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Reimplantation of an avulsed tooth: A case report

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Abstract

Tooth avulsion can be defined as a complete displacement of a tooth out of its alveolar socket due to accidental or non-accidental injury. It is considered as one of the most serious dental injuries. Proper and correct emergency treatment is required for the best possible outcome following the trauma. This case report describes the management of an avulsed permanent central incisor in a 10-year-old female patient. The tooth was replanted in the socket and treated with endodontic treatment. This case was successfully managed.

Keywords: Avulsion, Reimplantation, splinting, Dental trauma, Injury

Introduction

Almost 0.5% of injuries are accounted for by the avulsion of permanent teeth.[1,2] The most frequently affected teeth are the upper central incisors in children between the ages of 7 and 9 years due to their exposed

position in the dental arch.[3–5] The peak of dental injuries occurs between the ages of 8 and 11 years consequently, the growth spurt during this period might influence the development of complications.[6] Management of tooth avulsion in permanent dentition often presents a challenge. Reimplantation of avulsed permanent teeth is the most accepted treatment approach considering aesthetics and functionality. Replantation in primary dentition is contraindicated because such a procedure may damage the permanent successor.[7,8] When there is an avulsion of teeth, the blood supply to the pulp is interrupted and the periodontal ligament cells are exposed to injuries caused by the external environment.[3] The complete healing and success of replanted tooth depend on various factors like short extraoral dry time, appropriate storage media, time of removal of pulp after Reimplantation, root maturation level, degree of periodontal damage, and splinting time.[1,3,9,10] The most common complication after Reimplantation of a tooth is root resorption which can be prevented by early removal of necrotic pulp followed by calcium hydroxide dressing and obturation with gutta-percha/sealer.[9,11] The management of the present case was done in accordance with the guidelines developed by the International Association of Dental Traumatology (IADT) in 2020.[12]

Case report

A 10-year-old female child patient presented to our Department of Pediatric and Preventive Dentistry, Nashik along with her parents, the chief complaint being avulsion of permanent left central incisor due to an accident. The tooth had no contact with soil after the accident. The patient had trauma 25 minutes before she visited the department. The tooth was in dry storage for about 10 minutes and then it was kept in normal saline for the next 15 minutes which was suggested by the community health worker in primary care. On extraoral examination, the patient had a laceration and soft tissue injuries over the upper lip and chin. Intraoral examination showed an empty socket of avulsed 21 with a blood clot in it and soft tissue injury over the marginal gingiva. Also, there was Ellis class III fracture with 11. The anterior maxilla was examined for fracture and any other abnormality. A preoperative intraoral periapical radiograph showed an empty socket of 21 without any hard tissue injury (Fig. 1). After obtaining the informed consent of parents, Reimplantation of 21 was planned. Local anesthesia was achieved using the administration of 2% lignocaine with 1:80,000 adrenaline (Lignox 2%). The avulsed tooth was inspected for fracture and debris. The crown of the avulsed tooth had an enamel fracture and the root was almost completely formed. All the visible contaminants of the root surface of the tooth were rinsed with a stream of saline. The alveolar socket was also rinsed with betadine and saline to remove the contaminated coagulum. The tooth was replanted using slight digital pressure and the correct position of the tooth was determined both radiographically as well as clinically (Fig. 2). The tooth was stabilized using flexible splinting made of twisted ligature wire of diameter 0.010" (30 gauge) and composite (Fig. 3). As the patient was having anterior deep bite, bite raise was done by placing glass ionomer cement on 36 and 46. The patient had been prescribed antibiotics for 5 days and was made sure that the patient had taken tetanus prophylaxis as recommended by IADT guidelines. As there was grade II mobility with 11 and pulp was exposed, root canal treatment was decided. Endodontic treatment with 11 and 21 was initiated and completed simultaneously within 14 days of trauma (Fig. 4) and splinting was removed after 2 weeks. After that composite build-up was done with 11 and 21 both (Fig.

5). Follow-up was taken after 1 week, 1 month, 3 months, and 6 months. Mobility was absent after one month of trauma for both 11 and 21. After 3 months and 6 months, clinical examination showed no pain, no swelling, or draining sinus associated with 11 and 21 (Fig. 6, 7). Radiograph showed PDL healing without any periapical lesion or root resorption. In this way, this case was successfully managed. The patient will be monitored till her growth is complete and appropriate treatment will be carried out if needed.

Fig. 1: Preoperative clinical image and intraoral radiograph

Fig. 2: Avulsed tooth after reimplantation

Fig. 3: Splinting

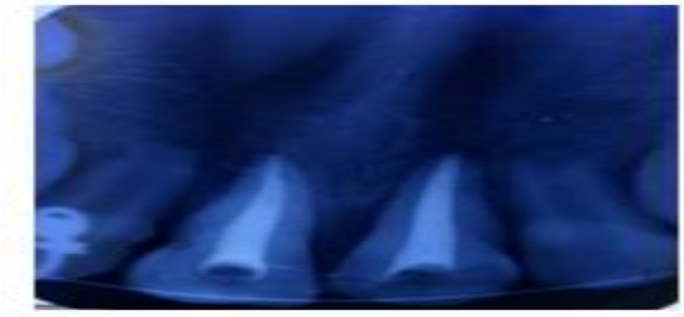

Fig.4: Completion of root canal treatment with 11, 21

Fig.5: Removal of splinting and composite build-up with 11, 21

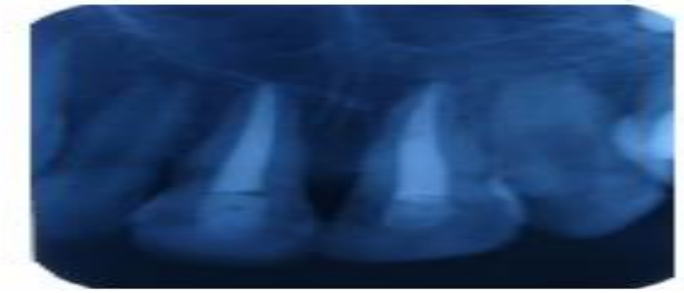

Fig.6: Follow-up after 3 months

Fig.7: Follow-up after 6 months

Discussion

Avulsion of the tooth takes place when a tooth directly sustains trauma which displaces the tooth from the socket. Dental avulsion mostly affects children and adolescents with a prevalence of 17.5%. It is three times more frequent in males than females.[13,14] The most ideal

treatment for avulsed permanent teeth is immediate reimplantation.[12,15] However, it cannot be carried out immediately. Andreasen reported in a retrospective study that 90% of avulsed teeth could be successfully retained when they were replanted within the first 30 minutes of the accident in 1966.[16]

Several studies have investigated the effect of dry storage and time elapsed after the avulsion of the tooth which plays an important role in the viability of the periodontal ligament cells and may be responsible for the occurrence of inflammatory resorption.[15] A previous study by Kinirons et al.[17]indicated that the risk of resorption increases dramatically after five minutes of dryness, with the probability of resorption increasing by 29% for every additional 10 minutes of dryness. The early resorption risk is higher for teeth that are kept in dry conditions for longer than 15 min than teeth kept in physical conditions.[18]

According to clinical studies, if avulsed teeth are replanted within 5 minutes, the prognosis and success rate are good. After an hour after tooth avulsion, all periodontal ligament cells become nonviable. PDL cells are viable but compromised when extraoral dry time is more than 15 minutes and less than 60 minutes when a tooth has been kept in storage media.[12] Even though the prognosis is different for different clinical conditions, treatment might be the same, and reimplantation of a tooth is a universally accepted and successful treatment for an avulsed permanent tooth. In the present case, the time elapsed from the occurrence of trauma till emergency care was only 25 minutes, thus prognosis was good considering IADT guidelines.

In the optimal scenario, the avulsed tooth should be replanted immediately or should be stored in a physiological medium such as saline for only a short period before replantation.[19] The patient's saliva, saline, milk, and "Hank's Balanced Salt Solution"[HBSS] are suitable media for storage of the tooth after avulsion.[15]

According to the studies comparing the survival rates of teeth with open and closed apices after avulsion injury, immature permanent teeth with open apices indicate lower survival in comparison to teeth with closed apices.[20]

The most common complications after avulsions are necrosis of the pulp and root resorption. Immediate replantation strongly contributes to the favorable healing of the PDL. The incidence of external root resorption [inflammatory/replacement] can be high and varies between 59% and 80% in patients with so-called correct reimplantation.[7]

Many researchers recommended applying semi-rigid splints for a time ranging 7-14 days following replantation.[5,21] The prolonged time of splinting may cause ankylosis of teeth that occurs through trauma. In this case, flexible splinting was applied for 2 weeks after replantation as suggested by IADT guidelines.[12]

The prime treatment objective of replantation of 21 was to preserve the alveolar bone height and arch length in such young patients as most avulsion trauma occurs before the patient's facial growth is completed. Other objectives were to maintain the esthetic appearance and occlusal function, to prevent inflammatory root resorption, and to achieve periodontal healing with replacement root resorption. Other treatment options for avulsed teeth are prosthetic replacement of the missing incisor, space closure with orthodontic treatment, or autotransplantation of another tooth to the empty space.

A recent study also shows that the risk of developing severe inflammatory resorption is related to the timing of pulp extirpation after replantation it must be done promptly to reduce the risk of early complications.[22] In this case, endodontic treatment with 11 and 21 was

initiated within 2 weeks as given in IADT guidelines. After proper biomechanical preparation with 11 and 21, calcium hydroxide dressing was given as intracanal medicament to prevent root resorption. Root canal treatment was completed followed by a composite build-up with 11,21 and splinting was removed after 2 weeks to prevent ankylosis of teeth.

Replanted teeth must be monitored carefully and clinical/ radiographical findings should be recorded. In the present case, there is less probability of complications considering clinical factors like extraoral dry time of less than 60 minutes, closed apex, young age, and flexible splinting for 2 weeks.

Conclusion

In patients for whom growth has not ceased, using the replanted tooth to maintain the surrounding bone for a few years until the patient is a viable implant candidate can be considered a suitable therapeutic option. Considering IADT guidelines, we were able to manage this case by successfully reimplanting the avulsed tooth. A regular clinical and radiographic examination follow-up every year is fundamental even though the prognosis is good in the present case.

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