961;3:176-84.
- Cvek M, Granath LE, Hollender L. Treatment of non-vital permanent incisors with calcium hydroxide. III. Variation of occurrence of ankylosis of replanted teeth with duration of extra-alveolar period and storage environment. Odontol Revy 1974;25:43–56.
- Hammarström L, Blomlöf L, Feiglin B, Anderson L, Lindskog S. Replantation of teeth and antibiotic treatment. Endod Dent Traumatol 1986;2:51–7.

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