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Replantation of an Avulsed Maxillary Permanent Central Incisor after Prolonged Extra oral Time-A Case Report

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Abstract: *Avulsion of tooth is a common emergency situation that may occurs after a traumatic accident. It requires immediate care because the time elapsed between the trauma and the start of treatment is considered the most important factor in the prognosis. This case report describes the successful management of an avulsed tooth that has been stored in saliva for a period of 18 hours. The tooth was root canal treated extraorally, immersed in Doxycycline hydrochloride for 20 minutes and immediately replanted. Anterior maxillary teeth were splinted by a semi-rigid splint. After 2 weeks splint was removed and a radiographic review was done. 6 months follow-up revealed no radiographic or clinical signs and symptoms.*
Keywords: *Avulsion, Doxycycline, Root Canal Treatment, Splint, Trauma*

I. Introduction

One of the most common dental problems among children and adolescents could be the trauma to anterior teeth. Avulsion accounts for 0.5-16 % of dental trauma [1]. A tooth being displaced completely out of its alveolar socket owing to trauma is termed as avulsion. It often occurs in the age group of 7-9, since the resilient alveolar bone in this age offers minimal resistance to extrusive forces; it is also most prevalent in maxillary incisors [1]. The extra oral time of the avulsed tooth decides the prognosis of an avulsed tooth. Due to ignorance, patients do not report with the tooth in time creating more challenge in management of avulsion. Prolonged extra oral dry time results in necrosis of the periodontal ligament, also replacement resorption occurs after the replantation [2]. But a properly managed avulsed tooth can be successfully replanted, where it remains functional for a certain time. This article discusses the successful management of an avulsed maxillary permanent central incisor which was stored in saliva for 18 hours.

II. Case Report

An 18 year old male patient with a history of trauma 18 hours before reported to our Department of Conservative Dentistry and Endodontics, Govt. Dental College, Kozhikode, India, with an avulsed maxillary permanent right central incisor (fig.1). The avulsed tooth brought was contained in a plastic bottle with patient's own saliva. On intra oral examination, maxillary right central incisor was found missing; in addition Ellis class II fracture was noticed for maxillary right lateral, left central and left lateral incisors.

Fig 1: maxillary right permanent central incisor avulsed from alveolar socket

After rinsing with saline the tooth was root canal treated extraorally during which the tooth was held in position at the crown region with the help of a gauze piece. Biomechanical preparation was done using Mani files and for irrigating the root canal, 5.25% sodium hypochlorite and normal saline solution were used. Care was taken to prevent NaOCl contacting the external root surface. Obturation was done using Diadent gutta percha points with lateral condensation technique. The tooth was then immersed in Doxycycline hydrochloride (approx. 1mg/20 ml saline) for 20 minutes (fig.2). In this time period, the alveolar socket was rinsed with saline and blood clot was removed (fig.3). The alveolar socket was not curetted.

Fig 2: avulsed tooth treated with Doxycycline hydrochloride
Fig 3:Blood clot removed from the alveolar socket. Care being taken not to curette the alveolar socket.

Using a slight finger pressure the tooth was replanted. A semi-rigid splinting using 0.018×0.025 inch arch wire (fig.4, 5) was done and maintained for 2 weeks. Systemic antibiotics were prescribed. Patient was advised to take soft diet and to avoid biting with the anterior teeth. He was also recommended to use mouth wash (Hexidine mouthwash) to maintain oral hygiene.

Fig 4: immediately after replantation **Fig 5: tooth replanted and splinted**

Patient was recalled after 2 weeks for splint removal and an IOPA radiograph was taken (fig.6). After 3 month another IOPA of replanted tooth was taken and there were no signs of external resorption (fig.7). Patient was again recalled after 6 months and on taking IOPA, there was absolutely no sign of resorption (fig.8).

Fig 6: IOPA after 2 weeks **Fig 7: IOPA after 3 months** **Fig 8: IOPA after 6 months**

Since the adjacent maxillary central incisor was also found to be non-vital, it was root canal treated. Composite restoration was given for all the maxillary incisors (fig.9).

Fig 9: after composite veneering

III. Discussion

Avulsion is a serious injury that affects the tooth, gingiva and periodontal ligament which results in functional and aesthetic disturbances. It has been found that teeth replanted within 5 minutes after avulsion has the best prognosis [2]. Usually it is not possible for the patient to report to the dental clinic within this time period. Here comes the importance of a proper storage media for an avulsed tooth. According to Marzola et al, the best storage media for avulsed tooth is the alveolus itself [4]. Marzola [5] and Peterson et al [6] suggested milk as an effective storage media. It was reported that milk is shown to maintain vitality of periodontal ligament cells for 3 hours being relatively bacteria-free with pH and osmolarity compatible with vital cells [10]. Hank's Balance Salt Solution (HBSS) is an efficient transport media available for avulsed tooth. Other effective transport media available are Viaspan, saline, coconut water, propolis, saliva, etc. Readily available storage media for an avulsed tooth in order of preference are milk, saliva, and saline. Fortunately in this case, the patient managed to store the avulsed tooth in his own saliva immediately after the trauma which made the prognosis of this case better.

Donaldson and Kinirons found that dry time is the most critical clinical factor associated with the development of post replantation root resorption [7]. Kinirons et al [8] studies shows that the risk of resorption increased dramatically after 5 minutes of dryness with the probability of resorption increasing by 29 % for every additional 10 minutes of dryness. In this case, as the dry time was very less, it was assumed that the possibility for resorption was less.

In cases of avulsed teeth with avital periodontal ligament, treatment with various agents such as tetracycline before replantation has been suggested in the hope of slowing down the resorption process. Andreason & Andreason suggested treatment of root surface with acidulated sodium fluoride solution (2.4%, pH 5.5) for 20 minutes after root planing. In our case, since the tooth was stored in saliva, root surface treatment with Doxycycline hydrochloride (5mg/10ml saline) was preferred.

Studies conducted on dog's extracted teeth by Iqbal & Bamaas shows that replacement resorption will be less if the root surface is treated with enamel matrix derivative gel (Emdogain, Biora AB, Malmo, Sweden) [3]. It has been shown that emdogain has the potential to promote regeneration of periodontal ligament from the socket-side periodontal population.

After replantation of avulsed tooth, splinting is required. Splinting technique that allows physiological tooth movement during healing and is in place for a minimal time period shows less incidence of ankylosis. Semi-rigid fixation for 7-10 days is recommended [9**].** In our case, the tooth was root canal treated extra-orally, reimplanted into the original socket 18 hours after avulsion and splinted with 0.018 × 0.025 inch semi-rigid arch wire and bonded using flowable composite. The splint was maintained for 2 weeks.

Systemic antibiotics are often recommended after replantation, but their effectiveness in preventing root resorption is questionable [11]. Andreason et al [12] has shown that systemic antibiotics have no effect on periodontal healing clinically. In our case, Systemic antibiotics was prescribed and the patient was also advised to maintain good oral hygiene.

IV. Conclusion

Dental trauma should be considered as an acute emergency. Early presentation in cases of avulsion is very important for dental management. Even if the extra oral time is extended, an avulsed tooth can be replanted successfully with effective storage medium, splinting for a minimal time period and proper root surface treatment.

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