Tooth avulsion-A Dental emergency in children: A Review

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Abstract
Traumatic dental injuries like tooth luxation, avulsion, fracture or laceration of soft tissue often occurs in the children and young adults due to various etiological factors. Out of these, tooth avulsion comprises which comprises of 12-16% of dental complications in children and are considered as dental emergency as the success of treatment and the survival of tooth depends on the extraoral time duration of the avulsed tooth. In the present review article, an attempt has been made to enumerate etiology of dental avulsion in children, its storage media and the systematic management protocol.

Keywords: Tooth avulsion, children, etiology and management

Cite this article as:

Source of Support: Nil, Conflict of Interest: None declared
Introduction
Traumatic dental injuries are one of the emergency conditions in children and it is the dentist’s responsibility to save the offending tooth[1]. Among the various traumatic injuries of the orofacial region, avulsion requires emergency management. According to the World Health Organization (WHO) classification system, later modified by Andreasen, avulsion is classified as an injury of periodontal tissue [2].

Tooth avulsion
The traumatic dental injuries occur most commonly between the ages 8 and 11 years, as the falling accidents in a school environment are very common. Avulsion injuries occur at 7 to 9 years most commonly, when the when permanent incisors are erupting and also favored by the elasticity of alveolar bone. Tooth avulsion is defined as the complete displacement of a tooth from its socket due to accidental or non-accidental injury [3,4].
Avulsion occurs in 0.5% to 16% of traumatic injuries in permanent dentition and 7 to 13% involving the primary dentition. Mostly, avulsion involves a single tooth but multiple avulsions can occur due to trauma. Avulsion injuries are three times more frequent in boys than girls because of their active participation in sports and games [4]. Although various emergency measures have been advocated for the management of avulsed permanent tooth, most commonly accepted treatment of choice is the immediate replantation. The success of replantation of the avulsed tooth depends upon several factors, such as storage of the tooth until replantation, extra-alveolar period, the type of retention employed, oral hygiene status, time of endodontic intervention, type of drug prescribed and the overall general health of the patient. Dental avulsion injuries are most commonly associated not only with the physical concern, but also social, psychological and esthetic trauma [4]. It is therefore necessary that the parents, school teachers and the general dentists should have basic knowledge of the emergency management of the tooth avulsion, so that it will improve the prognosis of the avulsed teeth.

Management protocol
Management of the avulsed teeth is very complicated because of the involvement of the several components like the periodontal ligament (PDL) fibers, the neurovascular bundle at the root apex, the cement layer of the tooth, alveolar bone and the gingival [5]. Various steps should be followed for the patient’s esthetic, social and psychological benefit, and prognosis of the offending tooth.

Clinical examination
For the assessment of the patient’s condition and to give the necessary treatment, detailed examination of the patient should be done about the history of injury, medical history, neurological evaluation, any extraoral swelling, and dental examination. All of these are helpful
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in the future treatment planning of the patient [3,6].

Treatment of root
In the immediate treatment, the avulsed tooth should be rinsed carefully with saline or milk or clean water to remove all the contaminants and also the socket should be flushed with saline. After the traumatic injury, the tooth should be located and carried up by the crown or enamel portion and not the root [1,7,8].
The maintenance of the vitality of the periodontal ligament is most important in the success of the replantation, which allows tooth to adhere to survive and recover their function, therefore the extra-alveolar drying time is most critical in the replantation procedure [1,7].
For the replantation of teeth in children with incomplete root formation, the critical period of drying is 20 min. Also, the dry time of 20–60 min is shown to have 15% chance of optimal periodontal ligament (PDL) healing. But, teeth with closed apices have a significantly lower chance of healing [1].

Management of adjacent soft tissues
Dental avulsion injuries are most commonly associated with soft tissue lacerations, which are sutured. Help of plastic surgeon can be taken in the areas of aesthetic importance like the lips [9].

Radiological examination
A detailed radiographic examination is essential to know the status of root development and the relation to the permanent successors, also to establish the extent of the injury to the supporting tissues. The type of radiograph to be taken depends on the type of injury suspected and the extent of injury [10].

Storage media
The ideal storage medium should preserve the majority of the functional capacities of the cells of the periodontal ligament. Various storage media that can be used are Hanks balanced salt solution, saliva, saline solution, tap water, endogain, propolis, egg white, contact lens solution, milk and viaspan. Out of these hanks balanced salt solution is the preferred storage media, which preserves the components of tissue in its normal physiological conditions [11,12].

Special considerations in primary teeth [10]
1. Treatment of primary teeth related problems are usually difficult to treat because of fear and lack of cooperation from child patients.
2. As there is close relationship of the apex of primary tooth and the underlying permanent tooth germ, consequences like tooth malformation, impacted teeth and eruption disturbances in the developing permanent dentition can occur following severe injuries to primary teeth and/or alveolar bone.
3. Child’s maturity, ability to cope with the emergency situation, occlusion and the time for
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shedding of the injured tooth are all important factors that influence treatment selection in the child patient.

4. Also, most important factor that should be taken into consideration is frequency of repeated trauma episodes in children. It should be taken into consideration if planning endodontic treatment in an avulsed primary tooth.

Replantation
A. Primary teeth: Generally they are not replanted to avoid injury to the developing permanent tooth buds [13].
B. Permanent teeth: Treatment is usually complex, expensive, time consuming and often requires multidisciplinary approaches [6].

Tooth having closed apex

Tooth with open apex

Tooth with less than 60 min of extraoral dry time
Tooth to be replanted is gently rinsed and then replanted. In this situation, endodontic treatment is not initiated until any signs of pathosis develop[9].

Tooth with more than 60 min of extraoral dry time
In these tooth, the periodontal ligament most becomes necrotic and healing is not expected to occur. Apexification procedure is started at the second visit after the tooth replantation[9].

Splinting
Splinting procedures is usually done for the cases involving alveolar bone fractures or intra-alveolar root fractures [10,12].

Use of antibiotics
Children’s medical status and the severity of traumatic injury to soft tissues decide the use of antibiotics [10].

Complications
Root resorption and ankyloses are the two most common complications observed in most of the replanted teeth, if the management protocols are not followed carefully [14,15].

Conclusion
The avulsion of teeth should be considered as the dental emergency, as the length of extraoral time will affect the prognosis of the tooth. As the loss of teeth in the early age affect the patient’s social, mental
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status as well as self-confidence; avulsion should be treated as soon as possible. Thus every dental practitioner should know the management protocol and should be updated with the present treatment modality, so that it will be beneficial to the patient.

References

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