Management of the avulsed permanent tooth.  
A review of current guidelines

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Received July 2016. Accepted following peer review August 2016. Published August 2016

JISHANT 2016:1

Introduction

Avulsions of the permanent dentition occur in up to 3% of all dental injuries and are most common in children in the mixed dentition.

These injuries can prove costly, not only in financial terms of the long term care required but also, as it is the upper anterior teeth that are often involved this can affect aesthetics during the adolescent period of a child’s development. This may have psychological implications.

Even though a replanted permanent tooth may not survive in the long term, it may nevertheless maintain a satisfactory level of supporting alveolar bone for future oral rehabilitation and keep future treatment options open.

Failure to replant an avulsed permanent tooth may be met with complaints from patients, or even litigation. Therefore, it is usually best to attempt replantation whenever possible, although it is important to be mindful that there are sometimes specific contraindications.
What guidance exists?

Although knowledge with regard to the pathology and subsequent clinical outcomes of this injury have improved markedly there is still a lack of level 1 evidence. Existing guidelines have therefore been mostly based on consensus opinion using the best evidence available. These include:


- Dentaltraumaguide.org http://www.dentaltraumaguide.org/Permanent_Avulsion_Treatment.aspx

- British Society of Paediatric Dentistry http://bspd.co.uk/Portals/0/Public/Files/Guidelines/avulsion_guidelines_v7_final_.pdf


- Dentaltraumauk.org http://www.dentaltrauma.co.uk/Public/Injured+teeth.aspx
How do these guidelines differ?

These guidelines are generally in agreement as to how to manage avulsed teeth.

Telephone advice and initial management are the same, although storage solutions and the use of antibiotics may differ.

A variety of splinting techniques are described.

The timing of further assessments and treatment are similar in all guidelines. These depend on the history and initial management of the tooth – namely how long the tooth has been out of the socket, with or without storage medium. The latter gives an indication of the condition of the periodontal ligament cells. The maturity of the root apex is also another important consideration.

In addition to the contraindications to replanting a tooth (advised in the IADT guidelines), the BSPD, Toronto group and Oral Health Malaysia guidelines also advise not to implant very immature permanent teeth with a wide-open apex and a short root.

Generally, the take home message is to replant an intact permanent tooth as soon as possible.
Initial management of tooth avulsion at time of injury (telephone advice)

Pick up tooth by crown (white, flat end)

Do not touch the pointed end of the tooth

Rinse in milk/saline or cold running water briefly

Put it back into socket

Ask patient to bite on rolled up handkerchief

Attend local dentist or emergency department immediately

If replantation is not possible, gently place the tooth in a vessel containing a suitable storage medium – milk, physiological saline or saliva, but not water. Holding the tooth within the cheek or lip has also been described – but only if the patient is cooperative enough to do so.

Attend local Dentist or Emergency department immediately.
**Initial Assessment by Emergency team**

If not already replanted, the tooth must be placed in physiological saline whilst a full history and thorough clinical examination are undertaken.

Ascertaining the time of injury, time of implantation and or storage will help to determine prognosis.

If there is any history of loss of consciousness, vomiting or amnesia, the possibility of a head injury must be investigated and excluded by the Emergency department team.

If the mechanism of injury was significant, there may be concomitant facial, skull and C-spine injuries, which require further evaluation.

A thorough medical history should be taken to ensure that replantation is not contraindicated e.g. Congenital cardiac defects, immunosuppression. Take note of any drug allergies and the patient’s tetanus status.

If a missing tooth or fragments cannot be accounted for, aspiration must be ruled out with a chest x-ray. Soft tissue x-rays can be performed to assess suspected embedded tooth fragments if visual examination is inconclusive.

If the injuries are extensive and require thorough debridement, treatment may be better delivered with a general anaesthetic.

Beware of discrepancies between history and clinical findings, or delay in presentation, as these may indicate non-accidental injury. If there are safeguarding concerns, it will be necessary to discuss these with your local Safeguarding team or Paediatricians.

During this time it is important to advise the parent (and child) with regard to current and future management and potential prognosis, ideally written information should be given and written consent taken.
Contraindications to replanting an avulsed tooth

Primary tooth

Where other severe injuries take preference

When replantation would place the patient at risk e.g. the immunocompromised patient, those with congenital cardiac defects

Where the tooth is diseased or fractured

An immature permanent tooth with prolonged and dry extra-alveolar time

If the tooth has already been replanted prior to arrival

Leave the tooth in place

Clean the area gently with water / saline spray

Suture any gingival lacerations

Verify the correct position of the replanted tooth clinically and radiographically

Apply a flexible splint for up to 2 weeks.

If the tooth has not been replanted at the time of injury

Pick up tooth by crown (white, flat end)

Do not touch the pointed end of the tooth

Gently clean the root surface with a stream of saline

Store in saline whilst you prepare the socket by submerging tooth in a small amount of storage medium

Administer local anaesthesia to the area

Irrigate the socket with saline, suck out any debris or large blood clots.

Examine the socket – if there is a fracture of the socket wall – reposition it with a suitable instrument.
Replant the tooth back into the socket slowly with slight digital pressure only.

Gently squeeze the bony walls of the socket around the tooth

Suture gingival lacerations if present

Verify the correct position of the tooth clinically and radiographically

Ask patient to bite on a rolled up handkerchief / gauze whilst you measure up a flexible splint against the arch.

Alternatively click here: http://www.dentaltrauma.co.uk/Public/Self-help+videos.aspx

If the patient is an uncooperative child, it may be necessary to replant the tooth under sedation; or admit for general anaesthetic treatment.
Further management

This is dependent upon the maturity of the root and the extra oral ‘dry time’

**Tooth with a closed apex:**

1a. If tooth has been stored in an appropriate storage medium and /or stored dry for < 60 minutes - as above; splint tooth for 2 weeks.

1b. If the dry time is >60 minutes the technique for delayed replantation is as above BUT – remove attached non-viable soft tissue carefully; consider root canal treatment later; splint the tooth for 4 weeks.

**Tooth with an open apex:**

2a. If tooth has been stored in an accepted storage medium and/or stored dry for <60 minutes – as 1a.

2b. If the dry time is >60 minutes – as 1b.

**Splinting a replaced tooth**

A step by step guide can be found at [http://www.dentaltraumaguide.org/Permanent_Avulsion_Treatment.aspx](http://www.dentaltraumaguide.org/Permanent_Avulsion_Treatment.aspx)

The aim of flexible splinting is to maintain the tooth in correct position, provide patient comfort and improve function, using the adjacent teeth.

Replaced teeth are now most commonly splinted with flexible wires and dental filling materials. Filling material can also be used as a continuous bridge without the wire if needed. Orthodontic brackets and wire can also be used.

The wire should span across the replaced tooth and two teeth either side (provided these teeth are stable). In reality, it may encompass more teeth in order to splint to a stable tooth.

Measure a suitable length of wire (orthodontic wires or a paper clip).

Bend the wire to the shape of the row of teeth. Check that the position of your planned splint will not interfere with the patient’s occlusion.
Pack the labial sulcus with cotton wool rolls to isolate the area and control moisture in the area. It is extremely challenging to keep the moisture under control, but without this, the dental filling materials will not bond to the teeth.

Apply dental acid etch for 30 seconds to the front surfaces of the teeth you want to splint (including the replaced tooth).

Wash and dry the teeth to remove the etchant. Teeth can be washed with water from a syringe and dried with a suction tip or air in a syringe. When the etchant has been removed, the teeth will have a frosted appearance.

Apply primer and bonding agent to the areas that have just been etched. Alternatively, all in 1 etch-prime-bond agents may be available.

Light cure these teeth for 20-30 seconds. If the light cure is unavailable, an overhead operating light can usually cure the bonding agent, but at a slower pace.

Line the wire up along the midpoints of the teeth to be splinted.

Apply a small amount of dental composite filling material to each tooth to be splinted. Apply some composite to the wire ends to prevent irritation from the sharp ends to the soft tissues

Light cure for 20-30 seconds

Gently check that the splint is stable and doesn’t slide off the teeth.

It is important that the gingival margin remains easy to clean.

Advice to patient on discharge

Avoid participation in contact sports.

Soft food for up to 2 weeks.

Brush teeth with a soft toothbrush after each meal.

Use a chlorhexidine (0.1 %) mouth rinse twice a day for 1 week.

Prescribe a course of antibiotics if there is clinical need.

See their Dental surgeon as soon as possible as close follow up is imperative.
Written information of treatment undertaken should be given to the parent to give to their Dental surgeon.

**Some general points to note – from our experience**

It is crucial to get tooth replanted as soon as possible. The time out of mouth should ideally be <60 minutes.

The decision to replant is usually the correct decision unless one of the listed contraindications is met.

For efficient splinting, stock orthodontic wires and brackets, wire cutters, paperclips, composite filling material, dental cotton wool rolls in a ‘dental trauma box’. Also consider the use of local haemostats - where bleeding can contaminate and impede setting of a composite splint e.g. silver nitrate sticks, local anaesthetic with adrenaline etc.

Keep calm and remember you are replacing a tooth. Your patient the will most likely by traumatised by the events. With the use of local anaesthesia, this is actually quite a simple procedure and not particularly painful.

This is nigh on impossible to do well on your own and a second pair of hands makes this a lot easier.

Accepted August 2016

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