

DELAYED REPLANTATION OF AVULSED ANTERIOR PERMANENT TEETH : CASE SERIES

Dr. Lopamoodra Das* , Dr. Khooshbu Gayen*
 Dr. Avik Narayan Chatterjee* , Dr. Raju Biswas*
 Dr. Subrata Saha**, Dr. Subir Sarkar**

ABSTRACT

Various treatment options are present in case of coronal fracture of anterior teeth depending on the extent of fracture. The following case reports are going to highlight on the anterior tooth trauma management with successful replantation. In first case a 10-year-old female child reported to the department of pedodontia with avulsion of 11. Here successful replantation was done followed by root canal treatment of 11. In second case the root canal procedure was done extraorally and the replantation was done after that. Successful esthetics and functions were restored in both the cases with conservative approaches and six month follow-up shows no signs of failure, no post operative pain.

KEY WORDS

Avulsion, Replantation, Trauma

ABOUT THE AUTHORS

* Post Graduate Student, **Professor and PG Guide
 Dept of Pedodontics And Preventive Dentistry
 Dr. R. Ahmed Dental College & Hospital, Kolkata

CORRESPONDING AUTHOR

Dr. Khooshbu Gayen
 Post Graduate Student
 Dept of Pedodontics And Preventive Dentistry
 Dr.R.Ahmed Dental College & Hospital, Kolkata.
 e-mail id: gayenkhooshbu@gmail.com

INTRODUCTION

Tooth avulsion(exarticulation) is complete displacement of a tooth from its socket ranging from 0.5–3% of traumatic injuries in the permanent dentition. Avulsion generally occurs in the maxilla, and the most commonly affected teeth are the maxillary central incisors. Increased overjet and incompetent lips act as potential etiological factors in such cases. The prevalence of avulsion in children increases between the ages of 7 and 9 years when the permanent incisors are in eruptive stage. At this stage, the loosely structured periodontal ligament and low mineralized bone surrounding the erupting teeth provide minimal resistance to extrusive force. Avulsion in permanent dentition is generally a result of falls, fights, sport injuries, automobile accidents, and child abuse¹⁻³

The primary goal in treating an avulsed tooth is to preserve and treat the supporting tooth tissues and to replant the avulsed teeth. The success of replantation depends on the patient's general health, the maturity of the root, the time the tooth is out of its socket, and storage medium.⁴⁻⁷ Prolonged extraoral storage of an avulsed tooth before replantation will lead to total necrosis of periodontal ligament and will affect the outcome of treatment. Delayed replantation of avulsed teeth can lead to complications such as inflammatory resorption and replacement resorption. Two important reasons have been cited for delayed replantation, namely, lack of knowledge of the people at the site of injury for the management of an avulsed tooth, and also as the soft tissue lacerations and bleeding mask the loss of teeth⁸.

The recommended treatment for avulsed tooth is immediate replantation though it is not always possible. The present case series describes the management of avulsed maxillary central incisors with long extra oral period and their follow up observation.

CASE REPORT 1

A 10-year-old female child reported to the department of pedodontia with a history of dental trauma sustained 6 hours ago due to fall from a motorcycle.



Figure 1: Preoperative intraoral photograph- avulsed 11



Figure 2: Avulsed tooth after cleansing



Figure 3: Replantation in socket and acid etch composite splinting done



Figure 4: Radiograph after completion of root canal treatment



Figure 5: Post operative photograph after removal of splinting



Figure 6: Intraoral radiograph of 6 months follow up

There was no history of loss of consciousness or vomiting. Her parents had let the avulsed tooth dry in a piece of paper and brought it to the clinic. Intraoral examination revealed that the maxillary right permanent central incisor (tooth 11) was avulsed. (Figure.1) No abnormality was detected in the adjacent teeth and in a vitality test, the adjacent teeth gave a positive response. Examination of the avulsed tooth showed that the crown portion was intact, root apex was closed, and the root surface was covered with remnants of periodontal ligament. There was no evidence of alveolar bone fracture both clinically and in the periapical radiograph. Extraoral examination revealed laceration on lower lip.

The tooth socket was inspected for loose bony fragments that would impede healing. It was then gently rinsed with saline solution and providine iodine under local anesthesia to remove the infected coagulum. Part of the periodontal ligament tissue that necrosed were carefully removed from the root surface by gently rinsing with saline by holding the crown portion of the tooth with forceps. Tooth was soaked in 2% sodium fluoride (2% NaF) for approximately 20 minutes. (Figure.2) The tooth was replanted gently with slight digital pressure, and the position of the replanted tooth was verified both

clinically and radiographically before stabilization using a flexible splint by employing an acid-etch composite resin technique. (Figure.3) Postoperative oral hygiene instructions were given, a soft diet was recommended, and chlorhexidine mouthwash was advised during the stabilization period. Antibiotic therapy with amoxicillin and clavulonic acid (375 mg) thrice daily was prescribed for 1 week and 0.5 ml tetanus booster was administered.

The patient was recalled after 1 week for follow up examination. Endodontic treatment was initiated on the replanted tooth on the same appointment. Pulp tissue was extirpated and a tentative working length was established. Biomechanical preparation was done by step back technique with an apical preparation corresponding to 50 K file size. Hypochlorite irrigation was performed during the debridement procedure. The canal was dried and gutta percha obturation was done by lateral condensation technique. Access cavity was then sealed with Glass Ionomer Cement. The patient was again recalled after 2 weeks. There were no observable pathological changes, both clinically and radiographically. (Figure.4) Splinting was removed and the parents were informed about the importance of regularly returning for periodic follow up.



Figure 1: Preoperative intraoral photograph- avulsed 11, enamel fracture in 21 and 12



Figure 2: Extraoral endodontic treatment in 11



Figure 3: Replantation in socket and acid etch composite splinting done

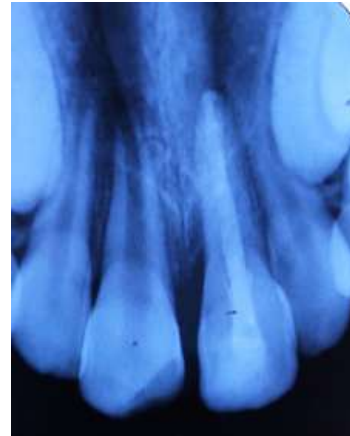


Figure 5: Intraoral radiograph after 6 months follow up

(Figure.5) The patient was again seen 1 month after splint removal. The periodontal ligament space and the peripical region appeared intact on the radiograph. Periodic evaluation at 3,6 and 12 months showed that the replanted tooth remained in a stable functional position. (Figure.6) The child will be under continuous supervision and appropriate treatment will be carried out if needed.

CASE REPORT 2:

A 9 year old female patient reported to the Pedodontia department with a history of fall at a playground 27 hours ago. The avulsed tooth had been left dry in an uncovered plastic container after the injury. Any concomitant systemic disease was not defined by the patient's parents; there was no history of loss of consciousness or vomiting. On examination, no extra-oral injury was detected. The intraoral examination revealed that the maxillary right permanent central incisor (tooth 11) was avulsed. The left central incisor (tooth 21) and right lateral incisor (tooth 12) showed enamel fracture.(Figure.1) Examination of the avulsed tooth revealed that the crown had an enamel fracture and that the root had a closed apex.

The necrotic and dried remnants of periodontal tissue were carefully removed from the root surface

of the avulsed tooth. Extraoral endodontic treatment was initiated on the tooth. (Figure.2) Surface treatment of the knocked out tooth was done with 2.4% Acidulated Sodium Fluoride solution(pH 5.5) for 20 minutes before extraoral root canal treatment. Local anesthesia was administered to the patient. Alveolar socket was gently irrigated with 2% chlorhexidine gluconate solution to remove any granulation tissue and the tooth was replanted using light digital pressure. A periapical radiograph was taken to ensure that the tooth had been correctly positioned in the socket. The upper anterior teeth were splinted with a flexible splint using acid etch technique. (Figure.3) The instructions given to the patient's family were as described in Case I (diet suggestions and oral hygiene instructions). Prophylactic antibiotic therapy with amoxicillin trihydrate/potassium clavulanate at a dose of 375mg thrice daily was prescribed for one week.

One week after replantation, the patient was reviewed, and no clinical or radiological evidence of pathological changes was detected. The patient was seen again after one week, and the splinting wire was removed at this appointment. The permanent restoration of the fractured crowns were completed with composite resin. The patient was followed up at 1-, 3-, and 6-month interval for examination of the replanted tooth, and the tooth was asymptomatic. (Figure.4) On clinical examination of the replanted

tooth, there was no abnormality seen and there were no signs of root resorption or ankylosis in radiographic examination. The patient is still under observation the patient will be monitored till her growth is complete and appropriate treatment will be carried out as and when required.

DISCUSSION

The guidelines for the treatment of avulsed permanent teeth vary, but the consensus is that the ideal treatment for an avulsed tooth is immediate replantation though it cannot always be performed immediately. Relative to other tooth injuries, avulsion is a more serious assault on the gingiva, the periodontal ligament and the pulp. The treatment decision regarding avulsed teeth is related to the maturity of the root apex (open or closed) and the condition of the PDL cells. Clinical studies have indicated that the risk of resorption increases dramatically after 5 min of dryness, with the probability of resorption increasing by 29% for every additional 10 min of dryness.⁹ Hence in the optimal scenario, the teeth which cannot be replanted immediately should be stored in an appropriate media such as normal saline, milk, saliva, hanks solution, or coconut water. The chance of pulpal and periodontal healing is inversely related to the stage of root development and the period of extra-oral dry storage. The extra-oral period significantly affects the outcome and has a direct correlation with the survival of PDL cells.

In the present cases, the extra-oral dry time was more than 60 minutes (6 hours and 27 hours in Cases I and II, resp.). It is indicated that, if the tooth has been dry for more than 60min before replantation, the root canal treatment may be done extra-orally prior to replantation or later. In case 1, the endodontic treatment was initiated after replantation prior to splint removal. Whereas in case 2, the root of the avulsed incisor was also filled extraorally. Given that replacement root resorption was inevitable after the prolonged period of dry storage, it was thought that further drying and handling of the root surface was unlikely to worsen the prognosis.¹⁰ In cases of avulsed tooth with extended dry time, in the hope of slowing down the resorption process, it has been recommended to perform planning of the root surface to remove necrotic periodontal tissues and tooth to be soaked in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 min before extraoral root canal treatment^[4]. Hence, in case 2, the avulsed tooth was soaked in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 min before the initiation of the root canal treatment. Endodontic intervention was necessary as the pulp tissue of the avulsed tooth was necrosed and infected and if endodontic treatment is not initiated then infection can pass from the pulp tissue through the dentinal tubules to the external root surface and stimulate an inflammatory response, resulting in inflammatory root resorption.

Systemic antibiotics are often recommended after replantation, but their effectiveness in preventing root resorption is questionable¹¹. Andreasen and others, in their prospective study, showed that systemic antibiotics had no effect on periodontal healing clinically⁸. Teeth replanted after 60 minutes of dry storage become ankylosed and are resorbed within 7 years in young patients, whereas teeth replanted under similar conditions in patients older than 16 may remain functional for considerably longer periods¹². Ebeleseder and others also found that replacement resorption of replanted mature teeth was more extensive and the overall prognosis worse for children and adolescents than for adults¹³. It has been suggested that the more rapid resorption of teeth in children is related to the higher rate of bone remodelling in children than in adults¹¹.

Splinting is required routinely after replantation of avulsed tooth. Kinirons et al. demonstrated that using semi-rigid or flexible splint for 2 weeks of time is best to avoid ankylosis of the tooth and is sufficient to create adequate periodontal support to maintain the avulsed tooth in position⁹. The splint should have no memory (so the tooth is not moved during healing) should not impinge on the gingiva and not prevent maintenance of proper oral hygiene in the area. Hence, in both the cases, a flexible splint was used for 2 weeks. If the avulsed incisors had not been replanted in the present cases, other treatment options might have included prosthetic replacement of the missing incisor, space closure with orthodontic treatment, or autotransplantation of another tooth to the empty space.

CONCLUSION

Careful clinical monitoring of the avulsed tooth should be done periodically and clinical/radiographic findings should be recorded. 1 year and 6 month follow up were done respectively in the present cases. Clinical and radiographic examination revealed that the replanted tooth were asymptomatic, suggestive of successful delayed replantation of an avulsed tooth. Further long-term follow-up visits will confirm the final success of the delayed replantation of the avulsed tooth.

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