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RESEARCH ARTICLE

DELAYED REPLANTATION OF AVULSED INCISOR WITH OPEN APEX: A CASE REPORT

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ABSTRACT

Avulsion of permanent teeth in children is a common dental emergency. Immediate replantation is the standard treatment protocol. Long term prognosis of the replanted teeth depends on the time elapsed between avulsion and replantation. In children and adolescents replantation of permanent teeth with open apex is a much needed intermediate procedure irrespective of the final outcome. Finally the replanted teeth may undergo progressive replacement resorption (ankylosis) and eventual teeth loss. Replantation of immature permanent teeth not only helps to maintain the width and height of the surrounding alveolar bone which is undergoing continuous growth and remodeling, but also relieves the child of psychological trauma by restoring esthetics and function.

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INTRODUCTION

Trauma to the orofacial region is common in childhood. Traumatic injuries to dentition may lead to avulsion of teeth. Avulsion (ex-articulation) refers to complete displacement of the tooth out of its socket. In permanent dentition, it accounts for 0.5%-16% of all the dental injuries (Andreasen and Andreasen, 1994). It occurs almost twice commonly in boys than girls (Raghavendra et al., 2013). Permanent anterior teeth, especially the maxillary central incisors are mostly affected (Utomi et al., 2003). The incidence of avulsion peaks at 7-9 years of age when the permanent central incisors are erupting and the roots are not yet completely formed as at this stage alveolar bone is relatively resilient, providing minimal resistance to external extrusive forces (Andersson et al., 2012; Sharma and Duggal, 1994). Avulsion results in loss of health, function, esthetics, thus psychologically demoralizing the child. It further affects the social life of the child negatively (Cortes et al., 2000). Immediate replantation of an avulsed permanent tooth into its socket is regarded as the gold standard treatment protocol. The main aim is to reestablish the lost function and esthetics (Cardoso et al., 2012). Complete healing can be guaranteed if tooth is replanted within first 5 minutes (Andreasen et al., 1995). Replantation of avulsed tooth after 5 minutes of extraoral dry time is considered as delayed replantation (Andreasen et al., 1995).

Practically, it is not always possible to replant the avulsed tooth at the earliest. This results in extended extra-oral dry time and storage in non physiologic medium. Both these factors affect the vitality of the periodontal ligament cells and pulpal tissue of the tooth adversely (Andreasen et al., 1995). Keeping the young age of the child in mind; it is of utmost importance to allow the surrounding alveolar bone to grow. Herein lies the importance of delayed replantation in young permanent avulsed tooth. In growing period, success of replanted tooth not only implies full re-establishment of form and function; rather it is an important intermediate treatment to maintain the alveolar bone height and width for further definitive treatment planning in adult age (Andreasen et al., 1995). Irrespective of the adverse conditions like extended dry time, open apex and non physiologic media storage; replantation of young permanent tooth should always be strongly considered. In this article management of an avulsed immature permanent central incisor with extraoral dry time of 31 hours is presented.

CASE REPORT

A 9 year old male patient, reported to the Department of Pedodontics and Preventive Dentistry with the chief complain of loss of upper anterior teeth. History revealed he had faced a road traffic accident 1 day ago with trauma to his upper anterior teeth. The avulsed tooth was retrieved from the site of accident and kept in dry newspaper for 31 hours and it was brought to our department as such. Extraoral examination was insignificant.

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Figure 1. Avulsed tooth



Figure 4. Immediate postoperative photograph after splinting



Figure 2. Pre-operative intraoral photograph showing empty socket



Figure 5. Immediate postoperative radiograph after splinting



Figure 3. Intraoral periapical radiograph showing empty socket



Figure 6. Splint removal after 3 weeks



Figure 7. Radiograph on 6 months follow up



Figure 8. Radiograph on 12 months follow up



Figure 9. Composite restoration of fractured teeth

Thorough intraoral examination revealed missing (due to Ellis class V fracture) maxillary right central incisor and Ellis class II fracture of maxillary left central incisor. Patient's medical history was unremarkable. Examination of the avulsed tooth revealed enamel and dentine fracture in the crown with open apex. The root surface was covered in dust and remnants of dried periodontal soft tissue. Clinical examination of the empty socket revealed blood clot formation within it. Intraoral periapical radiographic examination confirmed absence of root fragments, no evidence of any foreign object and no associated alveolar bone fracture. Considering the young age of the patient the best possible treatment plan was framed and it was decided to replant the avulsed tooth. The treatment plan along with possible outcome was explained to the parents and consent was taken. Root surface was thoroughly rinsed with physiologic saline. The contaminated tissue remnants were removed by root planing. Root was cleaned by soaking it in 5.25% sodium hypochlorite for 5 minutes, then treated with 2.4% acidulated sodium fluoride solution for 20 minutes. Extraoral root canal treatment was performed before replantation. Access was made on the lingual surface of the crown and pulp tissue was extirpated. Conventional cleaning and shaping of the root canal was performed. The open apex was closed with Mineral Trioxide Aggregate (MTA) cement. Canal was dried with sterile paper points and filled with gutta percha. Access cavity was closed with glass ionomer cement. Proper aseptic environment was maintained throughout the extraoral procedure. Local anesthesia was administered at the site of the socket. It was gently irrigated with physiologic saline solution to remove debris, coagulum, and loose granulation tissue. The avulsed tooth was slowly replanted into the socket with gentle, mild digital pressure. After proper seating of the tooth, intraoral periapical radiograph was taken to confirm proper alignment in the socket. Occlusion was checked. Semi rigid splinting was done to stabilize the tooth in position. Stainless steel ligature wire was used with acid etch composite technique for splinting on the labial surface of six anterior teeth. Patient was instructed to take tetanus toxoid injection. Systemic antibiotic regimen was initiated for 5 days. Patient was instructed to maintain proper oral hygiene and to use of chlorhexidine mouth rinse twice daily for 7 days. He was advised to be on soft diet for 2 weeks. He was recalled after 3 weeks for further evaluation. After 3 weeks the splint was intact with replanted tooth in position. On examination the tooth was asymptomatic. Splint was removed. Replanted tooth showed normal mobility. Patient was kept on periodic follow up at 1, 3, 6 and 12 months. Regular follow up radiographs showed intact lamina dura. Clinical evaluation revealed healthy, functioning tooth in normal occlusion. Patient has been kept under review for long term prognosis.

DISCUSSION

The growing age of the patient, combined with the objective of retaining the tooth to maintain esthetics, occlusal function and alveolar bone height and width were the driving forces to attempt replantation in this case. It has been documented that when the dry time of root is more than 120 minutes, no cells remained vital (Andreasen, 1981). Root planing was done to mechanically remove necrotic soft tissue. Root was pretreated with Sodium hypochlorite to further dissolve the connective tissue remnants (Sonoda *et al.*, 2000). Soaking the tooth in 2.4% acidulated sodium fluoride reduces chance of resorption by incorporating fluoride as fluorapatite to demineralised root dentin, cementum and bone tissues (Bjorvatn and Massler,

1971). To reduce chances of internal inflammatory resorption due to pulpal infection, root canal treatment was carried out extra orally. A splinting technique allowing adequate physiologic tooth movement for a minimal time period is essential to decrease chances of ankylosis (Finucane and Kinirons, 2003). In this case stainless steel ligature wire with composite was used which is less stressful and well tolerated by patient. Ankylosis may lead to infraocclusion of replanted tooth (Ebeleseder *et al.*, 1998). Though systemic antibiotics were recommended, but their usefulness is debatable (Barrett and Kenny, 1997). A time period of 3-6 months is needed to diagnose replacement resorption. If resorption is not noted within 2 years of replantation, its chances are decreased drastically (Puri *et al.*, 2017). In the case presented, 1 year follow up of the replanted tooth showed the tooth to be asymptomatic and no resorption. Further follow up is needed for a long term prognosis.

Conclusion

According to recent guidelines on trauma (McIntyre *et al.*, 2009), an avulsed tooth with open apex in a growing child should be replanted to maintain alveolar ridge contour as the ankylosed tooth will ultimately undergo complete bony remodeling. This intermediate treatment helps to gain time for prosthodontic rehabilitation of the tooth once the facial growth is complete. It helps to reestablish esthetics and occlusal function, thus affecting the child's social life positively. So it can be concluded that in spite of risks associated, properly pre-treated avulsed tooth with open apex and extended extraoral dry time show promising outcome when replanted in aseptic conditions.

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