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Survival of Re-Implanted Avulsed Tooth after Extended Extra-Oral Dry Time with 36 Months Follow Up: A Case Report

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Case Report

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ABSTRACT

An avulsion is a serious injury to the tooth as well as to the periodontium. The present case report represents an avulsed permanent tooth with an extended extra-oral dry time period of 90 minutes. Re-implantation should be the emergency management for an avulsed tooth. Its prognosis will depend upon the time elapsed and the treatment plan to manage the avulsed tooth. In the present case, emphasis is given on the proper protocol in the emergency management of an avulsed permanent maxillary central incisor with a follow-up of 3 years.

Keywords: Avulsion, Extra-Oral Dry, Re-Implantation.

Introduction

Tooth avulsion being defined as the complete removal of a tooth outside its socket (ex-articulation).[1] It results in serious injury to the periodontium including the dental pulp and supporting structure.[2] The damage to neurovascular supply result in pulpal necrosis.[3] While a sequela of incidence occurs at the cellular level rendering the clastic activity resorb the hard tissue.[4] This either results in replacement resorption or ankylosis of the tooth itself.[5]

International Journal of Drug Research and Dental Science
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A pattern of healing after re-implantation showed a complex nature as inflammatory cells and viable periodontal cells show reorganization of the new attachment apparatus.[6] The extent of healing following re-implantation depends upon various aspects like the viability of PDL cells, extra-oral dry time period, and the storage of the tooth prior to re-implantation.[3] The minimal rupture of periodontal cells results in its regeneration and the resorption cavities are recolonized by cementoclast proceeding into physiologic or functional healing. But in the case of large resorption cavities bone remodelling consecutively ensue into replacemental resorption although necrotic pulp can lead to infection-related resorption (IRR).[6] The remnants of PDL cell attached to root surface is the most important factor for a prognosis of avulsed tooth.[3] Moreover the increased duration of extra-oral time leads to PDL cell death while the isotonic storage medium is responsible for its optimal healing.[6]

Clinically assessment of PDL cells viability following avulsion can only be signified by the extra-oral dry time. Ideally, immediate re-implantation within 20-30 minutes had the best possible prognosis.[3] Besides that the permanence of the tooth in the oral cavity, not only prevents atrophy of the alveolar bone of the socket but assimilates the loss of tooth which can remain functional for some years.[7] Although it's frustrating tooth loss after re-implantation eventually occurs as a common outcome.[5] Despite this fact the re-implantation of the avulsed tooth must be carried out.[3] According to the International Association of Dental Trauma (IADT) recommendations for avulsed tooth kept in non-biological conditions exceeding 60 minutes root preconditioning protocol must be carried out.[6] The present article reports management of avulsed permanent maxillary central incisor after 90 minutes of extra-oral dry time with a 6-year radiographic follow-up.

Case report: An 11-year-old boy reported to the Department of Pedodontics & Preventive Dentistry with a complaint of spat-out maxillary central incisor after falling from stairs at home 1½ hour back. The avulsed tooth was brought in a paper from the injury site. The intra-oral findings confirmed an avulsed tooth with a bleeding socket and lacerated adjacent labial mucosa. The patient medical history was non-contributory and any cerebral involvement was ruled out. Then an intra-oral radiograph was taken revealing the tooth socket without any fractured alveolar cortical plate as shown in figure1.

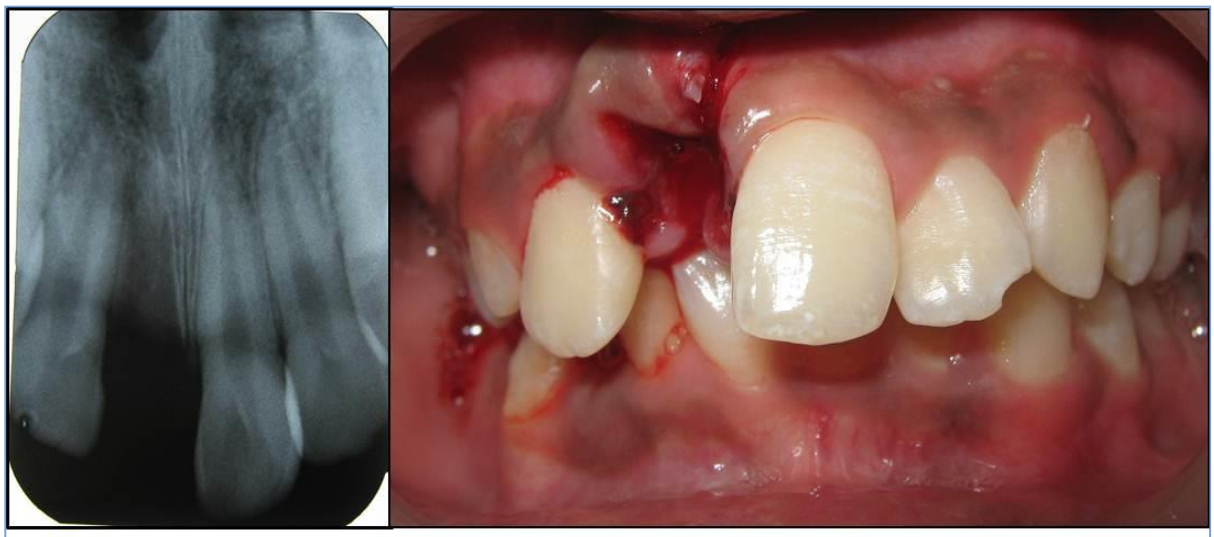

Figure 1: Pre-operative IOPA & intra-oral image

International Journal of Drug Research and Dental Science
Volume 3 Issue 1 (Page: 103-108), 2021 ISSN: 2582-0826

Informed consent was taken from the parents elucidating the treatment procedure and its outcome. A tooth was stored in doxycycline for 20 mins. At first, the avulsed tooth was kept in 2.5% sodium hypochlorite (Photon, India) to eliminate necrotic tissue followed by irrigation with normal saline (Marck, India) and then kept in 2.4% sodium fluoride solution (Qualigens Fine, India) for 20 minutes.[6] After the root conditioning due to unfavourable extra-oral condition the endodontic treatment was initiated before re-implantation as shown in figure 2.

Figure 2: Avulsed tooth

The tooth was hold using an extraction forcep (API, Germany) without touching the root portion and the access cavity was prepared using Endo access burs (Dentsply, USA), following pulp extirpation biomechanical preparation was done with smart prep (Dentsply, USA). The calcium hydroxide (Prime Dental, India) dressing was given and the cavity was sealed with temporary cement (Biomed, Korea).[6] The local anaesthesia was administered and the socket was gently irrigated to remove any coagulum, the avulsed tooth was placed inside the socket and the positioned was checked radiographically. Then a fibre reinforced splint was used for splinting at the inter-molar region for 4 weeks as shown in figure 3. Tetanus toxoid injection, systemic antibiotics with oral hygiene instruction were given.

Figure 3: Post-operative IOPA & Intra-oral image

International Journal of Drug Research and Dental Science
Volume 3 Issue 1 (Page: 103-108), 2021 ISSN: 2582-0826

On subsequent visit obturation of root canal was done using Gutta-percha (Gapadent, China) and permanent restoration with composite (3M ESPE, USA). After 4 weeks splint was removed and the tooth was asymptomatic with no mobility. The patient was kept under regular follow-up for 3 years as shown in figure 4.

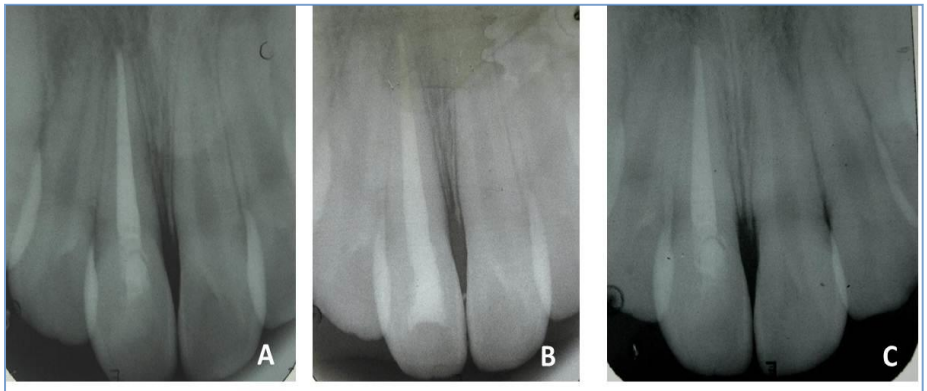

Figure 4: A- 6 months follow-up, B- 2 year follow-up, C- 3 year follow-up

Discussion: The prognosis of a re-implanted tooth after prolonged dry storage time is extremely low because of pulpal and periodontal conditions.[8] In the present case the extended extra-oral dry time was around 90 minutes. However, the case presented here was anticipated to prevent the inflammatory root resorption. It is a common complication of an avulsed tooth which can be attributed to more patent dentinal tubules in younger individuals.[9] To inhibit this 2.4% sodium fluoride solutions were used for 20 minutes considering decreasing the solubility of dental hard tissues.[5] According to Trope root surface treatment with tetracycline, dexamethasone certainly slows down the process of replacement resorption.[10]

The initiation of the endodontic treatment of avulsed tooth still holds to be controversial. According to the current guideline, the pulp extirpation should be achieved within 14 days of re-implantation due to infected pulp canal space however no studies were addressed in the literature specifying it.[2] The designed endodontic treatment should be such that it prevents the early onset of inflammatory root resorption. Andreasen showed that histological evidence of inflammatory root resorption starts within 7 days of re-implantation irrespective of the state of development of the root.[11] The recent studies had correlated the length of the pulp during re-implantation and storage media were the significant predictor of revascularization.[12] Although the large dentinal tubules and thin radicular walls of young permanent teeth can lead to pulpal necrosis and loss of a tooth.[13] In the present case reported the extra-oral initiation of endodontic treatment was done. This was followed by non-setting calcium hydroxide paste dressing due to its antibacterial alkaline activity aid in preventing inflammatory resorption.[14]

The process of immobilisation achieved in the present case was by soft resin splint for 4 weeks duration so as to prevent osseous replacement of the root. According to Andreasen et al 6 weeks of splinting results in lowering the process of healing and recommended up to 40 days.[15] The factors responsible for the inflammatory resorption include metabolic rate, rate of physiologic bone turn over and patient age. Although severely mutilated root surface due to unfavourable storage conditions results in negative periodontal healing or progressive root resorption.[16] After 36 months of re-implantation mild infra-occlusion (0.7mm) and replacement root resorption was present which has been observed most often during the first year of re-implantation. However, in the future, the crown can be removed and the root below CEJ kept submerged to

attain adequate dimension of the alveolus for a fixed prosthesis.[10] In the present case the patient is still under follow-up until any unfavourable conditions arise pertaining to the ultimate fate of the tooth.

Conclusion: In conclusion, irrespective of the extended extra-oral dry time the immediate management of avulsed tooth should be re-implantation. The present case report emphasised that proper treatment protocol should be taken into consideration that will decide the prognosis of the tooth. Moreover, it will aid in the normal growth of the alveolus contributing to the appropriate definite prosthetic treatment following re-implantation.

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