

Management of an Iatrogenic Avulsion: A Case Report

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Abstract: An avulsed permanent tooth is one of the few real emergency situations in dentistry. The aim of this case report is to present the management of an iatrogenic avulsion due to removal of a fixed partial denture (FPD). A 34 year old man reported to our department complaining of pain in relation to his lower anterior teeth. 4 anterior teeth were root canal treated 6 months back and a fixed partial denture (FPD) was placed. On removal of the FPD, iatrogenic avulsion of lower left central incisor occurred. The amount of damage to tooth and supporting structures, emergency treatment, types of storage media used and follow-up period play an important role in the prognosis of the avulsed tooth. Conclusion: During a one year of follow-up evaluation, the avulsed tooth of the patient is well retained in the arch, showing periodontal healing, even after endodontic retreatment.

Key Words: Iatrogenic avulsion, Periodontal Ligament Fibres (PDL), Replantation, Fibre Glass Splinting

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I. Introduction

Avulsion is defined as the complete displacement of a tooth from its socket in alveolar bone owing to trauma¹ and is one of the most serious of all dental injuries. Avulsion of a permanent tooth is estimated to represent 0.5% to 16% of all dental injuries². It occurs most frequently between the ages of 7 to 14 years, affecting the maxillary central incisors³.

The health of the pulp and periodontal ligament (PDL) are the key tissues that affect the prognosis of the avulsed tooth. PDL cells are critical in allowing the tooth to reattach back into the socket. Immediately after avulsion, both pulpal and PDL cells begin to suffer ischemic injury, which can be worsened by drying, bacteria, and chemical irritants. These factors cause the loss of vitality to these PDL cells and dehydration to the pulpal cells, which are invaluable for tooth survival¹.

Numerous studies by Andreasen, et al., in 1995 have shown the treatment outcome is strongly dependent upon:

- Extra-alveolar time
- Storage media

Andreasen, et al., demonstrated in a clinical study that immediate replantation (within 5 minutes) was one of the most critical factors necessary for PDL regeneration and return to normal function. Andersson and Bodin discovered that teeth replanted within 15 minutes have a favorable long-term prognosis, and most teeth replanted within 10 minutes experienced no resorption.

More recently, it has been found that dry storage of greater than 15 minutes causes precursor cells on the root side of the PDL to fail to reproduce and differentiate into fibroblasts⁴. Even if the avulsed tooth is then placed in a liquid medium prior to replantation, this results in the unfavorable “repair” as opposed to the favorable “regeneration” and leads to ankylosis, root resorption, and eventual tooth loss⁵.

The aim of this report is to present the case of an iatrogenically avulsed mandibular left central incisor kept in saline solution from the moment of avulsion until its replantation 12 mins later in a 34-year-old man.

II. Case report

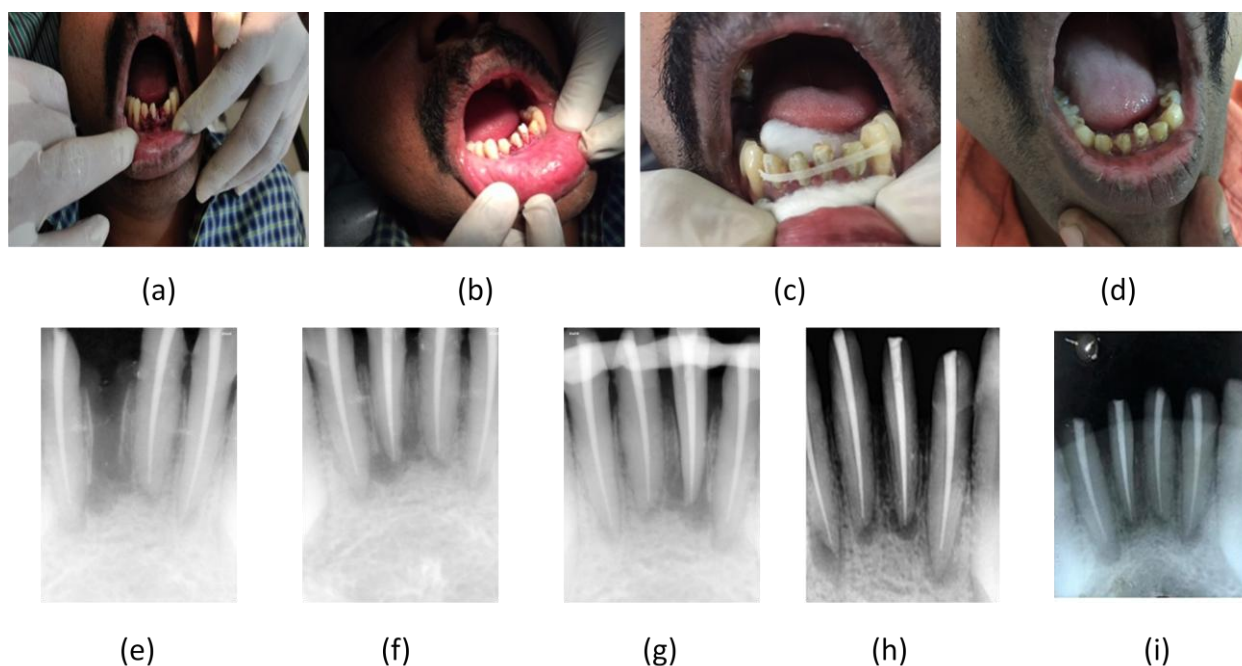
A 34 year old male patient was referred to the Department of Conservative Dentistry and Endodontics with pain in relation to root canal treated and FPD placed lower anterior teeth (31, 32, 41, 42). A review of his medical and past dental history revealed no contraindications to dental treatment. Clinical examination revealed a bulky FPD and slight tenderness to apical palpation and percussion. On radiographic examination, IOPA revealed a periapical lesion in relation to 31 and 41, along with under – obturated canals. The FPD was bulky and uncomfortable to the patient too.

The treatment plan decided upon was removal of the FPD and retreatment of both the lower central incisors. On removal of the FPD, left lower central incisor (31) came out (Fig a and e).

Management

The avulsed tooth was inspected for fracture and debris. The crown portion was intact and the root portion was fully formed. The tooth was immediately washed with 0.5% saline and placed in 0.5% saline during the extra – oral time, while the patient was assured and informed consent was obtained for replantation procedure.

Extraorally, the tooth underwent retreatment, with RC Solve (orangewood oil). After the guttapercha was removed, cleaning and shaping was done with rotary ProTaper file system, EDTA and 0.5% saline. Obturation done using 6% guttapercha cones. Intra-orally, the socket of 31 was inspected for loose bony fragments which would interfere with healing. Curettage in conjunction with irrigation of the alveolus cavity with saline was done to remove the inflammatory tissue and bleeding was induced. The tooth was placed back in the socket with light digital pressure. The correct position of the tooth was verified both clinically and radiographically (Fig b and f). The total replantation time taken was 12 mins. It was secured in place with the help of light cure composite splint. The composite splint was maintained for 2 weeks. 0.5 ml anti-tetanus booster was administered and oral antibiotics were prescribed for 5 days. Patient was given instructions as to go on a soft diet for a period of 2 weeks and to report back soon after.



When the patient reported back after 2 weeks the mobility was grade 3, so Interlig fibre glass splinting was utilized (Fig c and g). The patient was asked to report back after 2 weeks. This time the mobility had reduced to grade 1 and there was no discomfort. Radiographic evidence revealed periodontal ligament space and periapical region appeared intact throughout the follow up period. The patient was asked then to report back at 6 weeks, when splinting was removed (Fig d), the tooth had become firm, no clinical mobility could be assessed and a temporary FPD was placed.

The patient was re-evaluated every three months on a regular basis. After 6 (Fig h) and 12 months (Fig i) of recall, the tooth presented with no clinical mobility, functional, firm, free of symptoms and with sound periodontium. Patient was satisfied with the outcome.

III. 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 replantation⁶. In our case, since the avulsion occurred in the dental college, we were equipped to carry out replantation immediately.

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. The condition of PDL cells depends on the storage medium and the time the tooth has been out of the mouth⁷. The extra-oral period significantly affects the outcome and has a direct correlation with the survival of PDL cells. Clinical studies have indicated that teeth replanted within 5 minutes after avulsion have the best prognosis⁸. After a dry time of 60 minutes or more, all PDL cells are nonviable⁶. The storage and transport media during the extra-oral time are also of vital significance. In patients with a prolonged

extra-oral time, the tooth should be maintained in a suitable media, such as HBSS, saline, milk, or saliva until it is replanted by a dentist⁹.

Radiographic examination revealed periapical lesion with under – obturated canals in relation to 31 and 41. When the tooth got avulsed, retreatment was carried out for 31 extraorally. It is necessary to splint the replanted tooth to the adjacent teeth flexibly during 7-10 days for periodontal healing¹⁰. Prolonged extra-alveolar period and closed apex are the factors that cause deficiency in pulpal and periodontal healing. In our case time interval between avulsion and replantation was just 12 mins, thereby improving the prognosis considerably. It was aimed to prevent the tooth loss, maintain aesthetic and functional properties and minimize inflammatory root resorption when performing the re – treatment procedure. In order to achieve the goal of the treatment, the avulsed tooth was replanted back into its original socket, and then splinted to the adjacent teeth with composite resin for 10 days. After this period, Interlig fibre glass splinting was advocated, which provided greater flexibility and functionality. During this period, the patient was recommended to avoid biting on the splinted teeth and continue to brush his other teeth using soft toothbrush, and keep the mouth and teeth as healthy as possible by using 0.12% chlorhexidine mouthwash twice a day for 2 weeks. Additionally, systemic antibiotics along with 0.5 ml tetanus booster was administered to the patient.

The successful outcome of this treatment depended primarily upon the maintenance of aseptic conditions and limited extra-oral time, survival of periodontal ligament cells on the root surface. The patient should avoid chewing on the tooth during the healing period to avoid any excessive mastication forces that might affect the healing process. Splinting of the tooth as indicated can enhance healing and support the tooth when mobility is present. An oral hygiene checkup should be considered to prevent plaque accumulation. Certainly, patient cooperation and willingness for routine checkup appointments should be discussed before the treatment¹¹.

There are also individual situations where replantation is contraindicated like severe caries, periodontal disease, an uncooperative patient, severe cognitive impairment requiring sedation, severe medical conditions such as immunosuppression and severe cardiac conditions. Although replantation might save the tooth, it is important to realize that some of the replanted teeth have low probability of long – term survival and may be lost or condemned to extraction at a later stage. However, not replanting a tooth is an irreversible decision and therefore saving it should be attempted¹². In this regard, a recent study has shown that replanted teeth have higher chances of long – term survival after following the IADT treatment guidelines, compared to previous studies¹³.

IV. Conclusion

The iatrogenic avulsion was more or less an unforeseen incident which occurred. Nevertheless, retreatment and replantation was carried out effectively and efficiently. It can be recommended to keep the avulsed tooth in saline solution at least when more appropriate storage media are not on hand at the moment of accident. Clinical and radiographic follow up is essential for the success of a tooth which has been replanted for a period of 5 years. As of now, no guidelines have been provided for replantation concerning root canal treated avulsed teeth. Hence, it is a matter of serious concern and further research has to be advocated in this area for more conclusive treatment approaches.

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