



DELAYED REIMPLANTATION OF AVULSED PERMANENT MAXILLARY INCISORS WITH EXTENDED EXTRA-ORAL DRY TIME. A CASE REPORT.

Dentistry

Dr. Deepika*	Senior Lecturer, Department of Conservative Dentistry & Endodontics K.D. Dental College and Hospital, Mathura.U.P. *Corresponding Author
Dr. Pooja Yadav	MDS (Conservative Dentistry & Endodontics)
Dr. Ajay Kumar Nagpal	Head of the Department. Department of Conservative Dentistry & Endodontics. K.D. Dental College and Hospital, Mathura.U.P.

ABSTRACT

Avulsion of permanent teeth is one of the emergencies in dentistry that requires immediate intervention. The ideal treatment for avulsed teeth is immediate reimplantation; however, this is not always attainable owing to patient ignorance and delay in seeking treatment. The liability of root surface damage increases as the extra-oral time increases, affecting the prognosis of the treatment. Proper knowledge of the treatment protocols, storage medium, extra-oral dry time, and follow-up are the determinants of the successful management of avulsed teeth. This case report aims to present a case of reimplantation of avulsed teeth reimplanted after an extra-oral dry time of 20 hours. Despite an extended extra-oral time, reimplantation was carried out to address the patient functional and aesthetics concerns.

KEYWORDS

Reimplantation, storage medium, Extraoral dry time.

INTRODUCTION

Permanent tooth avulsion is the most severe dentoalveolar damage. In permanent dentition, avulsion accounts for 0.5-16% of all dental injuries.^[1] Tooth avulsion is described as the complete displacement of a tooth from its socket due to the breakdown of periodontal ligament fibers, with some retaining adhered to the cementum and the rest to the alveolar bone.^[2] An avulsion is most frequently observed in children because the roots have not fully grown, and the periodontium and bone are resilient.^[3] In addition to causing a loss of function, avulsion also adversely affects the quality of life, causing psychological and social pain that lowers self-esteem and makes smiling uncomfortable.^[4] Due to the patient's concurrent injuries at the time of the accident and a lack of expertise in the treatment of such injuries at the scene of the accident, prompt reimplantation of the avulsed tooth is not always possible, even though it is advised.^[5] Teeth reimplanted under favourable conditions, such as preservation of periodontal ligament vitality, cementum integrity, and minimum bacterial contamination, have a good prognosis and survival rate. These parameters are directly related to extra-alveolar time, storage medium, and root surface changes.^[6] The aim of this report is to present the case of an accidentally avulsed maxillary central incisors reimplanted after an extended dry extra-alveolar period of 20 hours.

Case Report

A 16-year-old male patient reported to the department of conservative dentistry and endodontics with a chief complaint of missing upper front teeth. He gave a history of trauma due to a fall from his cycle, 1 day ago. He kept the avulsed teeth wrapped in the paper. The intraoral examination revealed that the maxillary right and left permanent central incisors were avulsed (Figure-1A). The neighbouring teeth responded positively to a vitality test. The socket of maxillary right and left central incisors were inspected and found to be free of inflammation and infection. An intraoral periapical radiograph of the region revealed no evidence of alveolar fracture (Figure-1B). Written consent was obtained from the patient following an explanation of the intended procedure. The socket of the teeth was gently rinsed with saline solution under local anaesthesia. Extra-oral root canal treatment was carried out on the teeth.

The root surface was cleansed with gauze soaked in saline to remove necrotic and dried remnants of periodontal tissue and subsequently kept in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 minutes. Repositioning of the teeth was carried out with digital manipulation. The position of the reimplanted tooth was verified both clinically and radiographically. Occlusion was checked to ensure that there was no premature contact of the teeth. The teeth were splinted from canine to canine using a flexible splint (28-gauge orthodontic wire) and composite resin (3M ESPE Filtek Z350XT) (Figure1-C, D, E).

Postoperative instructions to maintain oral hygiene were given, and the

patient was advised to rinse twice daily with 0.12% chlorhexidine gluconate. A systemic antibiotic, amoxicillin 500mg twice a day for 5 days was prescribed. The patient was recalled after one week, and no clinical or radiological changes were detected (Figure1F). The patient was reviewed again, after four weeks to remove the splinting wire. During the 6-month follow-up, a percussion test on the reimplanted tooth indicated altered sound characteristics attributed to ankylosis. Throughout the one-year observation period, the tooth maintained a stable and functional position (Figure-2A). However, signs of initial replacement resorption and ankylosis were noted (Figure-2B). The patient will be closely followed in the future, and if necessary, appropriate treatment will be administered.



Figure 1 A) Pre-operative clinical picture B) Pre-operative radiograph C) Etchant applied D) Bonding agent applied E) Splinting done F) Follow-up after one week.



Figure 2 A)-Clinical picture after one year. B) Follow-up radiograph after one year.

DISCUSSION

Tooth avulsion is a serious injury that causes the tooth to be completely displaced outside of the socket, causing damage to the tooth's supporting apparatus such as periodontal ligament and bone. Tooth avulsion is more common in men and affects children aged 7 to 14 years.^[7] According to clinical studies, the best prognosis for reimplantation of teeth is within 5 minutes of avulsion.^[8] All periodontal ligament cells become nonviable after a dry period of at least 60 minutes.^[9, 10] The media used for storage and transmission

during the extra-oral period also has a crucial role. The tooth should be kept in a suitable medium, such as Hank's Balanced Salt Solution (HBSS), saline, milk, or saliva, in patients with a prolonged extra-oral period until reimplanted by a dentist.^[11] Reimplantation is advised, as per the International Association for Dental Traumatology and the American Association of Endodontists, even when the tooth is stored in an improper storage medium or when the dry time has already exceeded 60 minutes. However, the prognosis is poor, and root resorption/ankylosis and tooth infra-position can occur.^[9, 12] International Association of Dental Traumatology standards states that if the extra-alveolar dry time is greater than 60 minutes before reimplantation, root canal therapy can be done prior to reimplantation or later.^[9] In the present case, the teeth were kept in dry pieces of paper, and the extra-oral dry time was twenty hours. Thus, it was decided to carry out endodontic treatment extra-orally because the extra-oral time was prolonged, and no immediate reimplantation was required. Delayed reimplantation is associated with poor long-term prognosis. The periodontal ligament becomes necrotic, and chances of healing are minimal. The objective of delayed reimplantation is to restore the tooth for functional, aesthetic, and psychological well-being and to preserve the alveolar contour. The eventual possible result will be ankylosis and resorption of the root.^[9] In the present case, the teeth were immersed in 2.4% acidulated sodium fluoride solution (pH 5.5) for 20 minutes before reimplantation. The rationale for this fluoride soak is based on evidence that this procedure will delay but not prevent ankylosis.^[13] It is assumed that the surface of the demineralized dentin will be more susceptible to fluoride incorporation and may become more resistant to resorption.^[6]

The complication associated in this case was ankylosis of the teeth. A fusion of the tooth and the alveolar bone is known as dentoalveolar ankylosis, as a result of this, the tooth will be remodelled in the same way that the bone is remodelled, thereby replacing the tooth with bone. This process is called as replacement resorption. At the end of progressive replacement resorption, when the root is completely replaced by the bone, the crown will fracture or fall off.^[14] The patient's age and skeletal growth rate influence the rate of replacement resorption.^[15] An avulsed tooth that remains until growth is completed should be regarded as a successful outcome because tooth loss before this point frequently involves loss of the alveolar bone and further resorption of the bone at the site. This later situation significantly reduces treatment options for the missing tooth or teeth and may necessitate extensive and expensive procedures like bone augmentation and grafting.^[16]

CONCLUSION

Reimplantation of avulsed teeth is regarded as advisable to non-reimplantation. The reimplanted teeth, in this case remained in a stable and functional position in the dental arch despite an extended extra-alveolar dry storage time. Inadequate information and knowledge may lead to improper tooth storage practices and delay seeking professional treatment. People should be educated regarding the preservation of avulsed teeth because that could significantly affect the prognosis and success rate of the treatment.

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