

REVASCULARIZATION IN AN AVULSED PERMANENT TOOTH WITH PROLONGED EXTRA ORAL DRY TIME-AN UNUSUAL FINDING

¹SHAZIA NAZ

²AYESHA BASHIR

³SHAHIDA NASEEM RAEI

⁴ABDUL RAB

ABSTRACT

Dento-alveolar traumas are most commonly observed in children and adolescents, particularly in boys but may affect individuals of any age and accounts for 5% of all the injuries. While avulsion of permanent teeth comprises of 0.5-3% of all dental injuries. Numerous studies have shown that this injury is one of the most serious dental injuries, and the prognosis is mostly dependent on the emergency management at the place of accident and promptly after the avulsion. Replantation is in most situations the treatment of choice, but sometimes cannot always be carried out immediately. An appropriate emergency management and treatment plan is important for a good prognosis. This article describes the management of an avulsed mature tooth with prolonged extra oral dry time. The objective of delayed replantation was to conserve the soft and hard tissue esthetics and function of the tooth till the maturity of patient for definite management but luckily the tooth regained vascularity which was an unusual finding, not reported word wide till to date.

Key Words: Tooth avulsion, Delayed reimplantation, Revascularization, Dry storage.

INTRODUCTION

Avulsion is one of the most severe dento-alveolar injuries. Tooth avulsion accounts for 0.5%-3% of dento-alveolar trauma to permanent teeth but also have the poorest outcomes for dento alveolar trauma as 73-96% of replanted teeth being lost prematurely.¹

As following an avulsion injury, the pulpal tissue is cut off from its neurovascular supply. Therefore, for permanent teeth with a closed apex, International Association of Dental Traumatology guidelines (IADT guidelines) for the management of traumatic dental injuries, advise elective pulp extirpation to prevent the initiation and relentless progression of inflammatory resorption.²

¹ Shazia Naz, MDS (Operative Dentistry), BDS, Assistant Professor of Operative Dentistry, de, Montmorency College Of Dentistry, Lahore Correspondence: House 40/5 Canal City, Rail Town, Lahore E-mail: dr.shazianaz210@gmail.com Cell: +92333-4614543

² Ayesha Bashir, MDS (Operative Dentistry), BDS, Assistant Professor of Operative Dentistry, de, Montmorency College of Dentistry, Lahore Cell: +92301-4366278

³ Shahida Naseem Raee, Post Graduate Student (MDS Operative Dentistry), BDS, de, Montmorency College of Dentistry, Lahore Cell: +92333-2179014

⁴ Abdul Rab, PhD Scholar (Physics), MPhil, MSC, University of Engineering and Technology Lahore Cell: +92333-4273615

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While in cases of delayed replantation of closed apex teeth, Current IADT guidelines advocate that pulp extirpation and disinfection should be carried out either before reimplantation or 7-10 days following avulsion.² The recommended intracanal medicament is calcium hydroxide (CaOH) for 1 month followed by the obturation material.¹ Stabilization of tooth with flexible splint for a period of 2-4 weeks. The healing after traumatic dental injuries has long been known to be very complex and often unpredictable.¹

The possible sequelae of delayed replantation could be necrosis, replacement resorption, and ankylosis or infraocclusion. In case of necrosis and replacement resorption, root canal treatment RCT should be carried out to slow down the replacement resorption. In cases of ankylosis, surgical repositioning or simple extraction is indicated. While infra occlusion can be managed by decoronation or composite build up.²

This article reports, the management of an accidentally avulsed right permanent maxillary central incisor with closed apex that was remained dry up to 16 hrs from the moment of trauma till its reimplantation and the tooth regained its vascularity. The successful clinical and radiographic findings observed, are described here.

CASE REPORT

A 12-year-old girl reported to Department of Operative Dentistry, University College of Dentistry, The



Fig 1: Pre-operative



Fig 2: Just after replantation



Fig 3: After 3 months



Fig 4: Pre-operative x-ray



Fig 5: Just after replantation



Fig 6: After 3 months

University of Lahore at noon, with history of indoor fall resulting in tooth avulsion a night before. She had no avulsed tooth with her. Routine protocol for management of trauma patient was carried out. On arrival, the patient was examined for extra oral signs of injury, including swelling and symmetry of face and head. Inspection of facial bones, revealed normal mouth opening. No area of ecchymosed, crepitus or pain on palpation was observed, which removed the suspicion of underlying fractures.

Intraoral examination revealed avulsion of maxillary right central incisor (Fig 1). The adjacent teeth gave positive response to electric pulp testing (EPT). Oral hygiene was fair with no caries.

The total time elapsed from the moment of trauma until tooth replantation was 16 hours. The patient and parent were educated about avulsed injury and asked to go back to home and search for lost tooth. The patient came back with the lost tooth immersed in milk. The avulsed tooth had intact crown with closed apex.

Treatment options were reimplantation of avulsed tooth, no reimplantation, and prosthodontic replacement of tooth with removable partial denture, minimum preparation bridge, fixed partial denture, ortho-treatment, or implant placement at maturity. So the available treatment options were discussed with the patient and it was decided to reimplant the tooth for intermediate treatment. After taking the consent of the patient, reimplantation of the avulsed tooth was planned. Pre operative periapical x-ray was taken (Fig 4) to check the condition of alveolus.

The tooth was reimplanted into the socket (Fig 2) after meticulous inspection and irrigation of the avulsed tooth with saline and bleeding was also induced in the socket. Periapical x-ray was taken to confirm the position of replanted tooth (Fig 5). Flexible splinting was done to stabilize the tooth for 2 weeks. Root canal treatment (RCT) was deferred for one week due to off clinical time and patient was recalled after one week.

Antibiotics and analgesics were administered for 7 days and 0.12% chlorhexidine mouth rinses twice daily were prescribed for 7 days. But the patient came back after 2 weeks due to her examination. On next appointment, the splint was removed and before initiation of root canal treatment, the tooth was examined clinically. The tooth gave positive response to cold test and Electric Pulp Testing (EPT) and which was surprising finding, So RCT was deferred for further evaluation and patient was recalled after 1 month. After 1 month, the tooth again gave positive response to Cold, EPT tests as well as to the test cavity. The patient was recalled after 3 months and again the all tests were positive with normal colour and luster of tooth (Fig 3 and 6). The tooth regained its vitality with natural color and luster of the tooth. So the patient was kept under observation for possible sequelae i.e. necrosis, replacement resorption, and ankylosis or combination of these, and to take any measure accordingly.

DISCUSSION

Ideally, the avulsed tooth should be replanted immediately after avulsion or should be stored in a physiological medium such as saline or milk for only a short period till replantation.²

However in the present case, the avulsed incisor had a closed apex with extra oral dry time more than 16 hours, so it was anticipated that the chances of pulpal and periodontal healing would be extremely low. Even then the tooth was replanted to conserve the soft and hard tissue esthetics, occlusal function and wellbeing of the patient till maturity.

The rationale behind this decision was that with the removable partial denture and minimum preparations bridge, there were chances of collapse of ridge (loss of both hard and soft tissue esthetics requiring further

surgical intervention). While among the available treatment options, placement of implant and fixed prosthesis were reserved for definite treatment after adult age.

As replacement root resorption was inevitable sequelae after the prolonged extra oral dry storage, so root canal treatment RCT can be initiated extra orally before replantation as further dry time had no more worsen the outcome.² But because of late presentation to the clinic, RCT could not be initiated on the same visit and recalled for next visit after one week and medicated.

Systemic antibiotics are often prescribed after replantation, but their effectiveness in preventing root resorption is questionable.² Although, treatment of avulsed teeth with a vital periodontal ligament with various agents like tetracycline and fluoride solution before replantation have been suggested to slow down the resorption process, but it is not absolute recommendation.²

However, in this case the avulsed tooth was replanted without any chemical treatment of the root surface as tetracycline and fluoride solution were not available at that time.

However in this case, luckily the tooth regained its vascularity/ vitality which was unique finding not reported worldwide in cases of delayed reimplanted mature teeth with dry storage. So the RCT was postponed and the patient was kept under observation till further intervention or any signs of possible sequelae. This finding was very important as the whole world is working on pulpal regeneration or revascularization of pulpal space.

The possible contributing factors for revascularization might be the age of the patient, immersion in milk as carrying medium (nutrients), induction of bleeding in the socket (stem cells of apical tissues), hypoxia tolerance of the pulpal cells and size of the apical foramen (revascularization) which is least likely possibility in this case.

For mature teeth, with an apical width of 1 mm or less, no revascularization was reported in two clinical case series.^{3,4} However there are case reports in which revascularization of delayed reimplanted immature teeth has been reported in which pulpal regeneration protocol has been followed.^{5,6,7} Delayed reimplanted immature tooth also managed successfully by obturating with Mineral trioxide aggregate (MTA) after RCT.⁸

There is no local study of tooth avulsion cases on goggle search engine which can be compared or discussed. Although the long-term prognosis of replanted avulsed teeth with prolonged dry time is not so good especially in young patients because of ankylosis and resorption within few years.⁹ However in patients older

than 16 years, the replanted teeth may serve for longer periods of time.¹⁰

Ebeleseder and others also found that more extensive replacement resorption of replanted mature teeth in children and adolescents as compared to the adults. The more rapid resorption of teeth in young age might be related to the higher rate of bone remodeling than in adults.¹²

Ankylosis of the avulsed teeth in young patients also results in infra occlusion.¹³ If the avulsed incisor had not been replanted in the present case, the other available treatment options might be the prosthetic replacement of the missing incisor (removable partial denture or minimum preparation bridge), space closure with orthodontic treatment or auto transplantation of the premolar followed by the orthodontic treatment of the malocclusion.² However, orthodontic consultation and definitive treatment planning usually are not possible at the time of emergency management.

Reimplantation even after prolonged extra oral dry time not only restore the patient's esthetics, occlusal function but also the feeling of well being and the replanted tooth can serve for some years.

CONCLUSION

It can be concluded that in case of avulsed permanent tooth with prolonged dry storage, replantation can be carried out even for as intermediate treatment till definite treatment at maturity. Although the risk of progressive replacement resorption and subsequent tooth loss is high but alveolar ridge can be preserved with no or minimum defect at the age of maturity.

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CONTRIBUTIONS BY AUTHORS

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| 1 Shazia Naz: | Case management, discussion writing and review of the article as whole |
| 2 Ayesha Bashir: | Introduction writing |
| 3 Shahida Naseem Raee: | Managed the literature searches |
| 4 Abdul Rab: | Formatting of text. |