



Oral Health Division
Ministry of Health Malaysia

MANAGEMENT OF AVULSED PERMANENT ANTERIOR TEETH IN CHILDREN



2nd Edition
November 2010

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STATEMENT OF INTENT

These guidelines update and supplant the original guidelines developed in 2003 and are based on the best available contemporary evidence. They are intended as a guide for the best clinical practice in the management of avulsed permanent anterior teeth in children presently. However, it must be noted that adherence to these guidelines do not necessarily lead to the best clinical outcome in individual patient care, as every health care provider is responsible for the management of his/her unique patient based on the clinical presentation and management options available locally.

REVIEW OF THE GUIDELINES

These guidelines were issued in 2010 and will be reviewed in 2014 or earlier if important new evidence becomes available.

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Electronic version available on the following websites:

<http://www.moh.gov.my>

<http://www.acadmed.org.my>

GUIDELINES DEVELOPMENT AND OBJECTIVES

GUIDELINES DEVELOPMENT

The Development Group for these Clinical Practice Guidelines (CPG) consisted of Paediatric Dental Specialists and Dental Public Health Specialists. The Review Committee was actively involved in the development process of these guidelines.

The previous edition of the CPG on Management of Avulsed Anterior Permanent Teeth in Children (2003) was used as the basis for the development of these present guidelines. Reference was also made to other guidelines on management of dental trauma i.e. Guidelines for the Management of Traumatic Dental Injuries by the International Association of Dental Traumatology 2007; Guideline on Management of Acute Dental Trauma; American Academy of Pediatric Dentistry (AAPD) 2007; Recommended Guidelines of the American Association of Endodontists for the Treatment of Traumatic Dental Injuries; Treatment of Avulsed Permanent Teeth in Children, Royal College of Surgeons of England 1998; Decision tree for an avulsed tooth: AAPD, 2007. The recommendations were adapted taking into consideration local practices.

Several improvements have been introduced in this edition. In addition to the general text and photographic updates, new and updated information has been included in the management such as splinting techniques and single visit apexification. Besides this, clinical audit indicators have also been identified for the purpose of monitoring and evaluating outcomes.

Evidences were retrieved from publications from year 2003 onwards. Literature search was carried out using the following electronic databases: PUBMED/MEDLINE; Cochrane Database of Systemic Reviews (CDSR); ISI Web of Knowledge; Health Technology Assessment (HTA) and full text journal articles via OVID search engine. In addition, the reference lists of all relevant articles retrieved were searched to identify further studies. The following free text terms or MeSH terms were used either singly or in combination to retrieve the articles: “tooth avulsion”, “avulsed tooth”, “traumatic tooth loss”, “tooth replantation”, pe*diatric, “treatment avulsed teeth”, outcome*. All searches were

conducted between March 2009 and January 2010 and only literatures in English were retrieved.

There were two clinical questions which were assigned to members of the development group. The group members met a total of 10 times throughout the development of this guideline. All literatures retrieved were appraised by at least two members and presented in the form of evidence tables and discussed during group meetings. All statements and recommendations formulated were agreed upon by both the development group and review committee. These CPGs are based largely on the findings of randomized controlled trials and adapted according to local practices. However, where there was lack of evidence, recommendations were based on consensus of group members. Although, ideally patients view and preferences need to be considered in the development of CPGs, in this instance, it was not feasible. Nevertheless, patient information leaflets would be developed to facilitate the dissemination of important information to the public.

The levels of evidence of the literature were graded using the modified version from the United States (U.S) / Canadian Preventive Services Task Force, while the grading of recommendations was based on the modified version of the Scottish Intercollegiate Guidelines Network (SIGN).

The draft guidelines were reviewed by a team of external reviewers and were also posted on the Ministry of Health, Malaysia and Academy of Medicine, Malaysia websites for comments and feedbacks. These guidelines were presented to the Technical Advisory Committee for CPGs, and finally to the HTA and CPG Council, Ministry of Health, Malaysia for approval.

OBJECTIVE

To provide evidence-based guidance in the management of avulsed permanent anterior teeth in children

SPECIFIC OBJECTIVES

- i. To disseminate and reinforce knowledge on the management of avulsed permanent anterior teeth among healthcare professionals
- ii. To provide timely and appropriate management of avulsed permanent anterior teeth by healthcare professionals

CLINICAL QUESTIONS

The clinical questions addressed by these guidelines are:

- i. What is the importance of timely replantation of avulsed permanent anterior teeth in children?
- ii. How can avulsion of permanent anterior teeth in children be managed successfully?

TARGET POPULATION

i. Inclusion criteria

Children with traumatically avulsed permanent anterior teeth

ii. Exclusion criteria

- Children with avulsed permanent anterior teeth associated with comminuted alveolar fractures
- Children with grossly carious or periodontally diseased avulsed permanent anterior teeth

TARGET GROUP/USER

These guidelines are applicable to healthcare providers involved in the management of dental injuries in children.

HEALTHCARE SETTINGS

Dental Clinics, Health Clinics, Emergency and Trauma Department and community settings are the common areas of use of these guidelines.

ORGANISATIONAL BARRIERS AND COST IMPLICATIONS

When any type of traumatic dental injury occurs, the patient and/or parents expect competent treatment from the healthcare emergency department personnel. Many healthcare providers, especially those at the health clinics and emergency settings, are “uncomfortable” and unfamiliar with treating avulsed permanent anterior teeth in children. Inadequate treatment of this trauma and lack of knowledge of lay people on how to manage this event could have serious consequences on the outcome. As the outcomes of replantation is mostly dependant on the timely and appropriate management of the avulsed teeth, it is important to disseminate the knowledge among healthcare providers, as well as to lay people, in order to bridge the gap. This can be facilitated through the development of appropriate training modules and quick references

Cost implications on management of avulsed permanent anterior teeth in children vary depending on several factors, such as patient’s age, patient’s cooperation and pre-replantation condition of the avulsed tooth. Successful replantation would require splinting with or without root canal treatment and long term follow-up with associated radiographs; thus affecting the cost involved.

PROPOSED CLINICAL AUDIT INDICATORS FOR QUALITY MANAGEMENT

$$\text{Retention rate of replanted avulsed permanent anterior teeth} = \frac{\text{Number of replanted avulsed permanent anterior teeth retained 2 years post operatively}}{\text{Total number of replanted avulsed permanent anterior teeth}} \times 100$$

LEVELS OF EVIDENCE AND GRADES OF RECOMMENDATIONS

LEVEL	STUDY DESIGN
I	Evidence obtained from at least one properly designed randomised controlled trial
II-1	Evidence obtained from well-designed controlled trials without randomisation
II-2	Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one centre or research group
II-3	Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence
III	Opinions or respected authorities, based on clinical experience; descriptive studies and case reports; or reports of expert committees

Source: Adapted from U.S./Canadian Preventive Services Task Force

GRADES OF RECOMMENDATION

A	At least one meta analysis, systematic review or RCT or evidence rated as good or directly applicable to the target population
B	Evidence from well conducted clinical trials, directly applicable to the target population and demonstrating overall consistency of results; or evidence extrapolated from meta analysis, systematic reviews or RCT
C	Evidence from expert committee reports, or opinions and or clinical experiences of respected authorities; indicates absence of directly applicable clinical studies of good quality

Source: Modified from the Scottish Intercollegiate Guidelines Network (SIGN)

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These guidelines were reviewed by a panel of independent reviewers from both public and private sectors who were asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence supporting the recommendations in the guideline.

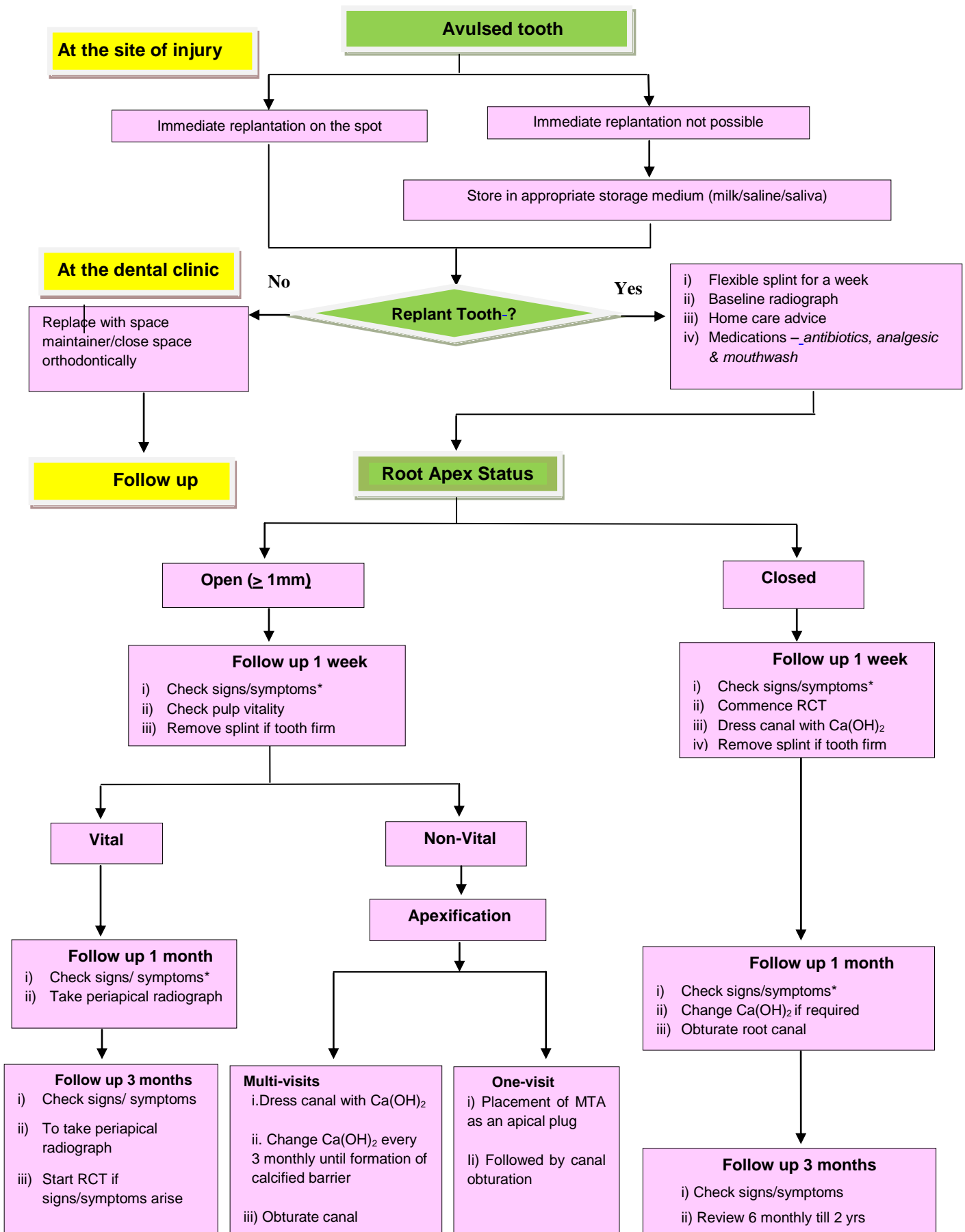
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ALGORITHM FOR THE MANAGEMENT OF AVULSED PERMANENT ANTERIOR TEETH IN CHILDREN



RCT – Root Canal Treatment
MTA – Mineral Trioxide Aggregate

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1. INTRODUCTION

Avulsion of a tooth is defined as the complete displacement of a tooth out of its socket (**Fig. 1**). It is associated with severed periodontal ligaments and may be associated with fractures of the alveolar socket. The management of avulsed permanent teeth in children is distressing for both the child and parents and often can be demanding for the dentist.

The prognosis of teeth with this traumatic injury depends on appropriate management at the place of accident or the extra-alveolar time immediately after the avulsion. Every endeavor should be made to replant these avulsed teeth in children as replantation of teeth even with less favourable prognostic indicators will allow normal establishment of the arch and occlusion. This works well as an interim measure before a more definitive treatment plan can be made later. Although most of these teeth are usually lost by replacement resorption, nevertheless, their presence allows preservation of the alveolar bone height, making prosthodontic replacement much simpler. Currently, there is an apparent lack of knowledge among parents, teachers, healthcare professionals and children themselves on the management of this problem when such an accident occurs.



Figure 1: Avulsed anterior permanent teeth

(Photo courtesy of Dr. Thevadass K.Palany)

1.1 Aetiology

Traumatic avulsion of teeth is mainly attributable to falls, collisions and accidents at home, school or playground due to common childhood activities such as contact sports, cycling, swimming and fights. In young children, the relatively resilient alveolar bone provides only minimal resistance to extrusive forces.

1.2 Prevalence

Avulsion injury is most frequently seen in children between the ages of 7 – 9 years. It is reported that up to 30% of children have been exposed to accidental injuries to the teeth by the age of 15 years. About 0.5% - 16% of all accidental injury to the teeth involves avulsion or total displacement of the tooth out of its socket.^{1-2,level I, 3,level II-2} This mishap can occur at any time and place and the most frequently avulsed teeth are the upper anterior permanent central incisors.

2. PATHOPHYSIOLOGY

Extrusive forces impinging on the teeth, when severe enough, can cause a tooth to be displaced out of its socket. For this to happen, the periodontal ligaments would have ruptured, leaving remnants on the cementum of the root and the inner walls of the alveolar socket. The vessels entering the pulp through the apical foramen would also have been severed with cessation of blood supply to the pulp.

The extent of injury sustained by the periodontal ligament and the pulp, and the subsequent healing of these tissues will depend on the extra-alveolar period i.e. the time the tooth remains out of its socket and the handling of the tooth **(Fig.2 and 3)**

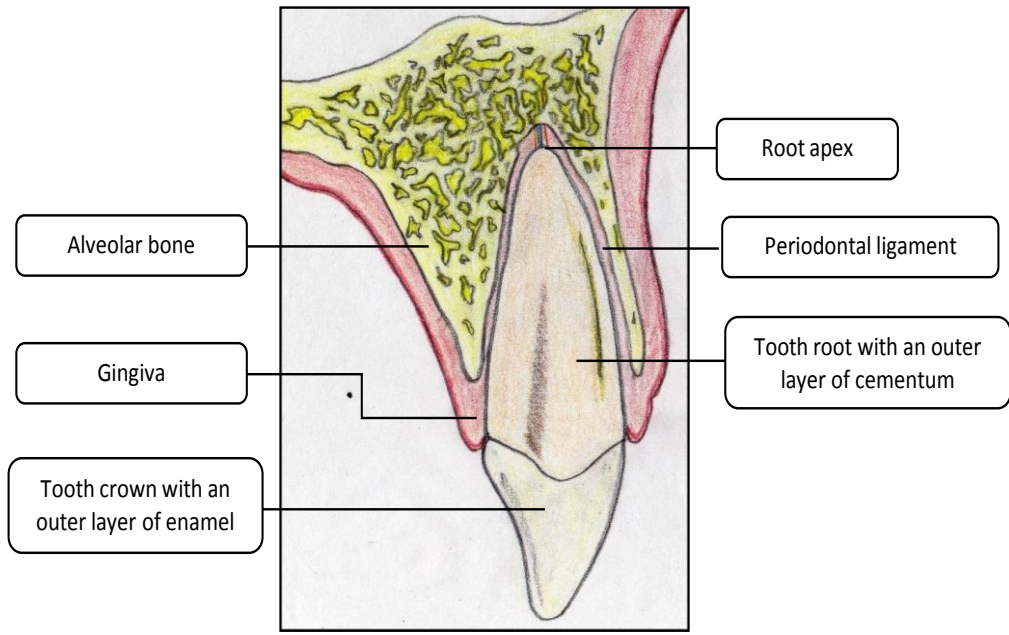


Figure 2: Anatomy of tooth and supporting structures

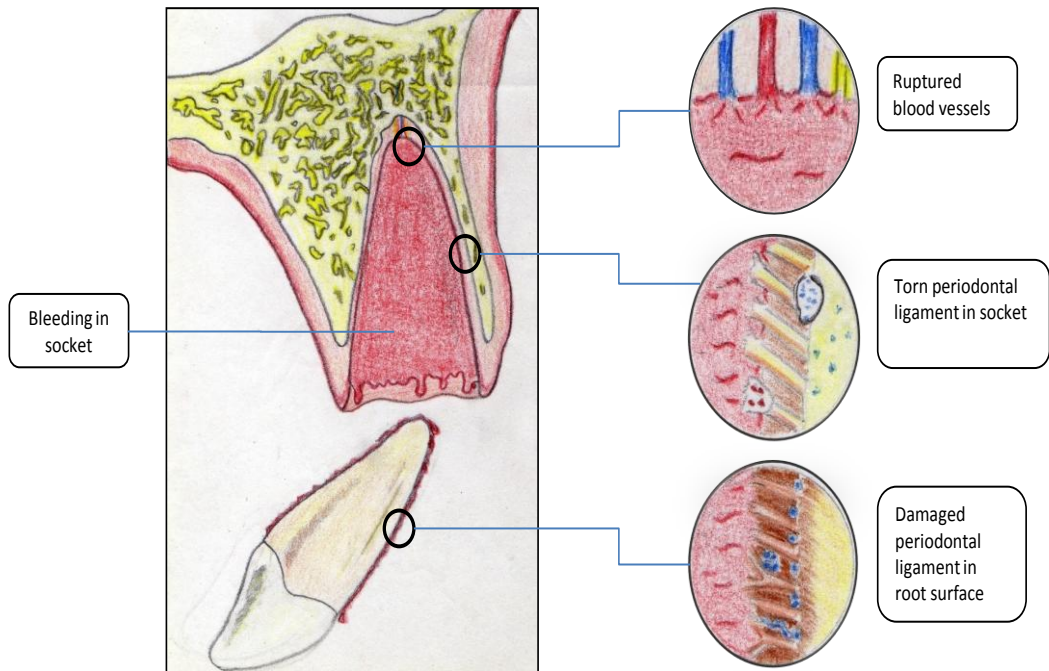


Figure 3: The avulsed tooth

2.1 Pulpal Reactions

A number of animal studies have shown that the pulp can be completely revascularised in immature avulsed teeth. Several factors influence the pulpal reaction such as the width of the apical foramen, the extra-alveolar period and the storage medium.^{4,level II-2, 5,level II-2}

The chances of revascularisation are greatest when the apical foramen is wider, the extra-alveolar time is short and the tooth is stored in an appropriate storage medium. The absence of bacterial contamination is also considered to be an essential requirement for complete revascularisation.

2.2 Periodontal Ligament Reactions

Three types of healing modalities have been described depending on the severity of injury sustained by the periodontal ligament^{6-8,level I}

- i. Functional healing^{8, level I}
Complete regeneration of the periodontal ligament along the root surface usually takes about 7 – 14 days. This will only occur if the periodontal ligament cells remain vital.
- ii. Healing with inflammatory resorption^{8, level I}
Histologically, it is characterised by areas of resorption in bone and the adjacent root surface. This may progress till the tooth becomes mobile and is extruded. Clinically, the percussion tone is dull. The patient may present with pain.
- iii. Healing with replacement resorption^{8, level I}
Histologically, fusion of bone and root surface is observed. Clinically, the tooth is not mobile (ankylosed) and gives a high percussion tone. It may become infra-occluded over time. This occurs when there is failure of regeneration of the periodontal ligament.

Note: More than one type of reaction may be present at any one time.

3. IMPORTANCE OF REPLANTATION

Although in many cases a replanted tooth survives only a matter of years, during this period it serves as a natural space maintainer whilst growth occurs, and also enables alveolar height to be preserved. This greatly simplifies future prosthetic rehabilitation by means of bridge or implant placement, in the event of failure of the replanted tooth.

Moreover it is generally recommended that implants should not be placed in children who are still actively growing. This means that children less than 16 years of age are not suitable candidates for implant placement. However, if traumatised incisors are lost at an early age there would be insufficient alveolar bone available to support implant prostheses. It is therefore very crucial to replant teeth even if the long term prognosis is poor. If the tooth can be maintained until the child reaches 16 years, alveolar bone is preserved and simplifies implant placement.^{2-4,level III}

In children with anterior crowding some authorities advocate closure of the lost incisor space by orthodontic means. Although an initial consideration for space closure may appear to be the treatment of choice, the modification of adjacent teeth to simulate the missing incisor is often of concern. There are, however, many problems arising from disguising the lateral incisor and modifying the canine and premolar teeth.^{2-4,level III}

RECOMMENDATION

Replantation should be considered in most cases of avulsed tooth.

(Grade B)

4. POSSIBLE CONTRAINDICATIONS FOR REPLANTATION

In the following instances replantation may not be advisable:

- i. The avulsed tooth has extensive caries and evidence of advanced periodontal disease^{2,level III}
- ii. Excessively dry or inappropriate storage^{2,level III}
- iii. The alveolar socket has major comminutions or fractures^{2,level III}
- iv. Uncooperative patients^{2,level III}
- v. Immature avulsed permanent tooth with short root and wide open apex^{2,level III}

Replantation is absolutely contraindicated in the following instances:

- i. Where other injuries are severe and require preferential emergency treatment or intensive care, for example a child with concomitant severe head injury or polytrauma which requires immediate urgent attention^{1,level I, 3,level III}
- ii. When there is compromised medical history, avulsed teeth should not be replanted in cases where doing so would place the patient at risk. Examples are patients with heart lesions who are at risk of bacteraemia with a possibility of developing infective endocarditis or patients with depressed immunity as in acute lymphoblastic leukemia. It may be possible in some cases to safely replant teeth in such individuals but this should only be carried out in liaison with the physician in charge of their medical care.^{9,level III}
- iii. When the immature permanent tooth has a short root with wide open apex and there is prolonged dry extra-alveolar time. If the dry extra-alveolar time is long then replacement resorption is inevitable. As replacement resorption occurs at a higher rate in a young person and

these teeth already have a short root, the prognosis is very poor. In most of these cases replantation is not warranted.^{1,level I}

RECOMMENDATION

Replantation should not be carried out in:

- Patients who have severe injuries or medically compromised
- Very uncooperative children
- Immature permanent tooth with short root and wide open apex

(Grade C)

5. MANAGEMENT

- Stages in management of avulsed permanent anterior teeth:
 - Emergency management at the site of injury (refer to section 5.1)
 - Storage and transportation medium (refer to section 5.2)
 - Management at dental clinic/emergency department (refer to section 5.3)
 - History taking (refer to section 5.3.1)
 - Replantation (refer to section 5.3.2)
 - Splinting (refer to section 5.3.3)
 - Medication (refer to section 5.3.4)
- Follow up (refer to section 5.4)

5.1 Emergency Management at Site of Injury

For child/parent/teacher/paramedics/bystander

The philosophy for treatment success of avulsed teeth is to replant the tooth immediately or as soon as possible. Time is the critical factor.^{1,8,10 level I}

- i. Pick the tooth by its crown. Do not handle the root
- ii. Check to see if the root surface is clean
- iii. If dirt is present on the root, rinse gently with cold fresh milk, saline or tap water in order of preference. Do not scrub dirt off the root
- iv. Place the tooth into its socket
- v. Get the child to bite on a clean, folded handkerchief to keep the tooth in place
- vi. Go to the nearest dental clinic as soon as possible

RECOMMENDATION

An avulsed tooth should be replanted as quickly as possible. **(Grade B)**

5.2 Storage and Transportation Medium

For child/parent/teacher/paramedics/bystander.

If, for any reason, it is not possible to replant the tooth at the site of accident, store the tooth in a suitable medium to be transported to the nearest dental clinic or hospital emergency service as soon as possible.^{10, level I, 11-19, level III}

- i. The best storage medium is the tooth socket itself
- ii. Other recommended transport media are:
 - Fresh or UHT milk (cold) and not condensed or powdered milk
 - Physiological saline (0.9% sodium chloride). Do not attempt to make your own saline solution
 - Saliva - get the child to spit into a clean container. Ensure tooth is kept moist at all times
 - In the event that the above media are unavailable, the tooth should be placed in a clean plastic bag/container for transportation
 - The tooth may also be placed in the buccal sulcus (between the cheek and teeth) of the child. However this is not recommended for fear of accidental swallowing or aspiration in a young child

Many studies have recommended various types of storage media, e.g pH balanced cell preserving solutions such as Hank's Solution/ Emergency Tooth Preserving System, Emdogain^{21, level III} and Viaspan^{22, level III} have been recommended. However these media are not widely available locally at the present time and outcome studies reveal that they do not offer any added benefits.^{8, level I} The critical factor of transportation is to keep the tooth moist at all times.

RECOMMENDATION

Keep tooth moist in appropriate storage medium such as milk, saline or saliva. **(Grade C)**

5.3 Management at Dental Clinic/Emergency Department

By healthcare workers

5.3.1 Pre-operative Assessment

- i. History
Obtain relevant dental /medical history.
- ii. Clinical evaluation of dental trauma
Rule out presence of other injuries i.e. head and neck injuries. Examine for presence of soft tissue lacerations, bone fractures.
- iii. Investigations
Obtain dental periapical radiograph for baseline records.

The above procedures should be carried out quickly but thoroughly so that precious time is not wasted.

5.3.2 Replantation

Where appropriate, the aim is to replant the avulsed tooth as soon as possible with minimal handling.^{2, level III}

- i. Place the tooth in physiological saline
- ii. Administer local anesthesia
- iii. Gently irrigate socket with normal saline
- iv. Avoid scraping or curettage within the socket
- v. Handle the tooth by its crown only
- vi. If the root is contaminated, run physiological saline over the tooth. If dirt is stubborn, gently dab with gauze soaked in saline
- vii. Seat the tooth back gently into its socket using light finger pressure. Do not use excessive force to try to seat back into socket
- viii. Instruct child to bite on a piece of gauze
- ix. If socket walls are fractured, and unable to replant tooth, reposition bone gently using a blunt instrument

RECOMMENDATION

Minimise handling of tooth and replant as soon as possible. **(Grade C)**

5.3.3 Splinting

The replanted tooth needs to be stabilized in position by splinting, the duration depending on the extent of the trauma sustained.^{12,21, level III}

- i. Splint teeth to adjacent teeth using physiological splinting method.
- ii. Types of splints:
 - Direct composite splint (**Fig. 3**)
 - Wire composite splint (**Fig. 4**)
 - Fibre reinforced meshed splint
- iii. Splint teeth for 7 – 14 days. If alveolar bone is fractured, splint for 4 weeks^{23,24 level III}.
- iv. Take a periapical dental radiograph to ascertain position of replanted tooth and as baseline information.
- v. Give home care advice during splinting such as:
 - Avoid biting on splinted teeth
 - Take soft diet
 - Maintain good oral hygiene



Figure 3: Direct composite splint



Figure 4: Wire composite splint

(Photos courtesy of Dr. Thevadass K.Palany)

RECOMMENDATION

Essential to stabilise tooth with physiological splinting such as composite resin or wire composite followed by careful home care **(Grade C)**

5.3.4 Medications

Prescription of appropriate medication is necessary for the achievement of better outcomes.^{25-27, level III}

- i. Check Tetanus immunisation status. Arrange to give ATT booster if necessary, especially if the avulsed tooth had contacted soil
- ii. Prescribe:-
 - Oral antibiotics, preferably penicillin based for 5 days
 - Oral analgesic (if patient is in pain, simple oral painkillers such as Syrup Paracetamol 10-15mg/kg stat may be given)
 - 0.12% chlorhexidine gluconate mouthwash twice daily for 1 week

5.4 FOLLOW UP

Success rates for survival of avulsed teeth also depend on the management of the replanted tooth during follow-up visits.^{13,14,level III, 28,29,level I, 30-33,level III}

5.4.1 Tooth with Closed Apex^{1,2 level I}

Duration	Recommended Procedures
One Week	i. Check for clinical signs and symptoms of infection*
	ii. Commence root canal treatment <ul style="list-style-type: none"> - Extirpate pulp - Carry out mechanical preparation of canal - Dress canal with calcium hydroxide paste
	iii. Seal access cavity with suitable intermediate restorative materials such as Glass Ionomer Cement (GIC)
	iv. Take radiograph to check for adequacy of fill
	v. Remove splint if tooth is fairly firm. If not, review weekly until firm
One Month	i. Check for clinical signs and symptoms of infection*
	ii. Take periapical dental radiographs
	iii. If no signs and symptoms, obturate the root canal followed by tooth restoration
	iv. If signs and symptoms of infection persist, change calcium hydroxide dressing
Three Months	i. Check for clinical signs and symptoms of infection*
	ii. Take periapical dental radiographs
	iii. In unobturated root canal, change calcium hydroxide dressing three monthly until signs and symptoms of infection has cleared. Once infection has cleared, proceed to obturate canal
	iv. Regular review 6 monthly for 2 years

5.4.2 Tooth with Open Apex ^{1,2 level I}

Duration	Recommended Procedures
One week	i. Check for clinical signs and symptoms of infection.*
	ii. Check for pulp vitality
	iii. When signs and symptoms of non-vital pulp arise, dress with calcium hydroxide to control the infection then institute apexification procedures
	iv. Remove splint if tooth is fairly firm. If not, review weekly until firm
Monthly for three months	i. If previously tooth vital: <ul style="list-style-type: none"> - Check for clinical signs and symptoms of infection* - Check for pulp vitality. - Take periapical dental radiographs. - When signs and symptoms non-vital pulp arise, dress with calcium hydroxide to control the infection then institute apexification procedures
	ii. If infection has been controlled, institute apexification <ul style="list-style-type: none"> - Change calcium hydroxide or - Use MTA for one visit apexification, then obturate canal^{34,level III}
Three monthly for 6 months or more	i. If previously tooth vital: <ul style="list-style-type: none"> - Check for clinical signs and symptoms of infection* - Check for pulp vitality - Take periapical dental radiographs. - When signs and symptoms of non-vital pulp arise, dress with calcium hydroxide to control the infection then institute apexification procedures
	ii. If apexification has been instituted <ul style="list-style-type: none"> - Check signs and symptoms of infection* - Take periapical dental radiographs - Change calcium hydroxide if necessary every three monthly until calcified barrier formation is achieved, then obturate canal
Six Monthly	i. If previously tooth vital <ul style="list-style-type: none"> - Check for clinical signs and symptoms of infection* - Check for pulp vitality - Take periapical dental radiographs - When signs and symptoms of non-vital pulp arise, dress with calcium hydroxide to control the infection then institute apexification procedures
	ii. If apexification has been instituted <ul style="list-style-type: none"> - Check for signs and symptoms of infection* - Take periapical dental radiographs
* Clinical signs and symptoms include:	
i. pain/ tenderness	
ii. swelling/ sinus	
iii. mobility	
iv. tooth discolouration	
v. pathological radiolucency at the periapical area	

The objective of apexification is to achieve formation of a calcified apical barrier, which facilitates effective root filling. This may be assessed radiographically or clinically at each review visit. If calcium hydroxide change is necessary, use Glass Ionomer Cement (GIC) to seal access cavity in between visits. Once apical closure is achieved, seal canal with gutta percha and restore access cavity.

After completion of root canal treatment the tooth should be reviewed yearly for two years to ensure that no signs or symptoms of infection are present.^{33,level III}

5.5 PROGNOSTIC FACTORS

The outcome of treatment depends on the physiological condition of the periodontal ligament cells and pulp tissue at the time of replantation. All endeavours should be made to ensure that these cells are not compromised or injured further at the time of replantation. Immediate replantation gives better prognosis. However, in the event of prolonged extra-alveolar period with dry storage where periodontal ligament cells are not expected to be viable, attempts should still be made to replant but pre-replantation conditioning of the tooth is required.^{35 level III} Immediate referrals/consultation to a Paediatric Dental Specialist is highly recommended.

Though most replanted teeth would eventually be lost due to replacement resorption, the timely replantation is important for preservation of alveolar growth/height. It is recommended that long term follow up of these cases be carried out in view of definitive treatment in the future when the adult /mature gingival margin is attained.

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GLOSSARY

Alveolus	The tooth bearing portion of the jaw bones.
Apexification	Induction of apical closure.
Apical foramen	The opening at the tip of the root through which the nerves and blood vessels pass through
Avulsion	Total displacement of the tooth out of the socket
Bridge	A dental prosthesis replacing missing teeth. Involves preparation of adjacent teeth
Caries	Tooth decay
Cementum	The outermost layer of the root
Closed apex	Apical foramen < 1 mm
Crown	That portion of the tooth which is visible in the mouth
Extra-alveolar period	Time the tooth is out of its socket
Extirpate pulp	Removal of pulp tissue
GIC	Glass Ionomer Cement
MTA	Mineral Trioxide Aggregate
Open apex	Apical foramen > 1 mm
Periodontal ligament	Connective tissue which attaches the root to the alveolar bone
Periodontal disease	Diseases of the supporting structures of the tooth
Pulp	The connective tissue in the central portion of the tooth
RCT	Root canal treatment
Regeneration	Process of replacement of lost or injured cells, tissues or organs
Repair	The physical or mechanical restoration of damaged tissues, especially the replacement of dead or damaged cells in a body tissue or organ by healthy new cells
Replantation	The procedure of placing the avulsed tooth back into its socket
Root	That portion of the tooth that is embedded in the alveolar bone
Sinus orifice	An opening for discharging pus
Splint	An appliance to stabilise/immobilise teeth
Storage medium	Solution in which the avulsed tooth is stored prior to replantation

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