

Management of Trauma

Purpose

This clinical guideline aims to provide public oral health clinicians with a clinical decision pathway for management of dental trauma.

Evidence-based clinical guidelines are intended to provide guidance, and are not a standard of care, requirement, or regulation. However, the application of clinical guidelines in publicly-provided oral health services allows for consistency to occur across large patients cohorts with a variety of oral health clinicians.

This Clinical Guideline aims to provide guidelines for the management of acute dental trauma. This includes the initial examination and record keeping, treatment and follow-up appointments. The types of trauma that are described include crown and root fractures, luxation, intrusion, extrusion and avulsion injuries as well as fractures to the alveolar processes, injuries to the primary dentition and soft tissue injuries. It will also detail expected sequelae and clinical management (Ref: www.dentaltraumaguide.org).

Guideline

Examination of traumatized patient

The first step in examination of a patient who has sustained dental trauma is to ensure that there are no medical problems requiring immediate management. This could mean an immediate referral to an acute medical facility prior to the provision of any dental care. If this is not required, then it is best to wash the patient's face (if applicable) and gain an initial examination of the injury.

Questions

The following questions should be asked and clearly documented in the patient's record:

- Are there any neurological symptoms (eg. headache, nausea, vomiting, period of unconsciousness)?
These are signs of brain concussion and indicate that urgent medical attention is required. However, they do not preclude stabilising immediate emergency dental management such as quickly replanting and splinting an avulsed tooth, or suturing oral lacerations. Relevant medical history (completion of standard DHSV questionnaire)
- When did the injury occur?
The answer implies a time factor, which may affect the choice of treatment.
- How did the injury occur?
Will indicate which area of the mouth is more likely to have been traumatized.
- Where did the injury occur?
May indicate whether there is likelihood of contamination of the wound. May also have legal implications.
- What is the patient's history of tetanus immunisation?
- Is there any disturbance in the occlusion/bite?
An incompetent bite may be indicative of tooth luxation or jaw fracture.
- Has there been previous injury to these teeth?
- Is there are reaction of teeth to hot/cold?
- General dental history

Within the Royal Dental Hospital of Melbourne (RDHM), form DR30 Accident Form is used for recording details regarding more severe accidents/trauma

Clinical Examination

The following tests should be performed at the clinical examination and the results clearly documented:

- Extraoral, including an assessment for a through-and-through laceration, as this may be the decider as to whether the child needs to be referred to RCH
- Gait.
- Neurological – speech, focus, dizziness, nausea.
- Bruising, other injuries.

Intraoral

- Examination of soft tissues, with emphasis on possible presence of foreign bodies and degloving injuries
- Examination of teeth involved and neighbouring teeth including those in opposing arch, including locating lines of infraction if present.
- Mobility testing of all teeth involved and neighbouring teeth including those in the opposing arch, as well as the surrounding hard tissue structures.
- Percussion and palpation testing with a finger or handle of metal instrument to assist in determining whether the injury involves intrusion, lateral luxation or damage to periodontal ligament.
- Pulp testing with CO₂ of teeth involved, acknowledging that pulp testing at the time of injury is unreliable and may not be possible due to patient being distressed. However, it should be attempted as it establishes a baseline, especially for adjacent/neighbouring teeth that are not apparently directly involved in the initial trauma.

Radiographs:

- In cases of soft tissue injuries (to lips), a radiograph of the area (labial to the teeth) at 25% normal exposure time will assist in identification of embedded foreign bodies.
- In the case of trauma to the anterior region, an occlusal exposure radiograph is useful especially for both tooth displacements as well as fracture of teeth and/or alveolar bone with supplemental periapical films where required.
- Two periapical radiographs should be taken at different vertical angles to ensure that a root fracture is not missed.
- As a complicating factor, anterior trauma may also result in more posterior bony trauma, such as subcondylar head fracture. In all severe trauma cases, an OPG radiograph [or facial CTs (where possible)] and other extra-oral films should be considered in order to better review the facial bones.
- Trauma to posterior teeth, which may have an associated jaw fracture, is best diagnosed with the assistance of an OPG, although this may not be possible if there are no facilities for external radiography. If not, bite-wing radiographs and multiple periapical films are indicated. In addition, a no. 4 (occlusal) film may be useful. If clinical examination suggests the possibility of significant jaw fracture, immediate referral to an appropriate institution for external radiography is required.
- In the cases of more complex trauma, including lateral luxation, intrusion, extrusion or root fracture, up to 4 films may be required (occlusal, periapical central, mesial excentric, distal excentric).

Types of injuries and treatment options – Permanent Teeth

Crown fracture

These injuries are the most frequent in the permanent dentition and are usually the result of a frontal impact. Apart from loss of hard tissue, this type of trauma can represent a

hazard to the pulp. Always ask to see the fractured tooth fragment as it may be possible to re-attach.

Enamel fractures

In some situations, selective grinding of the incisal edge may be sufficient, or, depending on the extent and location of the fracture, restoration with composite resin (CR) may be required.

Fractures of enamel and dentine

Restoration of these fractures is always required to seal off dentinal tubules and restore aesthetics. If there is no pulp exposure, use of a glass ionomer cement (GIC) lining under a CR restoration is usually the preferred option. In some situations, especially if there is pulpal involvement, a concomitant luxation injury or lack of patient cooperation, a temporary restoration such as GIC or a temporary crown and bridge material (eg. Protemp®) may be indicated. In all situations, use of rubber dam is advised and where there is involvement of pulpal tissue, its use is essential.

If the **crown fragment is still intact**, its re-attachment may provide a good aesthetic result. If possible, the tooth fragment should be stored in physiological saline or tap water to avoid dessication and minimise discolouration. In the case of an uncomplicated fracture (no pulpal involvement), enamel on both fractured surfaces should be bevelled to increase available surface area for bonding, then etched for 30 seconds with acid etchant. After washing and drying, the preferred bonding agents are to be applied to both surfaces according to the manufacturer's instructions. A thin mix of CR should be applied to both fracture surfaces and polymerised on both aspects of the tooth. It is also possible to reinforce the fracture site by using a round diamond bur to create a double chamfer margin 1mm coronally and apically to the fracture line. This defect is then etched, bonded, restored with CR and polished with discs.

In cases of **complicated fractures** where pulpal tissue is involved, treatment depends on whether maintenance of pulpal vitality is possible and the restorability of the tooth. Generally, a more profound crown fracture of a mature tooth requiring extensive restorative treatment is more likely to require pulpal extirpation than a less profound fracture in a young individual where there has been no damage to the periodontal ligament (PDL). In the latter situation, where the tooth can subsequently be restored with CR, a partial pulpotomy (Cvek pulpotomy) is the treatment of choice. Follow-ups of **complicated crown fractures** are generally desirable 1, 2, 3 and 12 months post-injury.

Partial (Cvek) pulpotomy – used for traumatic exposures of the pulp and consists of amputation of approximately 2 mm of the pulp under a copious water spray. Haemostasis should be allowed to occur spontaneously, however slight pressure may be applied with sterile cotton pledget soaked with local anaesthetic solution containing adrenaline, if required. The site should then be covered with a non-setting calcium hydroxide paste (Pulpdent) or Mineral Trioxide Aggregate (MTA). If non-setting calcium hydroxide is used, it should be covered with polycarboxylate cement and followed with GIC and the tooth restored. If MTA is used and tooth discolouration is noted (in anterior teeth this is common but unpredictable) internal bleaching can be successful once a hard tissue barrier is formed. The Cvek pulpotomy has an excellent success rate and should be considered for all teeth with open apices with traumatic exposures where maintenance of pulpal vitality is possible.

Crown-root fracture

Diagnosis

Most of these fractures occur as a result of a horizontal impact and generally consist of a single fracture line. Clinical diagnosis is apparent when the coronal fragment is mobile. Radiographic diagnosis is sometimes difficult especially in the lingual/palatal aspect, due to the fracture line often being perpendicular to the central radiographic beam. Two

radiographic views are recommended. Crown-root fractures may or may not involve the pulp.

Treatment

Palliative treatment may be provided initially and would involve stabilisation of the tooth via rigid splinting, especially if there is little time available to provide care and the patient is in pain. Treatment should consist of removal of the fragment and if possible, simple restoration. If the pulp is involved, endodontic treatment (partial pulpotomy or extirpation depending on the extent of fracture) may be required. In more complex crown-root fractures, where the fracture line is below the gingival margin, referral of the patient to a specialist paediatric dentist, or endodontist is indicated in the first instance

Specialist Services at the Royal Dental Hospital of Melbourne (RDHM) will most likely be required. Possible treatment options include:

- Reattachment of the coronal fragment if still intact and isolation is possible (described in 3.1.2)
- Removal of coronal fragment and restoration above the gingival margin.
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- Removal of coronal fragment and surgical or orthodontic extrusion of the root;
- Root burial to retain alveolar bone height, or
- Extraction of tooth

Horizontal Root fracture

Diagnosis

These fractures often result from a horizontal blow and often require more than one radiographic view to diagnose (see 2.2). Healing depends on whether the pulp has been severed and whether or not bacteria have invaded the fracture line. Treatment becomes more complex when the coronal portion of the tooth has been displaced and must be subsequently repositioned or reimplanted.

Treatment

To facilitate pulpal and periodontal healing, it is essential that the displaced coronal portion be optimally repositioned and that rigid splinting be maintained for approximately 12 weeks. Splinting is not always required if the fracture is in the apical third and the coronal fragment is not displaced nor mobile.

Follow-up

The major factors that determine pulpal prognosis are the stage of root development at time of injury and dislocation of the coronal tooth fragment. Healing by hard tissue union is ideal, albeit uncommon, however connective tissue healing is still acceptable and most likely.

Radiographic examination and pulp testing should be carried out at the time of injury, 3 weeks, 6 weeks and 6 months after the injury. It should be noted however that negative sensibility testing at the time of injury does **not** imply that the pulp is non-vital.

Radiographic findings may be divided into:

- **Normal healing** – where the healing of the fracture has taken place through union with hard tissue or by interposition of connective tissue from the periodontal ligament.
- **Resorption within the root canal** – this will originate at the fracture line and will eventually result in healing by interposition of connective tissue. No treatment is required although follow-up is desirable.
- **Resorption within bone on both sides of the fracture line** – this is an indicator of pulp necrosis (together with a negative pulp test response), usually of the coronal

portion and requires pulp therapy. This requires extirpation of the necrotic coronal portion of the pulp only to the fracture line, interim dressing with calcium hydroxide (or an MTA apical plug) and finally restoration with gutta percha (GP) of the portion of the root canal that is coronal to the fracture line. Successful endodontic treatment will lead to healing with interposition of connective tissue.

- **Pulp canal obliteration** – this is evidenced by obliteration of the coronal and apical portions of the tooth root and interposition of connective tissue between the fragments. In this situation, no treatment is generally required.

Should pulpal necrosis occur, as evidenced by bone resorption at the level of the fracture, calcium hydroxide paste (Pulpdent ®) should be used as an interim dressing material. After hard tissue closure of the fracture line, as evidenced via radiographs, the coronal portion should be filled with GP or MTA in some instances.

Concussion and subluxation

Teeth that are concussed are tender to percussion due to inflammation in the PDL, whereas teeth that have been subluxated are tender to percussion, abnormally loose and have evidence of bleeding from the PDL. Treatment generally consists of advising a soft diet.

In some instances, non-rigid splinting of the tooth may be required to minimise patient discomfort. This does not promote healing and should be removed after 2 weeks, unless dictated otherwise by other more serious injuries. See page 6, table 1 for clinical findings with different types of luxation.

Extrusion and lateral luxation

Diagnosis

Extrusion and lateral luxation generally damage both the pulp and the PDL. A lateral luxation is often the result of a horizontal impact forcing the crown palatally and the apex labially. An extruded tooth is usually very loose and kept in place by gingival fibres. For these injuries, occlusal films and periapical paralleling films are useful.

Clinically, the laterally luxated tooth has the crown displaced horizontally and may emit a high metallic sound when percussed indicating displacement of the root apex through the labial cortical plate.

Treatment

In both extrusion and lateral luxation, optimal repositioning of the tooth subsequent to trauma, healing in the PDL and pulpal revascularisation will affect the prognosis. Treatment generally involves teeth being repositioned with digital pressure and splinted (flexible wire splint). In mature teeth suffering luxation, generally endodontic treatment is required.

Follow-up

The splint can be removed 7-10 days after extrusion whereas prior to splint removal in lateral luxation, a radiograph should be taken to confirm healing. In rare cases where the marginal bone temporarily breaks down prior to healing, the splint should be left intact for up to 2 months. If external inflammatory resorption is evident radiographically (together with a negative pulp test response), endodontic treatment should be commenced and calcium hydroxide should be used as an interim root canal dressing.

Generally, the prognosis of teeth sustaining these types of injuries is greatly influenced by root maturity at the time of injury. The risk of damage to the pulp is high in cases where the teeth have mature roots.

Intrusion

Diagnosis

Intrusion generally results in the tooth being driven into the alveolar process due to an axially delivered force. Diagnosis is generally dictated by the horizontal height of the incisal edge of the tooth, however this is sometimes difficult to ascertain in a young person with a

mixed dentition. Healing is generally complex due to extensive injury to both the PDL and the pulp, with a high risk of inflammatory resorption. The majority of cases result in pulpal necrosis.

A percussion test will determine whether an intruded tooth is erupting (dull tone) or locked into bone (high metallic sound). See table 1, page 6. Up to 4 radiographic views may be required for appropriate radiographic assessment.

Treatment

Treatment principles for intruded teeth depend upon the stage of root development. In cases of immature root formation, spontaneous eruption may occur. The amount of crown visible should be noted in the patient record so that eruption can be carefully monitored. In these cases, if spontaneous eruption is not observed after 6-8 weeks, orthodontic repositioning may be required.

Pulpal healing should be periodically monitored radiographically, that is, 2, 4 and 6 weeks, and 3 months and 6 months post injury. If there is evidence of inflammatory root resorption, the necrotic pulp should be extirpated as soon as possible, and the tooth dressed with calcium hydroxide as a temporary measure.

Almost 100% of mature teeth experience pulpal necrosis following intrusion injuries, thus pulpal extirpation is usually required. If it is impossible to access the pulp chamber at this stage because of the degree of intrusion, the tooth may need to be first repositioned. The pulp should be extirpated within 2 weeks, using calcium hydroxide as an interim dressing material. The tooth can be filled with GP once the PDL has healed as evidenced radiographically.

Follow-up

Ankylosis may become apparent in teeth up to 10 years following an intrusion injury. Therefore, follow up including continuous radiographic and clinical monitoring is advised. Many teeth that have sustained intrusion injuries will demonstrate progressive root resorption.

Table 1: Clinical findings following luxation injuries

	Concussion	Subluxation	Extrusion	Lateral Luxation	Intrusion
Abnormal mobility	-	+	+	- (+ rarely)	- (+ rarely)
Tenderness to percussion	+	+ (- rarely)	+ / -	- (+ rarely)	- (+ rarely)
Percussion sound	normal	dull	dull	metallic	metallic
Response to pulp testing	+ / -	+ / -	- (+ rarely)	- (+ rarely)	- (+ rarely)
Clinical dislocation	-	-	+	+	+

Avulsion

Diagnosis

Avulsion of permanent teeth occurs most frequently when teeth are immature. The prognosis depends on the extra-alveolar time and the medium in which the tooth has been stored prior to replantation. Essentially, the shorter the time the tooth is out of its socket, the better the prognosis. Ideally, a replanted tooth will re-establish gingival attachment, periodontal revascularisation and pulpal revascularisation within a week. Repair will be delayed when there is physical damage or bacterial contamination of either pulp or PDL, or both. Damage to either of these is evidenced by inflammatory resorption or ankylosis.

A contraindication to replantation would include congenital heart conditions,

immunosuppressed patients, periodontally compromised teeth, deciduous teeth.

Treatment

Treatment alternatives following avulsion of permanent teeth are:

- **Immediate replantation** – in all cases where the tooth has been out of its socket for no more than 60 minutes and has been stored in physiological media including, milk, saliva and saline. Plastic food wrap may be used in the absence of suitable media.

Delayed implantation –Where the dry extra-alveolar period is greater than 60 minutes, the prognosis of the periodontal ligament is very poor depending on the age of the patient and degree of development of the tooth. Implanting the tooth should still be performed but planning for alternative prosthetic replacement should be carried out in consultation with the Prosthodontic and Endodontic Units. In the case of young patients, even with progressive replacement resorption, procedures such as root burial and submergence can be considered. It is essential that an endodontic opinion is sought for such scenarios.

Administration of LA is preferable prior to treatment, but not essential if there is no concomitant alveolar fracture and patient compliance is a problem. Generally, prior to replantation, the socket should be flushed with saline to remove the blood clot. The tooth should also be rinsed with saline without handling the root. The tooth should be replanted with slight to medium digital pressure. The socket must NOT be curetted.

A flexible splint should be placed to allow the replanted tooth some physiological and functional movement. See section 6.0 Splinting. The avulsed tooth should be splinted to two teeth on either side. The splint should be removed after 7-10 days to minimise the likelihood of ankylosis, however if there is excessive mobility it may be necessary to leave the splint on for another week. Endodontic treatment can be performed with the splint in place.

Antibiotics may be prescribed or administered (1000mg Amoxycillin immediately and 500mg qid thereafter for 10 days or another broad spectrum antibiotic if Penicillin allergy exists). Tetanus prophylaxis should be assessed in accordance with immunisation status of the patient.

Follow-up

In a tooth that has been replanted immediately, that has complete root formation (apex less than 1 mm diameter and evidence of advanced canal maturity), the pulp should be extirpated immediately prior to splint removal. The root canal should generally be dressed with calcium hydroxide (Pulpdent ®).

If the apex is greater than 1 mm in diameter, pulpal revascularization, although still unpredictable, is possible and should be monitored weekly during the month immediately following replantation, for signs of infection and/or resorption. For Children, up to the age of about 10years, it is prudent to review closely rather than hastily extirpating the pulp.

Replanted teeth require frequent follow-up at regular 2 weekly intervals depending on root development and any healing complications that may have been diagnosed. Radiographic examination at 2 weeks will allow diagnosis of inflammatory resorption, periapical radiolucency and other signs of pulpal necrosis. In these situations, fortnightly radiographs are advisable. Generally, follow-up appointments at 6 weeks, 3 months and 6 months after injury are advised, with mobility and percussion testing being carried out at each visit. A high metallic sound and decreased mobility are both indicative of ankylosis, however this should be confirmed radiographically. Pulp sensibility tests should be performed periodically if the pulp has not been extirpated.

Fracture of alveolar process

Diagnosis

Fracture of the alveolar process relates to total alveolar fracture. Partial alveolar fracture of either labial or palatal plate have been considered in sections relating to lateral luxation. Radiographic diagnosis may sometimes be difficult and differential diagnosis may include root fracture and multiple radiographs are often required.

Clinical examination often will provide details regarding the extent of the fracture when testing mobility, as several teeth may move. Haematoma is also often evident adjacent to the fracture.

Treatment

Usually consists of repositioning and splinting for 4-8 weeks. However, there are often complicating dental factors, particularly lateral luxation where the apices of teeth are locked into position. If the apices of teeth are directly in line with the fracture, pulpal healing may be compromised; often pulp testing will not elicit a response but definitive pulpal diagnosis must rely on clinical and radiographic findings because pulp vitality is defined by blood supply not pulp test response.

Referral

Referral to the Oral Surgery, Endodontic or Specialist Paediatric Departments at the Royal Dental Hospital of Melbourne is advisable.

Injuries to Primary Dentition

Injuries to the primary dentition are common. As the bone is generally resilient, most injuries are tooth luxations. The major concern in injuries to the primary dentition is possible damage to the permanent dentition, resulting both from direct impact to the developing permanent tooth germ as well as injury related to inflammation of the displaced primary tooth. Treatment is often dictated by possibility of damage to the permanent dentition, in particular if the follicle of the permanent tooth has been disturbed by the primary tooth. In this situation, extraction of primary teeth is the treatment of choice.

Diagnosis

Clinical and radiographic examination are required. Adult intervention (e.g. assistance with lap-to-lap examination) may be needed for smaller and younger children to enable appropriate examination and treatment if required. Radiographic interpretation of intruded primary teeth is important – the primary tooth that has been intruded facially appears *foreshortened* and the primary tooth that has been intruded palatally and therefore appears to have invaded the permanent tooth follicle appears *elongated*. Generally a film size number 2 is indicated.

Treatment

Crown fractures

Smoothing of the fracture is the treatment of choice (if indicated) in cases of fracture of enamel only and of both dentine and enamel. If there is a clinical pulpal exposure and the child is cooperative, a pulpotomy may be performed but generally extraction is indicated.

Crown/root fractures

Extraction is generally the treatment of choice.

Root fractures

As patient cooperation is often poor, it is frequently best to do nothing unless there are signs of pain and/or infection or mobility. In these cases, extraction of the coronal portion of the tooth is indicated, and the root left to be resorbed physiologically as the permanent tooth erupts.

Extrusive luxation

Extraction is generally the treatment of choice.

Lateral luxation

This is the most common type of injury to the primary dentition. Unless the luxated tooth is interfering with occlusion, no treatment generally is required as the tooth is displaced away from the developing permanent tooth germ. If the tooth however, is displaced towards the follicle of the permanent tooth or mobile, extraction is indicated (see 4.1 above).

Intrusion

Generally, due to the angle of impact, intruded anterior incisors will have been forced through the labial plate. Spontaneous re-eruption of these teeth may occur within 1 to 2 months. However, these should be monitored for usual signs of infection (pus, swelling, abscess formation, fever). Radiographically, these teeth appear foreshortened in an occlusal radiograph. If the teeth appear elongated, there is the possibility of intrusion into the permanent tooth germ. Therefore, careful forceps extraction is necessary during removal to minimise damage to the developing permanent teeth. If there is no sign of re-eruption after 4 to 6 weeks, the tooth should be extracted as it is most likely ankylosed. Primary teeth intruded more than half the length of the clinical crown rarely re-erupt and should be removed.

Discoloured deciduous teeth as a result of luxation or intrusion, that are without signs or symptoms (pus, swelling, abscess formation, fever or pain) may generally remain in situ without treatment.

Avulsion

Replantation of primary teeth following avulsion should not be performed as there is a risk of injury to the permanent developing tooth follicle. Radiographic examination of this is essential to ensure that the lost tooth has not been intruded.

Follow-up

All trauma to the primary dentition resulting in tooth displacement should be followed up, with the exception of the situation where the tooth has been extracted. Radiographic and clinical examination is advised 1, 2 and 12 months post injury.

Soft Tissue Injuries

Diagnosis

A large number of cases of dental trauma result in some injury to soft tissues, involving the gingiva, the lip and other oral mucosa. The nature of the injury (abrasion, contusion, laceration or loss of tissue should be determined) and careful consideration given to the presence of foreign bodies and/or tooth fragments. In deeper wounds, radiographic examination may be required (see 2.2)

Treatment

Treatment consists of wound cleansing and debridement, and repositioning and suturing of displaced tissues, including removal of foreign bodies. Tetanus prophylaxis should be considered for contaminated wounds.

Gingival wounds

Abrasion, laceration and separation (degloving) from the neck of the tooth are possible sequelae to trauma. Treatment of abrasion will generally involve removal of any foreign bodies. Treatment of laceration injuries should be carried out after LA has been administered and teeth have been repositioned. When multiple teeth are involved, sometimes treating/suturing the laceration first makes tooth repositioning easier.

The wound should be cleansed, foreign bodies removed and gingivae repositioned and kept in place by a number of fine sutures (4/0 monocryl). The patient should be instructed to rinse with 0.1% chlorhexidine solution for 4 to 5 days up to the time that sutures are removed. Exposed bone should be debrided during the emergency management procedure. If, however, any bone, especially in the case of the labial plate is left exposed, it should be noted that healing will be protracted and involve gingival retraction and possibly sequestration of exposed bone. Excellent oral hygiene will assist in optimising healing of damaged gingiva.

Laceration of lips

For cases of serious laceration of the lips, i.e. through-and-through laceration, or shallow but crossing the vermillion border, referral of the patient to the Oral and Maxillofacial Surgery Department of the RDHM or to the Emergency Department of an acute medical facility is often the best course of action as failure to remove foreign bodies and appropriately suture may cause scarring and disfiguration of the lips. The principles of treatment involve removal of foreign bodies, haemorrhage control and wound closure with fine sutures (5/0 monocryl sutures).

Foreign bodies

Presence of foreign bodies will significantly increase likelihood of infection and rate of healing. Their removal is carried out under LA and may involve use of saline irrigation, gauze swabs, small excavators or even a surgical blade. Radiographic identification of foreign bodies is essential (except in cases of wood or cloth which will not be apparent radiographically) and their removal registered radiographically after retrieval.

Splinting

Rationale

Splinting is required where the tooth and/or alveolar process has been sufficiently traumatised and there is a requirement for the teeth to be stabilised for a given period of time. In addition, it may be used occasionally to assist patient comfort.

In general, non-rigid splinting is more appropriate in most situations (except for root fractures) as it allows some physiological movement of the tooth during healing and therefore promotes healing of the PDL and faster revascularisation of the pulp. Rigid splinting is sometimes used in cases of alveolar trauma. However, current literature would suggest that a flexible splint applied for a shorter period of time appears to reduce risk of ankylosis or replacement resorption. For the case of root fractures other than in the apical 1/3 or 1/2 of the root rigid fixation is recommended for a period of 3 months.

Technique and materials

Materials:

- Etch only the enamel surface where the composite resin will be placed (spot etching will aid easy removal of the splint and minimizing damage to tooth structure), bond, CR and flexible orthodontic wire (In the absence of flexible (eg. NiTi or SS) orthodontic wire, another flexible medium such as nylon fishing line will suffice) or
- Etch, temporary crown and bridge material (Protemp ®)
- Non-prescription Orthodontic brackets and wire

Technique:

- Appropriately reposition the affected bone/teeth,
- Apply acid etch to the interproximal area of the teeth; apply Protemp ® according to the manufacturer's instructions to effectively "join" the teeth interproximally
- If using bond/CR and flexible wire, etch centre of facial surface of the tooth/teeth. Apply bond according to the manufacturer's instructions and apply CR to effectively bond the flexible wire to the surfaces of the teeth.
- Splint should span to ensure that traumatised teeth have been splinted to two stable teeth on either side eg. Trauma to 12 and 11; splint would span from 14 to 22

See table 2 for recommended removal times of splinting. Further details are in text related to each trauma description.

Table 2: Follow-up of splinting of traumatised teeth

Type of Trauma	Removal of Fixation
Concussion and subluxation	Generally only place for patient comfort, remove after 1 weeks
Luxation	2-3 weeks
Extrusion	3 weeks (unless radiograph reveals poor healing, then leave 6 to 8 weeks)
Avulsion & replantation	1 -2 weeks depending on mobility of tooth
Root Fracture	3 months (Rigid Fixation) –

Definitions

Nil

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Policy owner

Clinical Leadership Council

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and Research

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References and related documents

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