

Managing dental trauma in general practice

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Patients with dental trauma present to general practice clinics or emergency departments for several reasons, including being outside regular dental practice hours and living in communities with poor dental services. Managing acute presentations promptly and facilitating referrals to dental professionals are important to optimise patient outcomes.

The presentation of dental pathology, including dental trauma, to general practice clinics and emergency departments in Australia is not uncommon, with many patients, particularly in service-poor communities, opting to present to medical professionals rather than private dental surgeries for management.¹ Reasons for patient presentations to medical professionals, particularly within rural and service-poor communities, include the timing of presentation outside of regular dental practice hours, lack of a regular managing dentist, affordability, lack of private health insurance and location of trauma.¹

Presentations to medical professionals for the management of dental pathology make up nearly 1% of all emergency department presentations, with about 66% of these presentations attributed to dental trauma.² Hence, an understanding of the acute management required for dental trauma is essential for medical professionals. This article provides guidance on the key diagnostic features of dental trauma to allow for appropriate communication and timely management, before referral to dental professionals for definitive management.

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KEY POINTS

- Many patients who sustain dental trauma present to GPs or emergency departments, especially in service-poor communities.
- Dental trauma commonly presents as fractures, luxations or avulsions and may be associated with significant maxillofacial trauma that can be life threatening.
- Bony maxillofacial fractures, large facial lacerations or active uncontrolled bleeding should prompt acute referral to a local emergency department for appropriate surgical opinion and management.
- Panoramic radiographs can help exclude serious pathology and dentoalveolar trauma.
- Local anaesthesia, such as local area infiltration and inferior alveolar nerve blocks, are typically sufficient to manage discomfort in general practice.
- GPs must be equipped to create temporary dental splints to stabilise a patient's dentition until definitive management by a dental practitioner.

Dental anatomy of relevance

Medical practitioners should have a basic understanding of childhood primary (deciduous) dentition and adult permanent dentition to recognise dental trauma and appropriately communicate to patients. The permanent dentition contains 32 teeth, with the primary dentition limited to 20 teeth; these are each split into four quadrants (Figure 1). A mixed dentition refers to the transition period between complete primary and complete permanent dentition, when a child or adolescent has a combination of both primary and permanent teeth. The naming of the teeth within the respective dentitions follows the Fédération Dentaire Internationale notation in Australia.

The classification of dental trauma requires an understanding of the anatomical structure of the tooth (Figure 2). The outermost hard layer of the crown of a tooth, the enamel, covers another hard layer, the dentine, which extends to form the root. Within the dentine is the pulp, a neurovascular tissue that is responsible for neural sensation of the tooth. The tooth is retained in its tooth socket within the alveolar bone, a thickened ridge of bone on the jaw, by the periodontal ligament. Knowledge of these structures and of the distinction between the tooth crown and root guides classification and communication surrounding dental trauma, in addition to determining the treatment that may be required.

History taking

Of relevance to patient cosmesis and function, injury of the anterior dentition is the primary site of injury in both the primary and permanent dentition.³ A thorough history should be completed following an initial primary survey of a patient

1. CASE STUDY: A 16-YEAR OLD BOY WITH DENTAL TRAUMA

A 16-year-old boy presents at your rural medical practice 45 minutes after sustaining a head-to-knee collision during a weekend rugby match. His mother reports that he collided with another player and there was no loss of consciousness.

On examination, you find no clinical signs of significant maxillofacial trauma or facial lacerations. However, examination of his oral cavity reveals a missing central incisor, with the adjacent central incisor appearing anteriorly displaced compared with the adjacent dentition. His mother has the missing incisor sitting in a cup of milk.

The patient's mother requests dental first aid until definitive dental treatment can be provided by the local dentist the following day.

What treatment, if any, was acutely required, prior to his presentation to his local dentist? See Box 2.

presenting with dental trauma, considering the association of dentoalveolar trauma with other maxillofacial injuries.⁴ Key types of history relevant to the management of dentoalveolar trauma include, but are not limited to:⁵

- a basic trauma history, including how the trauma occurred, any associated loss of consciousness and the presence of vomiting, nausea, amnesia or confusion
- a dental trauma history, including time since the trauma occurred, time of any tooth being out of its socket, storage medium for the avulsed tooth, potential for wound contamination, reported occlusal changes and recovery and inhalation or ingestion of tooth fragments
- a basic dental history, including missing teeth prior to the trauma, a history of previous trauma, orthodontic

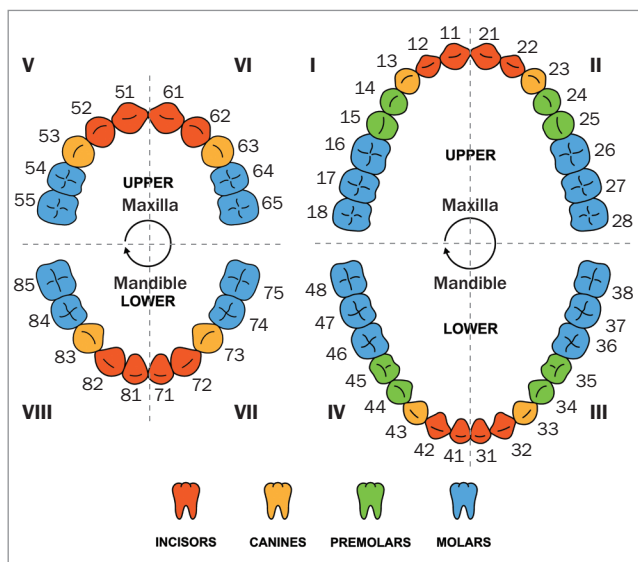


Figure 1. Primary dentition (left) and permanent dentition (right) with Fédération Dentaire Internationale notation.

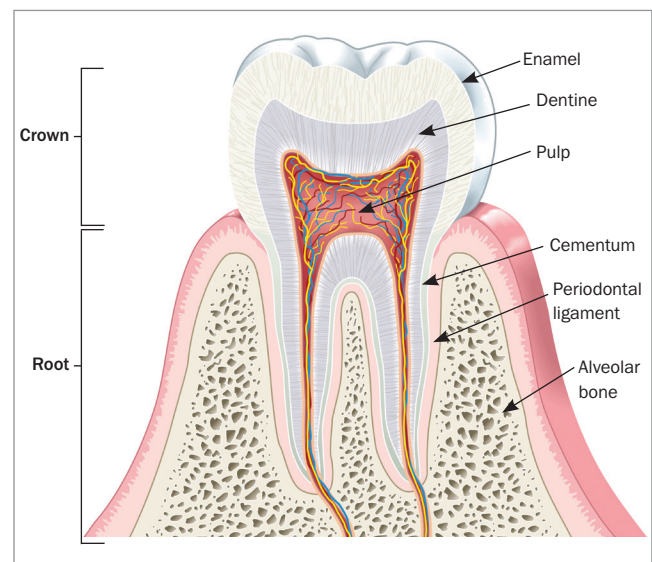


Figure 2. Basic dental anatomy. Each tooth contains three hard tissues (the enamel, dentine and cementum) and one soft tissue (the pulp).

2. CASE STUDY CONTINUED: MANAGEMENT OF AVULSION AND LUXATION

The patient presented in Box 1 has two forms of dental trauma: avulsion and lateral luxation.

You perform acute dental first aid. With permission from the patient's mother, you anaesthetise the area using lignocaine via local infiltration. You then attempt reimplantation of the avulsed central incisor into its anatomical socket, with digital manipulation of the adjacent luxated central incisor into its anatomical socket, and construct a basic splint.

The patient and his mother should be educated on the need for acute dental follow-up within 24 hours of the injury.

history and previous restorative work

- tetanus vaccination status.⁶

Of note, dental trauma, particularly with repeated presentation, may be the first sign of interpersonal violence or abuse. As such, it is important to collect appropriate clinical records, including clinical photographs, in the setting of dental trauma.

Clinical examination

Dental trauma may be associated with significant maxillofacial trauma. Thus, a primary survey should be completed early within a clinical examination to identify potentially life-threatening injuries. On examining the oral cavity in the context of dental trauma, a simple yet systematic 'outside-in' approach is used.⁵

- **Step 1.** Extra-oral assessment: assessments of the mandible and maxilla integrity and associated soft tissue
- **Step 2.** Intra-oral soft tissue assessment: assessments of lip and buccal mucosal lacerations and associated tooth fragments within lacerations; gingival tears and bleeding; and vestibular, sublingual or palatal bleeding, ecchymosis or oedema
- **Step 3.** Intra-oral hard tissue assessment: assessments of alveolar

bone continuity and fractures, missing or displaced dentition with associated mobility, and changes in occlusion.

The identification of bony maxillofacial fractures, large facial lacerations or active uncontrolled bleeding should prompt acute referral to a local emergency department for appropriate surgical opinion and management. A case study outlining the examination of a patient with dental trauma is presented in Box 1.

Radiographic assessment

Intra-oral radiographs are the mainstay of assessment for dental trauma; however, because of poor accessibility at general practice clinics and emergency departments, their use is limited. Panoramic radiographs are helpful in the assessment of dentoalveolar trauma and localisation of tooth fragments within surrounding soft tissue. Additionally, the use of chest x-rays in the setting of suspected aspiration should be considered.

[Splinting] should only be used when patients will proceed to acute and definitive management by a dental professional

Permanent dentition trauma: types and management

The management of dental trauma requires identifying the type of injury.⁶ The International Association of Dental Traumatology has developed many guidelines to aid diagnosis and management.⁷ Additional resources, such as those developed by the Australian Dental Association, are also accessible to medical professionals when encountering cases of dental trauma.

The Table outlines key dental trauma presentations, including fractures, luxations and avulsions, and describes management approaches appropriate for medical professionals and definitive

dental management approaches.⁸ These approaches allow appropriate communication to patients regarding the next stage in treatment following acute dental first aid.

General management principles

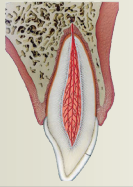
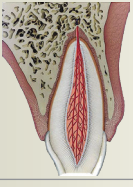
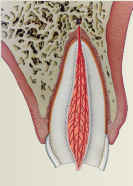
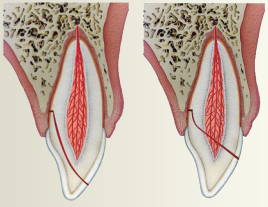


Dental trauma is typically associated with significant discomfort, with manipulations of tooth position causing further discomfort. As a result, appropriate intra-oral local anaesthesia techniques are required for the management of dental trauma presentations, including soft tissue lacerations. Techniques such as local area infiltration and inferior alveolar nerve blocks are typically sufficient for all management required within general practice. Local anaesthetic agents such as lignocaine, articaine and bupivacaine are suitable for intra-oral use, with lignocaine routinely available within all medical practices.

Following the provision of initial treatment, all patients should be counselled about consuming a soft food diet until reviewed by a dental professional. This should be supplemented with further postoperative management, including analgesia and prophylactic antibiotics, and the consideration of adjunctive mouthwashes, such as saline or chlorhexidine, to prevent infection before a dental review. The management approach for the case in Box 1 is presented in Box 2.

Splinting techniques




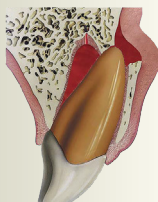
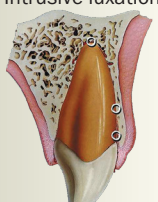

Splinting serves to stabilise a patient's dentition after manipulation or replantation following trauma and, as such, should extend to include adjacent teeth with confirmed stability.^{9,11} Simple splinting techniques include the use of aluminium foil or blue-tac moulded to the affected dentition; however, these techniques should only be used when patients will proceed to acute and definitive management by a dental professional. A more complex alternative is the use of malleable metal from a Hudson mask secured with skin glue.⁶ Regardless of the technique

TABLE. KEY DENTAL TRAUMA PRESENTATIONS FOR PERMANENT TEETH^{6,8-10}

Type of trauma	Definition	Clinical features	Management	Definitive dental management
Enamel infraction ⁸ 	Incomplete fracture limited to the enamel structure of the crown without a loss of tooth structure	Typically asymptomatic; minor enamel fractures may be visualised	No management required	Aesthetic management of infraction lines may be required in the setting of staining
Uncomplicated crown fracture, enamel or enamel-dentine fracture ⁸ 	Fracture limited to either the enamel or enamel and dentine of the crown, with a subsequent loss of tooth structure; no pulpal exposure	Visible loss of tooth structure with absence of any pulpal exposure; typically asymptomatic with no tooth mobility	Radiography to rule out loss of the fragment into the surrounding soft tissue; appropriate localisation of the fragment and referral to a dental practitioner for aesthetic restoration	Aesthetic restoration of enamel and dentine defect with pulpal therapy as indicated
Complicated crown fracture, enamel-dentine-pulp fracture ⁸ 	Fracture extending through the enamel and dentine of the crown with concurrent pulpal exposure and a loss of tooth structure	Visible loss of tooth structure with pulpal exposure; no tooth mobility; pulpal exposure is typically associated with increased sensitivity to stimuli	Radiography to rule out loss of the fragment into the surrounding soft tissue; appropriate localisation of the fragment and referral to a dental practitioner for pulpal and restorative therapy; application of a calcium hydroxide paste to the exposed pulp if a dental trauma kit is available	Pulpal therapy and subsequent restorative therapy
Crown root fracture ⁸ 	Fracture extending through the enamel, dentine and root cementum, with or without pulpal involvement	Fracture line typically extends below the gingival margin, with the coronal fragment typically retained; coronal segment is mobile relative to the root segment; tooth is typically tender	Stabilisation and splinting of the coronal segment until referral to a dental practitioner	Pulpal therapy as indicated, and restorative reconstruction of the defect associated with a possible loss of the fragment
Root fracture ⁸ 	Fracture of the tooth limited to the dentine, pulp and cementum of the root structure of the tooth	Coronal segment is often mobile or displaced with tenderness on examination; gingival bleeding may be noted	Repositioning of the displaced coronal segment, ideally with radiographical confirmation of the position, with stabilisation and splinting of the tooth; often requires intra-oral radiography for a definitive diagnosis	Prolonged stabilisation, and pulpal therapy of the coronal segment as indicated
Alveolar bone fracture ⁸ 	Fracture of the supportive alveolar bone around the tooth and possibly adjacent teeth	Visible bone deformity of the alveolar bone, bone segment mobility with possible movement of the associated dentition; displaced dentition associated with the alveolar bone segment; associated gingival lacerations	Repositioning of the bone segment and associated dentition with suturing of the associated soft tissue lacerations; stabilisation of the dentition with a splint until referral to a dental professional	Prolonged stabilisation, and pulpal therapy of the coronal segment as indicated, with placement of a definitive splint

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TABLE. KEY DENTAL TRAUMA PRESENTATIONS FOR PERMANENT TEETH^{6,8-10} continued

Type of trauma	Definition	Clinical features	Management	Definitive dental management
Concussion ⁸ 	Symptomatic presentation following trauma without clinical tooth damage or movement from the anatomical position	Tender to percussion, without mobility or displacement in the socket	No treatment required	Ongoing monitoring with no treatment required
Subluxation ⁸ 	Symptomatic presentation including tenderness and mobility following trauma without clinical tooth damage or movement from the anatomical position	Tender to examination with associated mobility, without displacement in the socket	Splinting for patient comfort until referral to a dental professional	Ongoing monitoring with short-term splinting for patient comfort
Extrusive luxation ⁸ 	Extrusive displacement of the tooth from its socket	Appearance of elongation of the suspected tooth relative to the adjacent teeth, with associated mobility	Repositioning of the tooth into the correct anatomical position within its socket; stabilisation and splinting	Ongoing monitoring with short-term splinting for patient comfort, with associated pulpal therapy
Lateral luxation ⁸ 	Lateral displacement of the tooth from its socket	Tooth is positioned laterally towards the palate or the buccal or labial tissue; typically associated with fracture of the alveolar bone and subsequent trapping of the tooth, yielding limited tooth mobility	Repositioning of the tooth and alveolar bone into the correct anatomical position; appropriate stabilisation and splinting	Ongoing monitoring with short-term splinting for patient comfort, with associated pulpal therapy
Intrusive luxation ⁸ 	Intrusive displacement of the tooth in its socket	Appearance of shortening of the suspected tooth relative to the adjacent teeth, with immobility	Intrusive luxation <3 mm requires no therapy, with greater intrusive luxation to be managed by a dental professional via orthodontic or surgical means	Pulpal therapy following orthodontic or surgical repositioning with splinting completed
Avulsion ^{6,9} 	Complete displacement of the tooth from its anatomical socket	Absence of the tooth in its socket, with bleeding or haemostasis likely visible in the socket; associated alveolar bone fracture is possible	Anatomical replantation of the tooth into its socket ideally <60 min after avulsion, with limited direct contact with the tooth root surface, followed by splinting; if the tooth surface is soiled, place under running cold water for 10 seconds without agitation; if providing telehealth advice, recommend replantation immediately to minimise time out of the socket; if tooth storage is needed before replantation, use milk, patient saliva or suitable commercial storage agents (e.g. Save-a-tooth), avoiding storage in water; prescribe prophylactic antibiotics (e.g. amoxicillin) after replantation	Pulpal therapy following replantation with splinting

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selected, such splints serve to provide temporary support until a definitive splint can be constructed by the patient's dental practitioner.

Primary dentition trauma: management

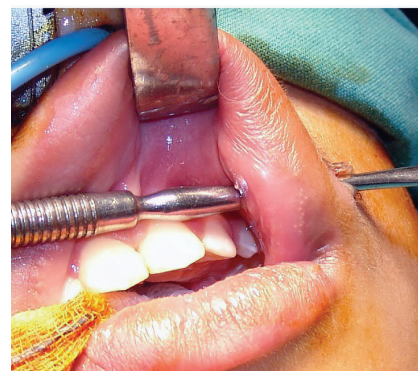
Similar management is required for complicated and uncomplicated crown fractures, alveolar bone fractures and tooth concussions in the primary dentition as in the permanent dentition.¹¹ However, the management of crown root fractures and luxations is different because of the greater depth of permanent dentition compared with the deciduous dentition. This management is often nonemergent, and patients routinely require medical referral to dental professionals for definitive management.¹¹ Regarding avulsions, primary teeth should not be replanted.¹¹

Soft tissue trauma

Common intra-oral soft tissue injuries associated with dentoalveolar trauma include gingival and mucosal lacerations. In the setting of concurrent loss of the tooth structure, the examination of lacerations should aim to ensure no foreign bodies, such as tooth fragments, are retained within the soft tissue before closure of the injury.

The principles of management of oral soft tissue trauma are similar to those for such injuries in the extra-oral environment, including haemostasis and primary closure of significant lacerations with ongoing bleeding, or that are likely to cause significant cosmetic or functional defects. Dental trauma may be associated with other maxillofacial presentations, including extra-oral lacerations. Referral to appropriate tertiary services, such as oral and maxillofacial or plastic surgery, for the definitive management of facial lacerations of significant functional and cosmetic importance should be considered.

Awareness of contamination with foreign bodies and the oral microbiome



Figures 3a and b. Soft tissue trauma to the mouth. a (left). Extra-oral appearance of soft tissue laceration. b (right). Continuity of intra-oral and extra-oral surfaces associated with trauma.

should guide antibiotic selection and the consideration of tetanus prophylaxis.⁶ Figures 3a and 3b show soft tissue trauma extending from the intra-oral to the extra-oral surface, requiring appropriate wound decontamination followed by closure.

Conclusion

The presentation of dental trauma to medical professionals is not uncommon in Australia, particularly within service-poor communities. Dental trauma commonly presents as fractures, luxations or avulsions, which may lead to further maxillofacial trauma. As a result, the timely management of acute presentations with subsequent appropriate referral is important in optimising patient outcomes. **MT**

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COMPETING INTERESTS: None.

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