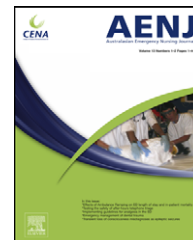




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CLINICAL PRACTICE UPDATE

Emergency management of dental trauma[☆]

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Summary Dental first aid is both simple and inexpensive and can dramatically improve future dental outcomes; however, it is rarely appropriately provided. We provide a simple guide with instructions and images and links to further resources.

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Introduction

It has been estimated that in the industrial world by the age of 14 years 54% of children and by the age of 25 years 60% of adults have suffered some dental trauma. This equates to 3 billion individuals or 60 million new injuries per year¹. A recent systematic review of dental trauma found that one third of all preschool children have suffered dental trauma involving the primary dentition, one fourth of all school children and almost one third of adults have suffered a trauma to the permanent dentition, but variations exist both between and within countries². While males suffer an

increased rate of dental trauma, research suggests that it is lip closure, mouth guard use, socio-economic status and the activities of a person and the environment are probably more determining factors of dental trauma than gender and age³ and that there is also an impact of treatment of dental trauma on the quality of life (QoL) of the individual²

Acute morbidity from dental injury includes pain, swelling, bleeding and infection. Long-term morbidity arises from the need for cosmetic and functional tooth replacement which may cost the patient thousands of dollars. Dental first aid is both simple and inexpensive and can dramatically improve future dental outcomes; however, it is rarely appropriately provided. It has been documented that only 4% of emergency treatments provided by hospital doctors would be deemed appropriate for something as simple as an avulsed tooth⁴, and a recent study concluded that dentists in Australia may not be competent in providing appropriate care for traumatic dental injuries⁵. By simply covering and protecting an exposed pulp in a crown fracture or by the simple repositioning and splinting of a

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Box 1 Emergency dental kit contents

- GC Fuji IX pack (glass ionomer cement powder + liquid + mixing pad)
- Dycal (Ca(OH)₂ base + catalyst)
- Microbrush applicators
- Record book to record type of trauma repair, which tooth and patient details
- Emergency Dental Handbook

luxated or avulsed tooth, dental outcomes may be dramatically improved.

In an effort to address the deficiency in dental trauma management, over 100 dental kits have been distributed by the NSW Rural Doctors Network in NSW and interstate to rural hospital EDs. The contents of the kit are listed in **Box 1**. These kits are to support dental education workshops (collaboration between Sydney West Area Health Service Oral Health Network and the University of Sydney Faculty of Dentistry) which involve four hours of training in the management of dental emergencies and is being delivered across several Australian States to emergency medical personnel. The effectiveness of this education is being evaluated using validated pre-post workshop questionnaires. Preliminary results involving 140 participants (includes doctors, nurse practitioners and medical students) during 2009 showed a highly significant improvement in post workshop knowledge relating to their management of dental emergencies including dental trauma. A more recent development by the Australian College of Rural and Remote Medicine has been the inclusion of the "Introduction To Dental Emergencies" module to be delivered using their RRMEO platform due for release in early 2010. In addition, in NSW discussions are underway for the nurse practitioner to expand their role in managing dental emergencies, including facial swellings and dental trauma, in view of the fact that they can prescribe antibiotics as well as administer local anaesthetic in parts of the body including the mouth.

Trauma to the teeth falls into two broad categories¹: first, injuries to the hard dental tissues of the mouth and includes both complicated and uncomplicated crown and crown-root fractures and second, injuries to the periodontal or supporting tissues of the teeth and includes tooth subluxation (loosening), luxation injuries where tooth displacement has been involved and tooth avulsion. The most frequent type of injury is a simple crown fracture of the maxillary central incisors in the permanent dentition while injuries to the periodontal tissues were more common in the primary dentition³.

Assessment and management

The ultimate goal of any dental emergency treatment is to re-establish normal tooth position together with normal function. In the absence of specialised dental personnel to manage dental trauma, appropriate first aid treatment for common dental trauma presentations may be provided by using simple equipment and techniques as out-



Figure 1.

lined below and summarised in **Table 1**. Information and resources relating to ED management of dental trauma can be found on the Emergency Dental Management Online website (www.edmo.net.au).

Assessment of the injured tooth or teeth initially involves clinical inspection, palpation and radiographic examination. This assessment should establish the number of teeth involved in the injury, the whereabouts of any dental fragments that may be missing as well as an understanding of whether primary or secondary teeth are involved.

Emergency management of uncomplicated crown fractures

If <2 mm tooth structure is missing, no intervention is necessary (**Fig. 1**). However, if >2 mm tooth structure is missing but no pulp (red centre) exposed either leave alone or cover with Blu Tack as first aid or with GIC (cement) if available (**Fig. 2**).

Treatment of complicated crown fractures

Complicated crown fractures are where the pulp has been exposed (**Fig. 3**). The exposed pulp and fractured tooth is covered using Blu Tack after drying. If available, calcium



Figure 2.

Table 1 Dental trauma descriptions (permanent teeth) and ED treatment.

Fracture type	Characteristics	ED treatment
Enamel fractures	Usually <2mm of tooth surface involved	Nil
Crown fractures involving dentine	Dentine is more yellow compared to the peripheral enamel Patient feels thermal/tactile sensitivity Usually >2mm of tooth lost but no 'red pulp' visible in centre of fracture	Treat by covering fracture surface with glass ionomer cement Keep built-up surfaces clear of opposing teeth when patient closes mouth completely
Crown fractures with exposed tooth pulp	'Red pulp' visible in centre of fracture	Give local anaesthetic (LA) (27-gauge needle available) if patient conscious. Pain from pulp would be similar to that of a compound fracture Flush exposed pulp surface with saline then stop haemorrhage with small cotton or gauze swab Cover 'red pulp' only with calcium hydroxide (Dycal) Once set, cover all of fracture surface with glass ionomer cement and keep free of the occlusion
Root fractures	Difficult to treat	For fracture level <5mm below gum, discard coronal tooth segment and cover any accessible exposed pulp with calcium hydroxide then glass ionomer cement on top For deeper fractures, reposition coronal piece of tooth and splint
Intrusive luxations	OPG radiograph to be ordered	If patient is adolescent or younger (jaws still growing) and intrusion is 3 to 6 mm or if intrusion is <3 mm (at any age) leave alone. If intrusion is greater than 6 mm in a child or is more than 3 mm in an adult reposition tooth with firm pressure using either forceps, large needle holders or even pliers (Refs: Gungor et al., Immediate surgical repositioning following intrusive luxation: a Case report and review of the literature. 2006.) Kenny et al., Avulsions and intrusions: the controversial displacement injuries. 2003.) Follow level and contour of adjacent teeth to help in repositioning Splint first then treat any crown fractures as described earlier
Extrusive luxations	OPG radiograph to be ordered	Give LA. Using fingers, grab extruded teeth and surrounding alveolus then reposition teeth and attached bone all together. After repositioning, splint with attention to bite relationship
Lateral luxations	Nearly always has alveolar bone fracture also present. OPG radiograph to be ordered	Same as for extrusive luxations.
Avulsions		Best if done within a few hours of injury Give LA Clean tooth and socket using saline but don't touch the root surface Insert tooth into socket. Use adjacent teeth as a reference and take care it doesn't interfere with occlusion Splint with glass ionomer cement



Figure 3.

hydroxide may be placed over the exposed pulp followed by GIC (Fig. 4).

Treatment of luxation injuries

Basic treatment principles include not repositioning deciduous teeth. Deciduous teeth are primary or baby teeth. Usually leave them alone or if very mobile and there is an inhalation risk, extract them. When treating permanent tooth injuries, give local anaesthesia when appropriate and reposition both teeth and surrounding bone. Ensure the patient is able to close their back teeth fully together after teeth have been repositioned. Splinting is done using either Blu Tack with thick aluminium foil or using GIC if available. An example of emergency management of luxated teeth is demonstrated in Figs. 5 and 6. The teeth should first be accurately repositioned using the adjacent teeth position as a guide. When completing the repositioning of the teeth, be sure that the patient can fully close their back teeth together. After repositioning the luxated teeth they should be splinted against adjacent sound teeth using GIC alone all or GIC and fine wire. Other useful emergency splints include the use of the patients orthodontic retainer or mouthguard if available.



Figure 4.



Figure 5.

Treatment of avulsion injuries

Avulsed teeth should be stored in cold milk during transport and re-implanted as soon as possible. Milk has an osmolality most similar to human blood and therefore helps maintain the vitality of the periodontal ligament cells which line the root of the tooth and which are critical for the tooth reattaching back to the socket. Milk is in fact better than saliva since saliva has a large bacterial load. Other suitable transport media include egg albumin and physiological saline. An avulsed tooth is not to be placed in the side of the cheek as was suggested some years ago since several children ended up swallowing these teeth.

If an avulsed tooth has been inappropriately stored dry for more than 1 hour, reimplantation should not be attempted. It is estimated that after 1 hour very few if any periodontal ligament cells are still alive on the root surface to allow the tooth to reattach. In addition, an avulsed deciduous (primary) tooth should never be re-implanted. This is because in trying to replace the deciduous tooth back into the socket there is the likelihood of damage to the developing permanent tooth which lies at the base of the socket just above the deciduous tooth. The tooth socket should be irrigated with saline. The avulsed tooth is handled only by the crown portion so as not to damage the periodontal ligament cells on the root surface which are essential to successful reattachment. The avulsed tooth is rinsed under running water to remove any gross debris then inserted back into the socket. Once the tooth is correctly positioned the



Figure 6.

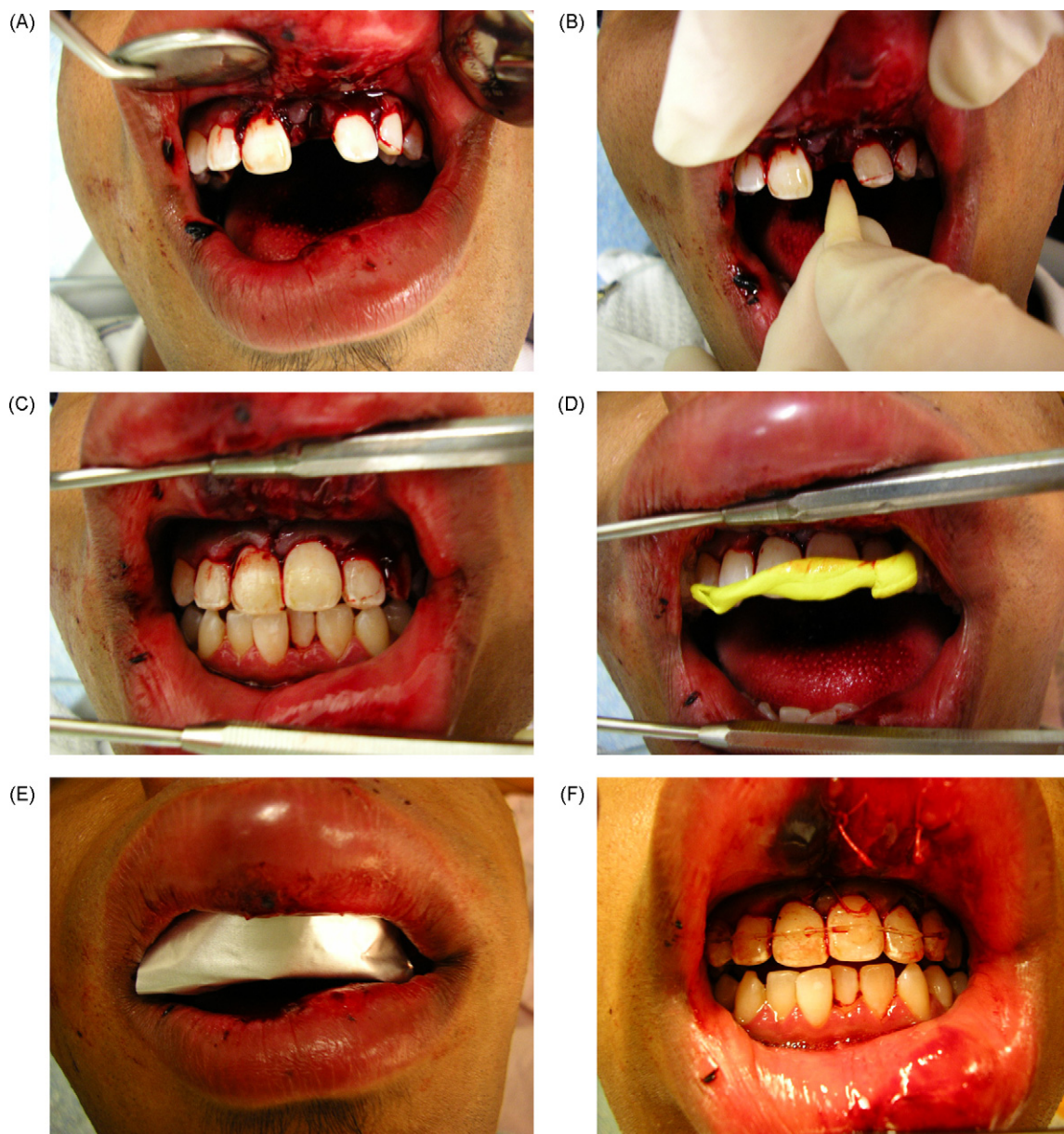


Figure 7.

patient should be able to completely close their back teeth together. Then the tooth should be splinted by using Blu Tack with foil on top or GIC, if available (Fig. 7A–F).

Summary

Dental injuries are a common presentation to the ED, particularly among multi trauma patients. Special attention should be given to the trauma principles of clearing and maintaining a patent airway, stabilising the cervical spine, oxygenation and controlling haemorrhage. The goal of treatment is life, function, and then cosmetic repair. The ultimate goal of any dental emergency treatment is to re-establish normal tooth position together with normal function. In the absence of specialised dental personnel, appropriate first aid as described in this chapter is important and decreases dental costs, complications and pain.

References

1. WHO. *Application of the international classification of diseases to dentistry and stomatology ICD-DA*. 3rd ed. Geneva: World Health Organization; 1994.
2. Glendor U. *Epidemiology of traumatic dental injuries—a 12 year review of the literature*. *Dent Traumatol* 2008;24(6):603–11.
3. Elisa B, Bastone EB, Freer TJ, McNamara JR. *Epidemiology of dental trauma: a review of the literature*. *Aust Dent J* 2000;45(1):2–9.
4. Holan G, Shmueli Y. *Knowledge of physicians in hospital emergency rooms in Israel on their role in cases of avulsion of permanent incisors*. *Int J Paediatr Dent* 2003;13:13–9.
5. Yeng T, Parashos P. *Dentists' management of dental injuries and dental trauma in Australia: a review*. *Dent Traumatol* 2008;24(3):268–71.