

Replantation Of Permanent Tooth Thirty-Two Hours Post Avulsion: A Two-Year Follow-Up

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ABSTRACT

Background: Avulsion is a rare and serious traumatic dental injury that needs immediate and complex management. But this is not always possible all the time.

O: This case report highlights a successful replantation of an avulsed maxillary central incisor despite an extended extra-oral duration of thirty -two hours without transport media.

Case report: A 19-year-old male patient presented with a traumatic dental injury sustained to the anterior maxillary region due to a fight. Clinical examination revealed an avulsed tooth 21 that was replanted and splinted after root canal therapy was done extra oral in first visit. Patient was seen at regular intervals of two, four weeks and splint removed after 2 months, with a two year follow up.

Conclusion: Replantation should always be considered in tooth avulsion, despite an extended extra-oral dry time without transport media, it can have a favourable outcome if all the recommended guidelines and protocols are followed.

Keywords: Avulsion, Replantation, Transport media.

INTRODUCTION

Avulsion of tooth is a complete displacement of a tooth from its alveolar socket, it is also known as ex-articulation (Aminizadeh et al., 2016. Andreasen & Andreasen 1994). Avulsion prevalence of permanent teeth varies from 0.5% to 16% in all dento-alveolar trauma (Kadulkar et al 2023). Tooth avulsion is a special form of dental injury in which the prognosis is associated with the duration of the extra oral time and when the tooth is replanted, the maturity of the root, storage medium and the general health of the patient (Sardanan et al., 2014, Glendor 1996). The prevalence of tooth avulsion in children is common between the ages of 7 and 9 years due to immature root development and minimal resistance of the alveolar bone and periodontal ligament (PDL) against forces of extrusion during the period of the teeth eruption (Aminizadeh et al., 2016). The viability of PDL cells is adversely affected by an extra-oral dry time that is longer than one hour, with potential complications being root resorption (inflammatory/replacement) (Singh 2013, Fouad 2020). Avulsion is important

because it commonly involves maxillary central incisors that have a major contribution to the smile and aesthetic (Sardanan et al., 2014, Bastone et al., 2000).

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Avulsion in permanent dentition mostly occur because of falls, fights, sport injuries, automobile accidents, and child abuse.¹ Increased overjet and incompetent lips were identified as predisposing factors to avulsion during trauma involving the Oro-facial region (Aminizadeh et al., 2016, Brin 2000).

The primary aim for treating an avulsed tooth is to preserve and treat the supporting tooth tissues and replant the avulsed teeth (Aminizadeh et al., 2016). This case report highlights the comprehensive procedures executed in the successful replantation of an avulsed maxillary central incisor despite an extended extra-oral duration of thirty -two hours without transport media.

CASE REPORT

A 19-year-old male patient presented with a history of a blow to the mouth from a fight resulting to total displacement of the tooth from the socket. The patient had no relevant past medical history and was alert as well as responsive during the process of examination. Extra-oral examination revealed mild swollen upper lip. On intra oral examination, the left maxillary central

incisor (21) was missing and the marginal gingiva in the associated area was lacerated (Figure 1). On inspection and palpation of the anterior maxillary segment, dento-alveolar fracture was ruled out. Periapical radiograph revealed an empty alveolar socket with an intact lamina dura in the 21 region; there was no other injury or fracture of the adjacent teeth and associated alveolar structures (Figure 2). The case was diagnosed as an Ellis class V fracture with 21

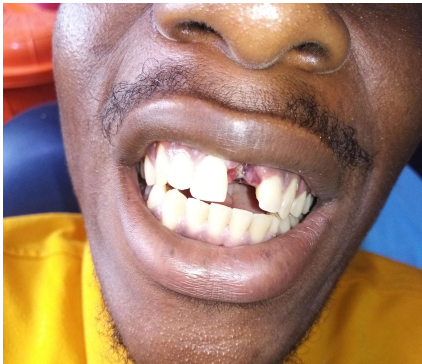


Figure 1



Figure 2



Figure 3

The patient preserved the avulsed tooth dry in a handkerchief and reported to the clinic, approximately thirty-two hours after the incidence of trauma. The patient was informed about the plausible complications (inflammatory resorption, replacement resorption/ankylosis, tooth discolouration) involved with replanting an avulsed tooth that had endured an extra-oral time of approximately thirty-two hours. After obtaining informed consent, it was decided to reposition and replant the avulsed tooth. The avulsed tooth had an intact crown and a well-formed root with a closed apex. After taking it out from the handkerchief, the avulsed tooth was held by the crown, placed in 1 in 5 solution of sodium hypochlorite for 20 min (figure 3). the root surface was washed with stream of saline with gauze and all the debris was removed gently. The root canal treatment was

completed at this appointment extra orally, and the root filling was done with gutta-percha and sealer, access cavity sealed with Glass ionomer cement. The tooth was subsequently kept in tetracycline solution till the patient was prepared for the procedure of replantation. Local anaesthetic was administered, and the empty socket was thoroughly irrigated with normal saline. After removing coagulum from the socket, the tooth was placed in the socket under light digital pressure (figure 4). The occlusion of the patient was checked to verify that there were no pre-mature contacts while biting to avoid further injury to the adjacent periodontal tissues using the incisal edge of the adjacent tooth as a guide. Stabilization was done using a flexible splint (0.7-inch wires) and the acid-etch composite resin technique splinting was done from canine to canine for two months (Fig.5).



Figure 4



Figure 5

Moreover, oral hygiene instructions and advice about soft diet and the need to use warm saline mouth bathe during the stabilization period were provided at this time. Oral Prophylactic antibiotic therapy with Amoxil 500mg, Metronidazole 400mg, 8hourly for five days with Paracetamol 1000mg 8hourly for three days and ascorbic acid for two weeks was prescribed. The patient was also referred for an anti-tetanus booster. The

patient was informed about the importance of regularly returning for clinical and radiographic follow-up. The patient was examined after 2 and 4 weeks, and no clinical or radiological pathological changes were detected. Patient was seen 2 months after replantation, and the splinting wire was removed at this appointment (figure 6) and a periapical radiograph taken (figure 7).

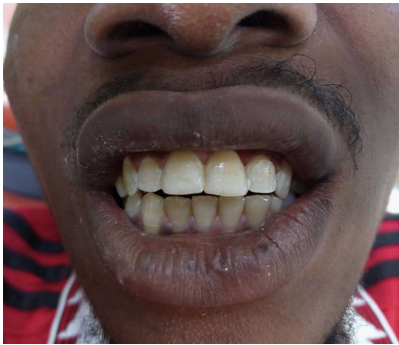


Figure 6



Figure 7: 2 months post replantation



Figure 8: 2-year post replantation



Figure 9: 2-year post replantation clinical picture

DISCUSSION

Avulsion is a traumatic dental injury that results in total loss of tooth out of socket with damage to the periodontal ligament (Pohl 2005). The optimal treatment option when an avulsion injury occurs is to replant the avulsed tooth at the quickest possible time. But this is not always possible in all cases because the avulsed tooth may be discarded owing to lack of knowledge, distance or inability to afford treatment. This is a case report on the replantation of an avulsed maxillary left central incisor after an extra-oral time of about thirty- two hours.

The factors affecting the successful outcome of replantation are the patient's general health, maturity of the root (open or closed), storage media, and extra-oral time. The storage media and the extra-oral time are the most important factors that greatly affect the viability of the PDL and the success of the replantation (Ram & Cohenca 2004). Clinical studies have shown that teeth replanted within five minutes after avulsion have the best prognosis, after a dry time of sixty

minutes or more, all PDL cells are nonviable (Aminizadeh et al., 2016, Andersson et al 2012) Avulsed tooth should be maintained in a suitable media, such as Hanks balance salt solution (HBSS), milk, socket, saliva or saline, until it is replanted by a dentist. Milk is the most extensively used media due to its easy availability and having a suitable pH with appropriate growth factors, nutrients, and osmolarity, Also, milk being a gland secretion contains epithelial growth factor (EGF) that stimulates the proliferation and regeneration of epithelial cell rests of Malassez (Poi et al., 2013). In this current case the tooth was not stored in any medium for thirty- two hours, hence it was supposed that the periodontal ligament cells were dead since the extra oral time was more than twenty minutes. Removal of dead periodontal ligament cells is one of the most important actions which need to be taken to decrease the rate of osseous replacement of the root surface (Sardanan et al., 2014). To achieve this, the tooth was placed in 1 in 5 solution of sodium hypochlorite for 20 minutes to decontaminate the tooth, root surface was

cleaned with gauze and normal saline to remove remaining dead periodontal ligament cells which could serve as source of infection that would accelerate inflammatory resorption. Some clinicians have even proposed periodontal curettes and scalers for debridement of periodontal ligament cells; however, excessive scraping of cementum may further accelerate the resorptive process instead of decreasing it (Sardanan et al., 2014). Thus, to achieve a balance of avoiding excessive debridement of cemental layer and at the same time completely remove dead periodontal ligament cells, sodium hypochlorite, gauze with normal saline were used. The tooth was subsequently kept in tetracycline solution till the patient was prepared for the procedure of replantation to minimize loss of precious time.

Delayed replantation causes necrosis of the PDL cells resulting in complications such as inflammatory/replacement root resorption, to avoid this, pre-treatment of root surface with fluoride is done (Panzarini et al., 2008). The mechanism of fluoride is not known but it is believed that it converts hydroxyapatite into fluorapatite by direct action on dentin, cementum, and bone and specifically inhibits the activity of clastic cells (Kadulkar et al., 2023). But in this case, pre-treatment of root surface was done using tetracycline solution because of its anti-resorptive effect to prevent root resorption post-replantation (Sardanan et al., 2014). The chances of complications were found to be higher in a tooth with an open apex than in a close apex (Kadulkar et al., 2023). In this present case, this factor was favourable as the avulsed tooth had a closed apex.

Root canal treatment was done extra orally because there were no chances of obtaining pulp space revascularization and the periodontal ligament was already necrotic and not expected to heal. The pulp was extirpated and the root canal obturated with gutta percha and a sealer. The rationale behind splinting the replanted tooth is to stabilise it in its appropriate position. In the case discussed above, Stabilization was done using a flexible splint (0.7-inch wires) and the acid-etch composite resin technique splinting was done from canine to canine for two months. In accordance with the guidelines prescribed by IADT, the ideal duration of splinting a replanted avulsed tooth with extra oral dry time greater than 60 minutes is four weeks (Fouad et al 2020). However, an additional week of splinting was necessary in this case because the clinician believed it would provide more stability because of the prolong extra-oral dry time without any negative consequence to patient.

The benefit of successful replantation of an avulsed tooth includes Preventing resorption of the surrounding bone and maintaining the tooth in the arch space, restoration of patient's aesthetic appearance

and occlusal function, and prevention of psychological trauma associated with a missing anterior tooth.

The patient was recalled at 2 months, 6 months, 1 year, 2 years after trauma and is still on yearly follow up.

CONCLUSION

Replantation should be treatment of choice for tooth avulsion. Despite an extended extra-oral dry time without transport media, favourable outcome can be achieved if all the recommended guidelines and protocols are followed. It does not only satisfy the patient's functional and aesthetic concerns but also helps to maintain the surrounding bone for prosthetic rehabilitation, in case of replantation failure.

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