

## **DENTAL INJURIES: A FIELD-SIDE GUIDE FOR PARENTS, ATHLETIC TRAINERS AND DENTISTS**

The person *least* likely to be present when a non-professional sports injury occurs is a dentist. With the exception of a knocked out tooth, the long-term outcomes of dental injuries are not affected by lack of on-site care as long as a dentist provides treatment within 6-12 hours. Ideally, treatment will take place as soon as possible but there may not be a dentist present or the athlete may be away from home. This guide will help caregivers determine if the athlete can wait for treatment by his/her family dentist or if treatment should be sought within hours.

### **What and When:**

**Immediate:** (less than 5 minutes)

Completely knocked out permanent tooth

**Emergent:** (less than 6 hours)

Primary tooth injuries

Permanent tooth driven into the jaw, extruded partially from the jaw, pushed out of alignment, root fracture

**Urgent:** (less than 24 hours)

Chipped/fractured teeth with/without a fracture that exposes the nerve

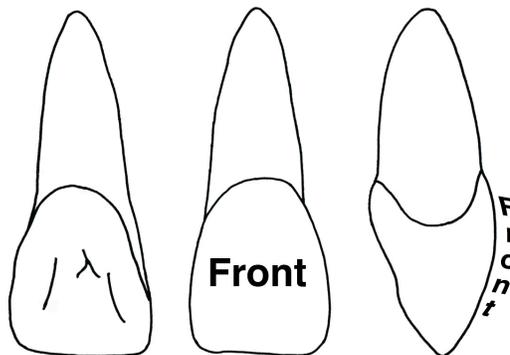
Tooth loosened or tender to touch

### **Immediate Treatment: Who and How?**

Treatment by any person present:

***Completely knocked out permanent tooth***

Ideally a caregiver and injured person will work together to achieve an immediate (<5 minute) replantation. If the root of the tooth has debris on it, rinse the root with water. If the root appears clean, grasp the crown between your thumb and first finger with the smooth flat surface forward.



If it is an upper tooth place the other hand on top of the person's head to stabilize it then push firmly and hold the tooth in place. Sustained pressure is required to move blood that has accumulated in the socket. When the tooth is seated into its original position, it must be held there by hand or with a wad of wet tissue to keep it from extruding from the socket. Do not worry about getting the tooth in 'correctly' it can be adjusted by the dentist later during splinting. Intraoral/lip bleeding can usually be controlled by uninterrupted direct pressure for 5 minutes by any caregiver.

If no one at the scene of the accident is prepared to replant the tooth, if the injured patient is unwilling or unable to cooperate with immediate replantation, or if the damage to the socket and adjacent teeth is substantial; control bleeding with pressure, place the tooth in liquid such as milk or water (preferably iced) to keep it from drying and transport the patient and tooth to a dentist.

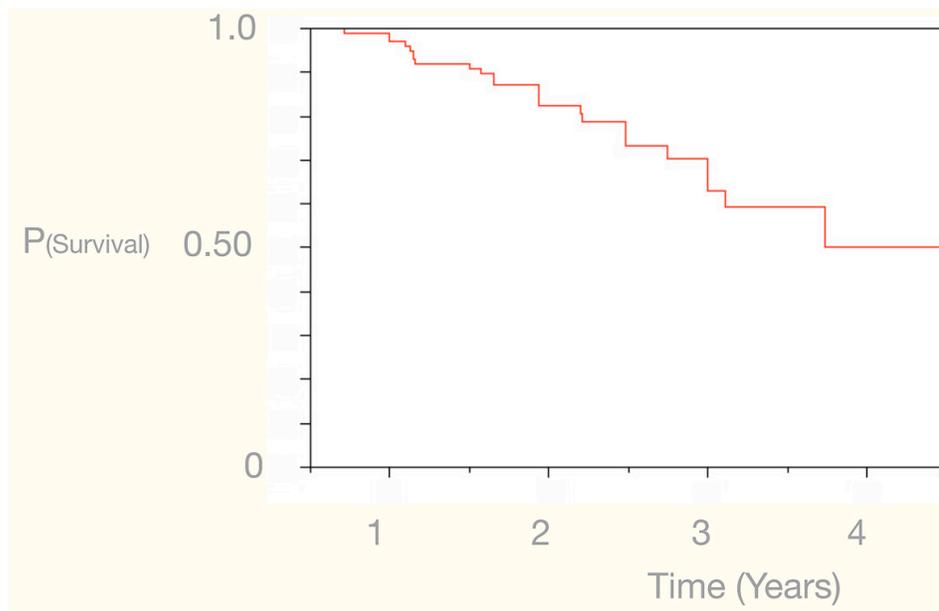
### Immediate Treatment: Why?

There is a solid body of evidence that identifies immediate (within 5 minutes) replacement (replantation) as the most important factor for long-term survival of knocked out (avulsed) teeth.(1-5) Two other factors of importance are removal of the dental pulp by a dentist within a few days and the patient's age at the time of injury.(5-7,8,10)

Beyond 5 minutes, storage/transportation in milk, saliva, commercial solutions will keep the avulsed tooth from drying but survival is determined by factors just described rather than choice of transport liquid.(2-4,6,8) This represents a variance from guidelines and protocols that ignore the overwhelming importance of time out of the jaw (as a free graft) on the ability to regenerate periodontal ligament (PDL) on the root surface. The consequence of healing by repair rather than regeneration of PDL is development of root resorption, fusion of the tooth to bone (ankylosis) and eventual tooth loss. Indeed, a primate study was described where replantation within 4 minutes demonstrated PDL regeneration in two-thirds of the teeth but that dropped to one-third beyond 5 minutes.(1) In a separate study only half of the teeth showed PDL regeneration if replanted between 5 and 10 minutes.(8) A functional PDL is essential (for survival) to prevent root resorption and ankylosis but this is not assured even with immediate replantation.

Most people do not realize that a tooth should be replanted as quickly as possible.(9) Less than one-half of a sample of caregivers who were surveyed knew that the proper way to remove debris from the root of an avulsed tooth was with cold running water (either tap or clean bottled water).(9) If a tooth has been out of the mouth more than 15 minutes there is no reason for an on-site caregiver to replant the tooth as its long-term outcome has already been determined.(5-8) The tooth should accompany the patient to the dentist for the replantation decision. Teeth can be replanted many hours after avulsion but they will eventually be lost due to the effects of root cell (PDL) damage. Replanted teeth of preadolescents have shorter survival than those of young adults.(7,10) The parents/patient will make the decision whether to replant the tooth or to remove a recently replanted tooth based upon information supplied by the dentist.

Avulsed permanent teeth pose a unique challenge to caregivers. This is the only dental injury where immediate management affects outcomes. A survey of physical education teachers, school nurses, swimming pool attendants and parents of teenagers showed that 80 per cent would not want to replant an avulsed tooth, principally due to lack of knowledge and training.(9) While most dental injuries occur at home, many occur at school and at sporting events. Dentists need to educate and empower caregivers to replant avulsed teeth on the rare occasion this injury occurs. Immediate replantation can have positive lifelong consequences for tooth survival. This graph shows that survival of teeth replanted beyond 5 minutes in pre-adolescents and adolescents is much worse than for young adults (combined Toronto-Belfast data, 2002).



### **Emergent Treatment (< 6 hours by a dentist) How?**

These injuries can be treated by a dentist over a period of hours without affecting tooth survival or changing outcomes.(11)

**Primary tooth injuries** Pain and bleeding that accompany primary tooth injuries is often the reason for a rapid visit to a dentist and immediate attention. However, primary teeth can be treated within 6 hours without changing their long-term outcomes. Analgesia and a night's sleep can make the treatment much less unpleasant for young children who damage their primary teeth by falling or colliding while at play.

[www.sickkids.ca/dentistry](http://www.sickkids.ca/dentistry) Resources, Clinician Information, Primary Tooth Trauma

#### **Permanent tooth:**

***Driven into the jaw***

***Extruded partially from the jaw***

***Pushed out of alignment***

***Root fractured***

While it is common sense that any dental injury should be treated as soon as possible for the comfort of the patient, it is less clear whether emergent treatment actually affects long-term outcomes of displaced teeth, crown fractures or fractured roots.(11) Patients usually present to a dentist within hours of such injuries and this is appropriate. Caregivers and parents are not used to seeing oral bleeding and this often drives their decision to go to a hospital/emergency clinic rather than attempt to contact their family dentist.

These injuries are sufficiently serious to affect a player's performance. If a dentist is in attendance s/he can freeze the teeth, move them back into place and splint them. If the athlete is stabilized this way s/he can complete the game without affecting long-term outcomes of these injuries.

[www.sickkids.ca/dentistry](http://www.sickkids.ca/dentistry) Resources, Clinician Information, Permanent Tooth Trauma, Extruded Permanent Tooth, Luxated Permanent Tooth, Avulsed Permanent Tooth, Intruded Permanent Tooth

[www.sickkids.ca/dentistry](http://www.sickkids.ca/dentistry) Resources, Parents/Caregivers Information, Broken Root, Knocked Out Permanent Tooth Info, Partially Knocked Out or Extruded Permanent Tooth Info, Displaced Permanent Tooth Info

### **Emergent Treatment: Why?**

Root fractures, intrusions, extrusions and teeth pushed out of alignment need to be treated by a dentist. The longer the tooth is left out of alignment the harder it will be to move it to its original location due to formation of blood clot(s) in the socket. Severe intrusions may need to be extracted and almost all teeth in these categories will require splinting. A dentist can record medical and dental data (12), administer local anesthetic, reposition a tooth or teeth and place a splint at the sporting event or in a dental office or clinic a few hours later without affecting outcomes.

A splint is constructed to keep the tooth or teeth in the new location in the arch following repositioning. Depending upon the injury the splint may stay in place between 10 days and 3 months.

### **Urgent Treatment (<12 hours by a dentist) How?**

#### ***Delayed replantation of avulsed permanent tooth***

[www.sickkids.ca/dentistry](http://www.sickkids.ca/dentistry) Resources, Clinician Information, Permanent Tooth Trauma, Avulsed Permanent Tooth

[www.sickkids.ca/dentistry](http://www.sickkids.ca/dentistry) Resources, Parents/Caregivers Information, Knocked Out Permanent Tooth Info

#### ***Chipped/fractured permanent teeth with/without a pulp exposure***

These teeth will be sensitive to touch, hot and cold and should be treated as soon as possible. However, treatment 12 hours after the crown fracture will not affect long-term outcomes. Restoration requires local anesthetic and dental treatment. If tooth fragments can be found, they may be reattached to the crown of the tooth.

### ***Teeth loosened or tender to touch***

No dental treatment required. The dentist will collect baseline clinical and radiographic information.(12)

### **Urgent Treatment: Why?**

If an avulsed tooth is not replanted immediately then delay of up to 12 hours will not affect either outcomes or survival. Consequently, the 'rush to replant' that was part of avulsion management is no longer supported by evidence. The average duration between avulsion and replantation at one metropolitan hospital was approximately 2 hours.(7) Family decisions have to be made regarding replantation and treatment of associated injuries. Removal of necrotic pulp tissue and conventional endodontic treatment is the most important dentist-controllable variable and evidence supports this treatment either prior to replantation or within 2 weeks.(5,6)

Crown fractures (the most common injury) with or without pulp exposure are sensitive to hot and cold but can be treated within 12 hours without any effects on outcomes. In fact, pulp exposures can be treated by a pulpotomy technique (CaOH<sub>2</sub> or MTA) for up to two days without long-term effects.(11) Incisors can be *temporarily* restored with glass ionomer cement or, for longer-term restorations the dentist may use the original tooth fragment or composite resin.

Teeth that are loosened or tender to touch are not treated nor are root fractures unless there is displacement of the tooth. Apical and mid-root fractures will heal without splinting whereas coronal root fractures pose a variety of problems and complicated treatment options. The dentist will assess the vitality of the dental pulp at 6 weeks and then periodically, usually in association with recall visits.

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