



Review Article

Best Practices in Avulsion Management - A Review

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ABSTRACT

Dentoalveolar trauma refers to injuries affecting the teeth, palate, mandible, maxilla, and gingiva due to external forces. These injuries can range from minor bruising to complete tooth avulsion, where the tooth is forcibly removed from its socket. Such avulsions typically require significant force and may also cause damage to adjacent structures. This review examines the risk factors, appropriate storage methods, and treatment strategies for dental avulsions, and highlights the importance of preventive measures for individuals at risk of dental injuries.

Keywords: Tooth Avulsion, Emergency Treatment, Management Protocols, Orofacial Trauma Prevention.

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INTRODUCTION

Injury to the mouth, including the teeth, lips, gums, tongue, and jawbones, is referred to as dental trauma. Approximately one-third of the population will have dental trauma at some point in their lifetime.^{1, 2} Avulsion, or total displacement of a tooth from its socket, is the most severe type of dental trauma which requires quick replantation to avoid external inflammatory resorption in future.³

A successful outcome will depend on efficient time management and careful preservation of the removed tooth. A more modern technique called anti-resorption therapy uses a combination of corticosteroids and antibiotics to counteract the normal inflammation that avulsed teeth develop when they are replanted. Splinting and systemic antibiotics are further components of a patient's treatment strategy for an avulsed tooth. Finally, it is important to arrange for follow-up appointments so that the tooth may be assessed clinically and radiographically to assess its vitality and rule out root resorption or ankylosis.

ETIOLOGY

Avulsion injuries can result from a variety of anatomical and socio-behavioral reasons. Significant maxillary incisor overjet, anterior open bite, and insufficient lip covering of anterior teeth are the anatomic characteristics that have been repeatedly found to raise the likelihood of anterior tooth injury.¹ The following socio-behavioural characteristics have been linked to an increased risk of traumatic damage to anterior teeth including gender; unfavourable psychosocial behaviour; problem behaviour; higher involvement in sports and leisure activities; and accident proneness.⁴

MANAGEMENT OF AVULSED PRIMARY TEETH

The dentist in a clinical practice is often confronted with traumatized primary teeth. According to the new 2020 International Association of Dental Traumatology emergency treatment guidelines replantation of primary teeth is contraindicated.⁵ An avulsed primary tooth should not be replanted. Reasons include a significant treatment burden including replantation, splint placement and removal, root canal treatment for a young child as well as the potential of causing further damage to the permanent tooth or to its eruption. However, the most important reason is to avoid a medical emergency resulting from aspiration of the tooth. Careful follow up is required to monitor the development and eruption of the permanent tooth.^{6,7,8}

MANAGEMENT OF AVULSED PERMANENT TEETH

For avulsed tooth replantation to be successful, meticulous planning is essential. Prior to replacing a permanent tooth, the following circumstances need to be taken into account. There shouldn't be any severe periodontal disease present in the lost tooth. For the avulsed tooth to have a place to rest, the alveolar socket has to be somewhat intact. It is important to take into account the extra-alveolar interval; dry extra-oral periods lasting longer than an hour are typically linked to noticeable root resorption. One should take into account the stage of root growth. The tooth's open or closed apex and the length of time it takes to replant the tooth determine the course of treatment for the avulsed tooth.

AVULSED PERMANENT ANTERIOR TEETH WITH CLOSED APEX

The patient will generally present with one of three clinical scenarios:

The tooth has already been replanted

Do not extract the tooth. Keep the tooth in its location. Use saline, 0.12% chlorhexidine, or water to clean the afflicted region. Gum laceration should be sutured, particularly if it is in the cervical region. Ensure that the implanted tooth is radiographically in its natural location. Using a flexible splint, up to 0.016" or 0.4mm, apply it for two weeks. If an intracanal corticosteroid medication is chosen to be used as an anti-inflammatory, antiresorptive medicament, it should be placed immediately or shortly following replantation and left for at least two weeks.⁷

The tooth has been kept in an appropriate storage media or the extra-oral dry time has been less than 60 minutes

Use saline to clean the contaminated root surface. If necessary, the tooth can be kept in a storage medium until a trauma assessment is promptly completed, such as Viaspan or Hanks balanced salt solution. If available, soak the tooth for five minutes in a solution of doxycycline or minocycline (1 mg per 20 ml of saline). Apply a local anaesthetic. The socket's suitability for replantation will be evaluated by palpating the damaged area and taking radiographs of the surrounding teeth and bone. Before replanting, socket wall fractures should be realigned. Using a stream of sterile saline, coagulum can be removed from the socket to enable gradual, gentle digital pressure replantation. Suture gingival laceration, especially in the cervical area. Verify normal position of the replanted tooth radiographically. Apply a flexible splint for two weeks (up to 0.016" or 0.4 mm). If an intracanal corticosteroid medication is chosen to be used as an anti-inflammatory, antiresorptive medicament, it should be placed immediately or shortly following replantation and left for at least two weeks.⁶



The tooth has an extra-oral dry time of more than 60 minutes

The root surface periodontal ligament cells are not expected to survive. Before replanting, check the damaged socket and its surroundings for fractures and realign. The coagulum should only be removed with sterile saline. It has been recommended to treat the root surface with fluoride prior to replantation (2% sodium fluoride solution for 20 minutes) in order to slow down osseous replacement of the tooth. Recent research indicates that using an enamel matrix protein, such as Emdogain® (Biora, Malmö, Sweden), may increase the root's resistance to resorption and encourage the formation of new periodontal ligament in the socket. The socket can be filled with Emdogain® prior to replantation of a tooth with an extra-oral dry time of greater than 60 minutes.⁹ It may also be valuable in cases where the extra-oral dry time is 20-60 minutes. Root canal treatment can be carried out prior to replantation or later. Replant the tooth slowly with slight digital pressure. Suture gingival laceration, especially in the cervical area. Verify normal position of the replanted tooth radiographically. Apply a flexible splint for 1-2 weeks (up to 0.016" or 0.4mm).

AVULSED PERMANENT ANTERIOR TEETH WITH OPEN APEX

The tooth has already been replanted prior to the patient arriving in the dental clinic

Maintain the tooth's position. Use 0.12% chlorhexidine, saline or water to clean the afflicted region. Gingival laceration should be sutured, particularly in the cervical region. Check radiographically that the implanted tooth is in its proper place. For two weeks, wear a flexible splint.

The extraoral dry time is less than 60 minutes:

Use a stream of saline water to clean the root surface and apical foramen. For five minutes, soak the tooth in either minocycline or doxycycline. Apply a local anaesthetic. Use saline to irrigate the socket. Check for any potential fractures in the socket and realign if required. Gently place the tooth back in while applying light pressure. Suture gingival laceration, particularly in cervical region. Use radiography to confirm that the implanted tooth is in its natural place. Put on a flexible splint for two weeks.

Extra oral dry time > 60minutes:

Using gauze, carefully remove any necrotic tissue that is attached to the root. Apply a local anaesthetic. Use saline to irrigate the socket. Check for any potential fractures in the socket and realign if required. Root canal therapy should ideally be completed before replanting. Gently place the tooth back in while applying light pressure. Repair gingival laceration, particularly if it is in the cervical region. Use radiography to confirm that the implanted tooth is in its natural place. For four weeks, use a flexible splint (up to 0.016" or 0.4 mm).

FOLLOW UP PROCEDURES OF REIMPLANTED AVULSED TEETH

The splint is removed after two weeks, or four weeks. If pulpal revascularization is not to be expected (teeth with closed apices), the pulp is extirpated prior to splint removal and calcium hydroxide is placed in the root canal as an interim dressing. In all cases, a radiographic control should be made once a week during the first month. At these times, signs of infection - related resorption may be present, which will dictate pulpal extirpation, and also in teeth with incomplete root formation. Radiographic controls should be performed in order to disclose root resorption. If not present within the first two years after injury, the risk of root resorption is significantly reduced, but can still occur.⁸ The onset of resorption appears to be earlier in cases with crown damage, visible contamination and dry extra alveolar time exceeding 15 minutes. Further radiographic and clinical controls should be made after three months, six months and then yearly for five years at which time ankylosis, if it is going to occur, can usually be demonstrated.

APPLIANCES TO PREVENT AVULSION

Wearing a mouthguard and faceguard during sports and other activities where there is a chance of falling or getting struck by an item appears to be the most efficient strategy to prevent oral injuries and greatly lessen their severity. Traffic accidents are another prevalent mechanism of oral damage. It is required to use a helmet with a chin arch when riding a motorbike and to buckle up when driving a car. The most popular bicycle helmets actually offer excellent protection against head injuries, as demonstrated by Victoria, Australia, where there was a 48% decrease in reported head injuries for cyclists a year after helmet wear became required.⁹ There is no oral or tooth protection provided by these helmets.

Faceguards are often a metal or composite cage that is constructed and fastened to a helmet or head strap. Clear polycarbonate plastic guards are now readily available, either prefabricated or custom-made. These faceguards seem to offer decent tooth and face protection, but they aren't suitable for every activity. In an

intervention research conducted by Kaplan et al., the use of faceguards decreased the incidence of dental traumatic injuries among patients aged 10 to 14 by about half (45.0%).¹⁰

The main purpose of mouth guards is to protect players during contact sports. It has been documented in the past that wearing mouthguards during contact sports can lower the risk of dental injuries by over 90%.¹¹ When a mouthguard is fitted correctly, it absorbs some energy, restricts the force to the oral hard and soft tissues, and then more uniformly distributes the stress across the orofacial complex.¹² According to clinical and experimental data, mouthguards can lessen the chance of serious injury by distributing impact energy.¹³

The use of mouthguards and faceguards during sports and high-risk activities is a highly effective method for preventing avulsion and reducing oral injuries. These protective devices play a critical role in minimizing both the incidence and severity of dental trauma.¹⁴ Furthermore, addressing oral injury risks in traffic-related incidents through the use of helmets with chin guards for motorcyclists and seatbelts for car occupants is essential. Implementing these preventive measures can substantially decrease the occurrence of oral injuries and enhance overall safety.

CONCLUSION:

Avulsion results in repercussions that are psychological, cosmetic, and functional, and the prognosis is mostly determined by the degree of periodontal membrane damage. People's levels of understanding regarding the emergency treatment of tooth avulsions need to be raised. Programmes for focused education can do this. The public should be provided with management-related posters and movies via camps and mainstream media. It is possible to encourage schools to use tooth avulsion applications to assist with the prompt management of avulsed teeth. While there is no 100% preventative strategy for orofacial trauma, there are steps that can be taken to lessen the severity of injuries.

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CONFLICTS OF INTEREST

There are no conflicts of interest

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