

Tooth Avulsion Replantation Management: A Review Article

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Abstract

Introduction: Avulsion of teeth is defined as total displacement of the tooth out of its socket. Incidence of avulsion constitutes 0.5 to 16 % of all traumatic injuries in the permanent dentition. Avulsion is more commonly seen in children and young adults, at an age when the alveolar bone is resilient and provides only minimal resistance to extrusive forces. The maxillary central incisors are the teeth most commonly affected. Teeth can be avulsed in many trauma situations. Sports and automobile accidents are the most frequent causes. The incidence of avulsion is reported to be less than 3% of all dental injuries. Tooth avulsion is a true dental emergency since timely attention to replantation could save many teeth. Unfortunately, avulsed teeth are usually lost at the accident scene, and both accident victims and those attending them may neglect to consider the value of finding and saving the teeth. This may gradually change as the public continues to become aware of the possibilities that avulsed teeth can be saved.

Discussion: Avulsion of permanent teeth is serious problems of dental injuries. The prognosis depends on the measures taken at the place of accident or the time immediately after the avulsions. Treatment for the avulsion teeth is replantation, but it's not suggested for primary teeth avulsion. It will give a high risk for underlying permanent tooth germs. Replantation is directed at avoiding or minimizing the resultant inflammation which occurs as a direct result of the two main consequences, attachment damage and pulpal infection. Attachment damage may cause by drying, can additionally occur to the periodontal membrane when tooth is out of the mouth. Drying can cause loss of normal physiologic metabolism and morphology of the periodontal ligament cells. The treatment should minimize this damage so that the fewest possible complication result.

Conclusion: Clinical success rate of replanted avulsed teeth based on media and time for replantation. Careful examination regardless including radiographs and clinical examination are necessary to help detect possible alveolar fractures or complication. Such fractures of the tooth socket may reduce the prognosis but are not always a contraindication.

Key words: Avulsion, Replantation, media

Introduction

Avulsion of teeth is defined as total displacement of the tooth out of its socket. Incidence of avulsion constitutes 0.5 to 16

% of all traumatic injuries in the permanent dentition. Avulsion is more commonly seen in children and young adults, at an age when the alveolar bone is resilient and provides only minimal resistance to

extrusive forces. The maxillary central incisors are the teeth most commonly affected^{1,2}.

Teeth can be avulsed in many trauma situations. Sports and automobile accidents are the most frequent causes. The incidence of avulsion is reported to be less than 3% of all dental injuries. Tooth avulsion is a true dental emergency since timely attention to replantation could save many teeth. Unfortunately, avulsed teeth are usually lost at the accident scene, and both accident victims and those attending them may neglect to consider the value of finding and saving the teeth. This may gradually change as the public continues to become aware of the possibilities that avulsed teeth can be saved³.

The reported clinical success rate of delayed replanted avulsed teeth has been low. One of the causes for this poor rate is the lack of recognition that avulsed teeth are presented in the dental office under different conditions that require different treatments. There are two main reasons for delayed replantation of avulsed teeth. People present at the site of injury are usually lay persons who rarely know how to manage an avulsed tooth⁴. In cases of avulsed teeth with avital periodontal ligament, treatment with various agents such as tetracycline, stannous fluoride and emdogain before replantation have been suggested in the hope of slowing down the resorption process⁵. This article aims to review tooth avulsion replantation management.

Discussion

Tooth Avulsion Examination

The patient should be carefully examined regardless of whether the tooth has been replanted before coming to the dental office. Radiographs and clinical examination are necessary to help detect possible alveolar fractures. Such fractures of the tooth socket may reduce the prognosis but are not always a contraindication. Examine the tooth carefully for debris or contamination. Record the time of the avulsion. The length of extra-alveolar time determines both treatment procedures and prognosis. If the tooth has been left dry for less than 1 hour or kept in milk for no more than 4 to 6 hours, the protocol for treatment

is described as “immediate” replantation; more than 1 hour of dry time is “delayed” replantation³.

Avulsion injuries are associated with soft tissue lacerations and bleeding. The mechanism of the injury is a particularly important aspect of history as avulsion of teeth is frequently caused by severe trauma. Avulsed teeth with nonvital periodontal ligament can be replanted and will remain functional for several years. Trauma to the dentition is considered an emergency situation. It results in functional and esthetic disturbances accompanied by concern from both the patient and the parents. Similar to other luxation type injuries, avulsion of teeth is a serious assault on the gingival and periodontal ligament. Studies have shown that teeth replanted within 5 minutes after avulsion had the best prognosis. The chance of pulpal and periodontal healing was inversely related to the stage of root development and the period of dry storage⁵.

High rates of avulsion injuries caused by road traffic accidents may be one of the reasons for delayed treatment. When a serious accident occurs, teeth are not the subject of greatest interest. While teeth are not of primary interest in an emergency situation endangering life, they are important for function and esthetic⁶.

Replantation

Avulsion of permanent teeth is serious problems of dental injuries. The prognosis depends on the measures taken at the place of accident or the time immediately after the avulsions. Treatment for the avulsion teeth is replantation, but it's not suggested for primary teeth avulsion. It will give a high risk for underlying permanent tooth germs⁷.

Replantation is directed at avoiding or minimizing the resultant inflammation which occurs as a direct result of the two main consequences, attachment damage and pulpal infection. Attachment damage may caused by drying, can additionally occur to the periodontal membrane when tooth is out of the mouth. Drying can cause loss of normal physiologic metabolism and morphology of the periodontal ligament cells. The treatment should minimizing this damage so that the fewest possible complication result⁸.

Examination Procedures

The clinician should do some examinations to the patient with avulsion tooth. Some general recommendations are as follows⁹:

a. Clinical examination

The clinicians should record extra oral wounds and palpate the facial skeleton. The clinicians also record condition of patient's intra oral, such as injuries of oral mucosa or gingiva, disturbance of occlusion, abnormal mobility of teeth or alveolar fragment, tenderness of teeth percussion and change in percussion, and reaction to pulpal sensibility testing.

b. Radiographic examination

This examination is used to reveal the stage of root formation and it discloses injuries affecting the root portion of the tooth and the periodontal structures. The projections and angles are recommended 90° horizontal angle, occlusal view, and lateral view.

c. Sensibility test

Sensibility testing refers to electric pulp test or cold test, to determine the condition of the tooth pulp. Initial tests following injury frequently give negative results, but such results may only indicate a transient lack of pulpal response.

d. Patient instructions

Prognosis of treatment also depends on patient's oral hygiene. Patient should be advised to brush with a soft brush and rinsing with chlorhexidine 0.1% is beneficial to prevent accumulation of plaque and debris.

Preparation of the Root

Preparation of the root is dependent on the maturity of the tooth (open or closed apex) and on the dry time of the tooth before it was placed in a storage medium. Suggested storage medium in order of preference are milk, saliva, HBSS (Hank Balanced Salt Solution), or either in the vestibule of the mouth or in a container into which patient spits, physiologic saline water¹⁰.



Figure1. Media HBSS for Avulsion Tooth

Water is the least desirable storage medium because the hypotonic environment causes rapid cell lysis and increased inflammation on replantation. To avoid a diffusion barrier during the extra oral storage the tooth should gently be shaken every few minutes within the medium. This storage method also contributes to washing off bacteria and toxic breakdown products from cell death which lead to worse result¹¹.

a. Closed apex

When the tooth has been dry for more than 60 minutes, the periodontal ligament cells are not expected to survive. In these cases, the root should be prepared to be as resistant to resorption as possible. These teeth should be soaked in acid for 5 minutes to remove all remaining periodontal ligament and thus remove the tissue that will initiate the inflammatory

response. The tooth should then be soaked in 2% stannous fluoride for 5 minutes and replanted⁹.

b. Open apex

Not to replant the tooth is the present recommendation of the International Association of Dental Trauma. However, it would be beneficial to replant the tooth even though it will inevitably be lost due to resorption. Endodontic treatment may be performed out of the mouth⁹.

Preparation of the Socket

The socket should not be disturbed before the replantation process. Emphasis is placed on the removal of obstacles within the socket to facilitate the replacement of the tooth into the socket. It should be lightly aspirated if there is a blood clot. If alveolar bone has collapsed, a factor which may prevent replantation or cause it to be traumatic, a blunt instrument should be inserted carefully into the socket¹¹.

Result After Replantation

Some researches show there are many results for replanted teeth, functional healing, replacement resorption or ankylosis, and infection-related resorption. In all mature replanted teeth and in most teeth with immature root stage pulp necrosis will occur, get infected and may cause infection-related resorption. Early occurrence of infection-related resorption caused by microorganism located in the root canal, which escape via dentinal tubules when these are opened at the periodontal aspects by resorption or damage. Cervical resorption is a topographical description of resorption. It will be seen in the teeth with a vital pulp and without resorption¹².

Crown discolorations are common in replanted teeth when the endodontic treatment is not carried out immediately. Immediate filling prevents the colonization of the pulp chamber with microorganism that might cause discolorations. These teeth need further expensive treatments like internal bleaching, veneers or crowns. Internal bleaching may provoke cervical root resorption, especially in traumatized teeth¹³.

Extra oral endodontic treatment is additional damage to the periodontal ligament by prolonged extra oral periods, by extra oral filling procedures as well as by root filling materials themselves. There was a slightly higher rate of ankylosis in extracted and replanted teeth. Ankylosis of the post replantation would prevent further development of the alveolar bone in growing patients^{14,15}.

Conclusion

Clinical success rate of replanted avulsed teeth based on media and time for replantation. Careful examination regardless including radiographs and clinical examination are necessary to help detect possible alveolar fractures or complications. Such fractures of the tooth socket may reduce the prognosis but are not always a contraindication.

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