



# The Lips, Mouth, Tongue and Teeth: Part III

# 26

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## 26.1 Injuries

### 26.1.1 Lip Lacerations

The lips are highly visible, aesthetically important structures that are essential for speech articulation, eating, expressing emotion and tactile sensation. Due to their prominent location on the face, lacerations are common and can be quite disfiguring. Lacerations can occur following localised trauma, or lip-biting following seizures or dental local anaesthetic. They may also be seen as part of more extensive facial injuries. This may be due to metal or glass, or from a blunt impact resulting in the teeth splitting the lips from inside out. Both lips have an abundant vascular supply and consequently bleeding and swelling can be quite severe. This can usually be controlled with pressure and a little ice. However this high level of vascularity also means that avulsed tissues should always be preserved whenever possible, even if attached by a thin pedicle. The infraorbital nerves on either side, provide sensation to the upper lip, the mental nerves provide sensation to the lower. The motor supply is primarily from the buccal and marginal mandibular branches of the facial nerve. Weakness or loss of sensation should always be carefully documented.

Following initial assessment, it is important to then ascertain whether there is a retained foreign body, such as tooth fragments, gravel, or glass. If this is suspected a soft tissue x-ray should be taken. The wound should then be gently examined for any obvious foreign matter. The external part of lacerations are usually self evident once they have been cleaned, but mucosal surfaces should also be inspected for

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‘through and through’ lacerations. The teeth and gingiva should also be carefully assessed as these are also often damaged. Gently feel for any possible retained foreign bodies within the substance of the lip, being careful not to injure yourself. During assessment consider the following:

- (i) Does the laceration cross the vermilion border? If it does then consider whether specialist referral is appropriate. Poor repairs are often a source of dissatisfaction and occasional litigation. However if you can clearly see the border then repair in the emergency department is reasonable. It is important to align the wound margins precisely to avoid a step in the vermilion border (Fig. 26.1).
- (ii) Is the laceration “through and through”? This is where the laceration passes through the entire thickness of the lip, to include all layers (skin, muscle, mucosa). In the lower lip saliva may leak through the wound onto the chin. If a full thickness wound is present a layered closure will be necessary. This will take time.
- (iii) Wound depth. If a wound is greater than approximately 0.5 cm deep it is likely to involve important deeper tissues such as the muscles and with lower lateral wounds, branches of the mental nerve. Deep lacerations have a tendency to gape, and will therefore need to be closed in layers. Applying glue or steri-strips alone will not be appropriate as the underlying muscles will apply a force to the skin, which over time will result in increasing scarring or dehiscence (Fig. 26.2).
- (iv) Is the wound clean or heavily contaminated? This will indicate how much time and debridement is needed prior to wound closure. In all cases copious irrigation is advised with a suitable antibacterial agent, such as betadine or chlorhexidine (assuming no allergies). Recent studies have suggested superiority of chlorhexidine over betadine for facial lacerations, but this is largely a matter of personal preference. Contaminated wounds will also influence whether antibiotics and tetanus prophylaxis are needed (Fig. 26.3).

**Fig. 26.1** Lip laceration and sutured lip. Taken immediately post-operatively, with anaesthetic accounting for the swelling, note the vermilion border has been approximated



**Fig. 26.2** Degloving injury



**Fig. 26.3** Crushed and torn tissues heal remarkably well



- (v) Could there be a foreign body? Fragments of teeth, glass, grit etc. may be present. Depending on the mechanism of injury a soft tissue X-Ray of the lip may be required prior to wound closure (Fig. 26.4)
- (vi) Is there any significant tissue loss? Gaping lacerations are common and often appear worse than they actually are. The mechanism of injury is helpful—dog bites, for example, after often associated with tissue loss. One way to assess the wound is to see if the edges can easily come together. If uncertain this may require senior review or referral (Fig. 26.5).

#### 26.1.1.1 Repair of Lacerations

All deep, gaping, through-and-through lacerations or those that involve the vermilion junction need to be carefully closed primarily. If the wound is contaminated, it should be gently debrided prior to closure, and will probably require antibiotics. Generally speaking, delayed primary closure is not required with most facial



**Fig. 26.4** Retained tooth fragments following heavy impact and lip laceration

wounds. However with dirty wounds and animal bites, antibiotics and tetanus prophylaxis are usually required. Most wounds can be closed under local anaesthetic, but if the patient is uncooperative or a complex and time-consuming repair is anticipated, consider sedation or a short general anaesthetic. Contrary to popular belief, it is safe to use adrenaline-containing dental local anaesthetics (adrenaline 1 in 80,000) in the oral cavity and face, due to the abundant blood supply. If given a full 10 min to work, their vasoconstrictive effects are very effective in haemostasis. All 3 layers (skin, muscle and oral mucosa) must be closed separately. The ‘white roll’ of tissue seen at the junction between the mucosa and skin (the vermilion border), needs particularly attention. Precise closure of this line is important—just 1 mm of misalignment may cause a noticeable step deformity. Whilst a fair amount of tissue loss from the lower lip can often be closed with little deformation, asymmetric closure of missing tissue in the upper lip may result in the philtrum (the vertical midline groove directly above the upper lip) being pulled to one side. Patients should be warned about this. If tissue loss is extensive the wound can be reconstructed using local tissue flaps.



**Fig. 26.5** In many patients, up to one third tissue loss in the lower lip can be managed with primary closure

Lips can sometimes be difficult to anaesthetise with local infiltration, as they are well innervated and very sensitive to injections. It is therefore better to start with a regional nerve block and progress to local infiltration once the lip is numb. To anaesthetise the lower lip, perform a mental nerve block. For the upper lip, an infraorbital nerve block provides extensive anaesthesia. Sometimes local infiltration intra-orally will suffice for extraoral wound closure. Local infiltration also causes swelling and distortion of anatomical landmarks, and can sometimes blanch and obscure the vermilion border. This should ideally be identified and marked prior to injection of anaesthetic (Fig. 26.6).

Other alternatives for clean wound closure include steri-strips and glue. Steri-strips have only a limited role in lip lacerations as they will probably not close a gaping wound. Facial movement during speech and facial expressions can cause the steri-strips to pull apart. Moisture from saliva can also cause them to loosen. Glue should not be used to close intraoral wounds, and will also not close a deep or gaping wound. Sutures are therefore required in most lip lacerations although very occasionally a tiny laceration in a young child may be closed with these alternatives. It is always best to discuss the options with the parent or guardian if possible. If suturing is undertaken, once the lip is anaesthetised, the wound is inspected carefully. Gentle probing and digital examination will identify hidden through-and-through lacerations. These are prone to considerable contamination and need thorough irrigation. With intraoral wounds of the lower lip, saliva and debris can collect and quickly become infected if not cleaned.





**Fig. 26.6** Primary repair gaping wound

Through and through lacerations require a layered closure. Deep, slow resorbing sutures such as 3/0 or 4/0 plain Vicryl are used to align muscle or fibrous layers using buried knots. Then the vermilion border is approximated with a 6–0 non-resorbable suture such as Ethilon or Prolene. This will ensure anatomical orientation. This is the most crucial step in the closure of lip lacerations that involve the vermilion border. The rest of the skin is then closed. The mucosal wound is closed using fast resorbable sutures such as 4–0 Vicryl rapide. In young uncooperative children, it may be reasonable to consider using resorbable sutures for repair of these lacerations. This removes the need for suture removal and may result in less emotional and physical trauma. Studies have shown no discernible difference in cosmetic outcome in the short-term (no long term studies currently exist). Otherwise, sutures are usually removed 5–7 days later (Fig. 26.7).

### **26.1.2 Intraoral Lacerations (Mucosa and Tongue)**

Intraoral lacerations can be hidden and careful examination with a good light source is required. Blood in the mouth mixes with saliva and therefore bleeding often appears more extensive than it really is. If it is not possible to see where the blood is coming from, the patient should be instructed to rinse their mouth out with warm water. Remember that blood in the mouth can result from epistaxis, haemoptysis, and haematemesis, depending on the circumstances. Once identified, assess the size

**Fig. 26.7** Always realign tissues if delay is anticipated. This will ensure continued perfusion



and depth of the wound, noting whether it is gaping, or contaminated. Involvement of local nearby structures, such as submandibular ducts in the floor of mouth, or parotid ducts inside the cheeks, will determine whether specialist referral is required for assessment and repair. Small intraoral lacerations can often be left and will usually heal. Saliva contains growth factors which accelerate this. These injuries generally heal very well without suturing, although repair may be indicated in some cases if there is a large flap of tissue. As a guide, intraoral wounds that require repair include (i) lacerations that create a flap which interferes with chewing, (ii) wounds larger than 3 cm (iii) any mucosal laceration that is large enough to trap food particles and (iv) if the laceration is suspected of involving important deeper structures. General anaesthesia is usually necessary for young children, where cooperation is difficult, or in cases where access to a deep laceration induces a gag reflex. Antibiotics are not always required, but good oral hygiene following repair is very important (Fig. 26.8).

### 26.1.3 Penetrating Intraoral Wounds

It is important to be careful with penetrating injuries in children, notably in the soft palate or pharyngeal arches. The typical history is usually a fall while running with a pencil or pen in the mouth. Although the palatal wound itself is usually small, carotid injury and delayed presentation of stroke have been reported. Penetrating skull base injuries have also been reported with pencils, screwdrivers, sewing needles, chopsticks, knives and scissors! Whenever a child holds an object in their mouth, oral injury is possible. With dry porous wooden objects a CT scan will show a low-attenuation structure. However, once water is absorbed from the surrounding tissues, the attenuation changes. Small foreign bodies that migrate into soft tissues are harder still to identify. In such cases, MRI should be performed.



**Fig. 26.8** Tongue lacerations

#### **26.1.4 The Loose Tooth**

Loose teeth following trauma always require a dental x-ray to determine whether or not there is a fracture of the root, alveolar bone, or even the jaw. If there is no sign of a fracture, the tooth is said to be luxated or subluxated. If there are multiple loose



teeth, then either there is a fracture of the alveolar bone, multiple crown fractures, or the patient may have pre-existing periodontal disease. The latter tends to present with gradual loosening of the teeth, intermittent bleeding, or receding gums and will have proceeded the injury. On imaging there is generalised loss of bone height and pocketing around the necks of the teeth. It is important also to bear in mind that there may be other co-existing causes of loose teeth, which may be contributing. ORN and BRONJ can also present with mobile, painful teeth, exposed bone and ulceration and require careful assessment and urgent referral. Loose teeth can also occur as a result on jaw cysts, or tumours. Remember that loose partial dentures may appear as loose teeth, although the teeth themselves move 'en block' and are not tender. Similarly a loose cosmetic crown can appear very life-like and mislead the unaware. It is therefore important to assess the mouth fully and examine the soft tissues as well, not just the teeth. Look for lacerations in the gingiva and feel for bone fragments in the sulci. If there is any soft tissue induration or ulceration, check for lymphadenopathy and refer urgently to an appropriate specialty. An OPG will usually show any significant changes in the bone. Large well-defined radiolucencies are likely to be radicular cysts, odontogenic keratocysts, or ameloblastoma (Fig. 26.9).

### 26.1.5 The Injured Tooth

The management of dental trauma depends on whether the injury involves primary or permanent teeth (baby/adult). Children usually keep their primary teeth until they are about 6 years old, at which point the adult teeth start to replace them. This process follows a specific order and continues until the age of about 14 years, when most children will then have all their permanent teeth exposed (except the wisdom teeth). The first step when assessing the patient is to determine whether there has been any other significant trauma. This includes the airway, c-spine, brain, eyes, and

**Fig. 26.9** Displaced crown of central incisor ? subluxation ? crown fracture



facial bones as outlined earlier in this book. The aims of treatment of the dental injuries themselves are (i) to retain the tooth in the dental arch if possible, (ii) maintain the viability of its pulp and (iii) prevent root resorption. Most dental injuries will therefore require treatment by a dentist, but recognising which injuries are serious and require urgent referral is an important first step. The success in management of many dental injuries is to some extent, time dependent.

Identifying where, when and how the trauma occurred provides useful information. Often the mechanism of injury will indicate the extent of trauma. Where the trauma took place will also give an indication of the risk of contamination with grit and foreign bodies. If contamination is suspected, enquire about the patients tetanus status. Such wounds should be considered high-risk and if necessary a booster should be given. When the incident occurred is particularly important with avulsed and potentially salvageable teeth. In children and other special-needs patients always keep in mind the possibility of non-accidental injury, especially if a significant amount of time has passed between the injury and seeking medical attention.

#### **26.1.5.1 Intrusion**

Intrusion is the forcible displacement of a tooth into its own socket. Clinically, the crown of the tooth may appear shortened and may be misdiagnosed as fractured. However the abnormal position of the otherwise intact tooth will be easily seen on periapical radiographs or an OPG. For permanent teeth treatment is dependent on the development of the apex of the tooth and the extent of intrusion. For teeth with incomplete root formation allow spontaneous eruption. If no movement within a few weeks consider orthodontic repositioning. If the tooth is intruded more than 7 mm then orthodontic or surgical repositioning will be required.

For intruded teeth of 3 mm with complete root formation although eruption without intervention. If this does not occur within 2–4 weeks it will require orthodontic or surgical positioning. The aim surgical or orthodontic repositioning is to attempt to prevent ankyloses and root resorption. If intruded 3–7 mm it will require surgical or orthodontic repositioning. If intruded beyond 7 mm reposition surgically. The pulp containing the nerve and blood vessels of the tooth will likely become necrotic in those with formed roots and a dentist will need to carry out root canal treatment.

Once an intruded tooth has been repositioned it will require a flexible splint for 4 weeks.

With deciduous teeth, if the root is displaced toward or through the outer bone, the tooth can be left where it is. However if the root is displaced into the developing tooth germ, the tooth may need to be extracted.

#### **26.1.5.2 Extrusion**

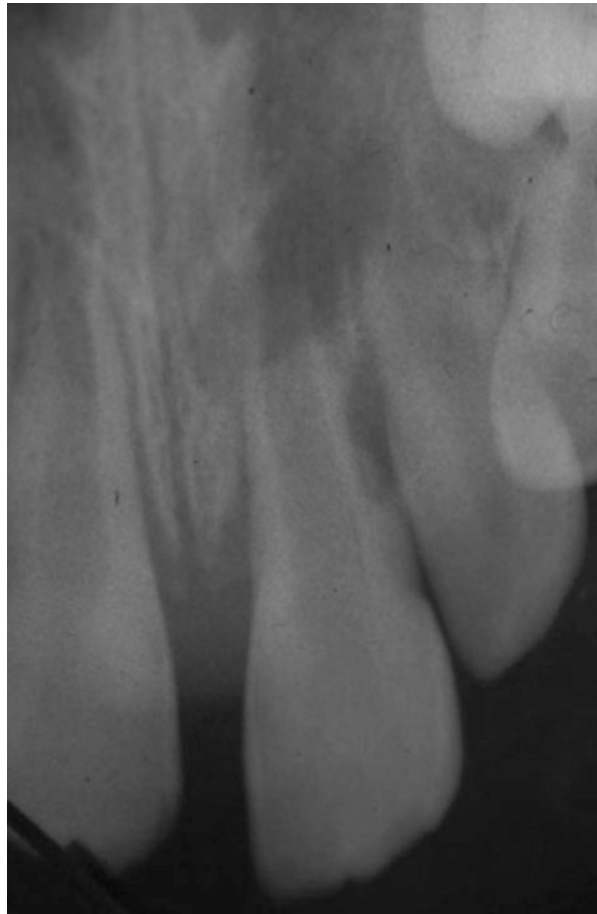
Extrusion is the partial displacement of a tooth out of its socket. This may sometimes be referred to as luxation. Clinically the tooth is loose. Subluxation is when the tooth is loose but not displaced. Management involves cleaning the wound and repositioning of the tooth which is then splinted for about 2 weeks. Clinical and radiographic follow up is required as the tooth may become non-vital.

### 26.1.5.3 The Avulsed Tooth

These injuries can prove costly, not only to the patient, but also the treating practitioner if they are poorly treated. Failure to replant an avulsed permanent tooth may result in complaints 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. Avulsions tend to involve the anterior teeth (incisors, canines and occasionally premolars) (Figs. 26.10 and 26.11).

If a tooth has been completely avulsed, it is important to determine if it is a primary tooth or a permanent tooth. Primary teeth should not be re-implanted, because of the risk of damaging the underlying adult tooth bud. However, permanent teeth can often be successfully reinserted if undertaken quickly. Ideally all avulsed adult teeth should be immediately re-implanted at the time of injury. A “dry time” of less than 60 min is essential. After that, the likelihood of successful treatment rapidly falls. If this is not possible the tooth should be placed in Ringer’s lactate, Hank’s balanced salt solution, the patient’s own saliva, or milk until the patient can see

**Fig. 26.10** Avulsion upper central incisor



**Fig. 26.11** Multiple avulsed/loose teeth—make sure you count them



someone who can treat them. It should never be handled by the root, and should not be washed, scrubbed or brushed. Even though a re-implanted permanent tooth may not survive in the long term, it may nevertheless maintain the supporting alveolar bone and keep further treatment options open.

#### **26.1.5.4 Re-implanting a Tooth**

Under local anaesthetic, the tooth is placed back in its socket (see below). If the clot does not dislodge from the socket, this may require gentle debridement to make space. Once re-implanted, the patient should bite down on a gauze swab to help seat the tooth. X-rays should be taken to confirm its position. A semi-rigid splint is then placed for several weeks whilst the tooth reattaches.

- (i) Pick up tooth by crown (white, flat end). Do not touch the pointed end of the tooth
- (ii) Gently clean the root surface with a stream of saline
- (iii) Store the tooth in storage medium or saline whilst you prepare the socket
- (iv) Administer local anaesthesia to the area
- (v) Irrigate the socket with saline, suck out any debris or large blood clots.
- (vi) Examine the socket—if there is a fracture of the socket wall—reposition it with a suitable instrument.
- (vii) Replant the tooth back into the socket slowly with slight digital pressure only. Gently squeeze the bony walls of the socket around the tooth
- (viii) Suture any gingival lacerations present
- (ix) Verify the correct position of the tooth radiographically
- (x) Ask the patient to bite on a rolled up handkerchief/gauze whilst you measure up a flexible splint against the arch.
- (xi) If the patient is an uncooperative child, it may be necessary to replant the tooth under sedation, or admit for general anaesthetic treatment.

Root canal treatment is required at a later date. Patients should also be given antibiotics, chlorhexidine mouthrinse and if required, tetanus prophylaxis. They should be advised to eat only a soft diet whilst the splint is in place. Longterm follow up with a dentist is essential. If the avulsed tooth has been out of the mouth for more than 1 h, the tooth is unlikely to reattach. A dental or maxillofacial opinion should then be sought as sometimes this may still be possible. If re-implantation is not possible, the patient will still need dental follow-up. Incorrect management of the avulsed tooth is a source of litigation. If you are unsure what to do, seek advice early.

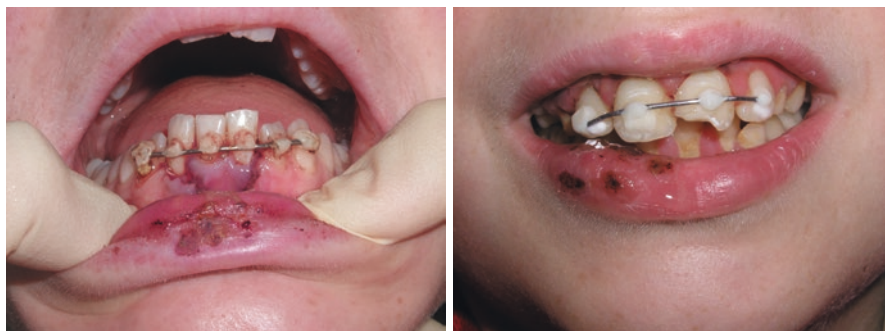
### **26.1.5.5 Splinting a Replaced Tooth**

The aim of flexible splinting is to maintain the tooth in correct position using the adjacent teeth and provide patient comfort. Re-implanted teeth are now most commonly splinted using flexible wires and dental filling materials. Filling material can also be used as an adhesive without a wire if needed. Orthodontic brackets and wire can also be used.

- (i) The wire should span across the re-implanted tooth and two teeth either side (provided these teeth are stable). In reality, it may encompass more teeth in order to stabilise the tooth. Measure a suitable length of wire (orthodontic wires or a paper clip).
- (ii) 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 bite.
- (iii) Pack the labial sulcus with cotton wool rolls to isolate the area and control moisture in the area. It can be very difficult to keep the moisture under control, but without this, the dental materials will not bond to the teeth.
- (iv) Apply dental acid etch for 30 s to the front surfaces of the teeth you want to splint (including the replaced tooth).
- (v) 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.
- (vi) Apply primer and bonding agent to the areas that have just been etched. Alternatively, all-in-1 etch-prime-bond agents may be available.
- (vii) Light cure the teeth for 20–30 s. If the light cure is unavailable, an overhead operating light can usually cure the bonding agent, but at a slower pace.
- (viii) Line the wire up along the midpoints of the teeth to be splinted.
- (ix) 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
- (x) Light cure for 20–30 s
- (xi) 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.

Where resources are limited dental filling material can also be used as an adhesive without a wire if needed. Orthodontic brackets and wire can also be used. If





**Fig. 26.12** Splinting of loose teeth

orthodontic wire is not available the needle from a cannula can be used, it has a hollow lumen and because of this is malleable. Failing this a paperclip may also be used (Fig. 26.12).

#### **26.1.5.6 Initial Management of Isolated Tooth Avulsion at the Time of Injury (Telephone Advice)**

- (i) Pick up tooth by crown (white, flat end)
- (ii) Do not touch the pointed end of the tooth
- (iii) If lightly contaminated, rinse in milk/saline or cold running water briefly
- (iv) If the patient has no serious medical conditions (see below) the tooth should be put it back into its socket if possible.
- (v) Ask the patient to bite on rolled up handkerchief
- (vi) If there are concerns about other injuries the patient should be taken to their nearest emergency department immediately. If not, then they should attend their local dentist (or if not possible the emergency department).
- (vii) 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.

#### **26.1.5.7 Initial Assessment in the Emergency Department**

- (i) If not already replanted, the tooth must be placed in physiological saline whilst a full history and thorough clinical examination are undertaken. If there is any history of loss of consciousness, vomiting or amnesia, the possibility of a head injury must be considered.
- (ii) 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.
- (iii) If a missing tooth or fragments cannot be accounted for, aspiration must be ruled out with a chest and neck x-ray. Soft tissue x-rays may also be required to assess suspected embedded tooth fragments if examination is inconclusive.

- (iv) If the injuries are extensive and require thorough debridement, treatment may be better provided under general anaesthetic.
- (v) Beware of discrepancies between the history and clinical findings, or delay in presentation—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.
- (vi) During this time it is important to advise the parent (and child) with regards to the future management and prognosis.

### **26.1.5.8 Contraindications to Replanting an Avulsed Tooth**

- (i) Primary tooth
- (ii) Where other severe injuries take priority
- (iii) When re-implantation would place the patient at risk e.g. the immunocompromised patient, those with congenital cardiac defects
- (iv) Where the tooth is diseased or fractured
- (v) An immature permanent tooth with prolonged, dry extra-alveolar time
- (vi) If the tooth has already been re-implanted prior to arrival, leave the tooth in place

## **26.1.6 Fractured Teeth**

Fractured teeth are usually obvious. They occur frequently in children and young adults, comprising 5% of all injuries. Luxation injuries are perhaps the most common injuries in the primary dentition, whereas crown fractures are more common in adult teeth. Careful diagnosis, treatment planning and follow-up are important to ensure best possible outcomes. Any missing fragments which cannot be accounted for require a CXR and soft tissue view of the neck to ensure they are not in the throat or lung. Radiographic assessment, such as an OPG or periapical view, is important to define exactly which part of the tooth has fractured and determine what treatment should be provided. Document carefully, avoiding short hand notation—these injuries frequently result in litigation.

### **26.1.6.1 Crown Fractures**

These are described as either complicated (involve the pulp) or uncomplicated (do not involve the pulp). Uncomplicated fractures include enamel fractures and enamel/dentine fractures. These can be treated with a filling or crown, or if the tooth fragment is available, this can be bonded back onto the tooth. Infraction is an incomplete fracture of the enamel without loss of tooth structure. These are not tender. If tenderness is present look for a possible luxation injury or a root fracture. Usually no there are radiographic abnormalities. With significant infractions, sealing with resin may prevent discolouration, but otherwise, no treatment is necessary.

Complicated fractures will require treatment of the exposed pulp, either by ‘pulp capping’ or root canal treatment, depending on the extent of contamination of pulp tissue. In young patients this usually involves pulp capping or partial pulpotomy.

Every effort should be made to preserve the vitality of the pulp in immature permanent teeth. If successful this will ensure continuous root development. The immature permanent tooth has a surprising capacity for healing after pulp exposure and fractures. In patients with mature root development, root canal treatment is usually the treatment of choice. The tooth is then restored. This is completed in dental practice.

#### **26.1.6.2 Root Fractures**

These are usually divided by the site of the fracture into coronal, middle or apical-thirds. Diagnosis of root fracture requires radiographic assessment with a periapical view. Usually a coronal-third root fracture is very mobile or displaced and may need to be removed to avoid the risk of inhalation. The tooth may be tender to percussion and bleeding from the gingival sulcus may be noted. Sensibility testing is often negative suggesting transient or permanent neural damage. Not all fractures are obvious on X-ray, depending on their plane of orientation. Fractures that are in the horizontal plane can usually be detected on a periapical film, usually in the cervical third of the root. Ideally reposition the coronal segment of the tooth as soon as possible. Middle and apical-third fractures may be stabilised by splinting the tooth. Various splinting techniques are available. Fractures should be stabilised with a flexible splint for about 4 weeks. If the fracture is nearer to the cervical area, stabilisation may need to be much longer (up to 4 months). Longterm follow up is required as root canal treatment may be indicated (Fig. 26.13).

#### **26.1.7 Alveolar Fractures**

Injuries to the supporting alveolar bone often accompany dental trauma. Owing to their exposed anatomy, these usually occur at the incisor and premolar regions. Injuries can vary from relatively minor cracks, to fractures that extend into the body of the mandible or maxilla. The gingiva is invariably involved to some extent, often resulting in exposed bone. Treatment involves early reduction and stabilisation of mobile segments for approximately 4 weeks. Inability to easily reduce fragments may be due to root or bony interferences. This may require surgical exposure. It is important to ensure closure of all wounds is meticulous to prevent exposure of bone (Figs. 26.14 and 26.15).

#### **26.1.8 Injuries to the Gingiva and Alveolar Mucosa**

Injuries to the gingiva and alveolar mucosa include abrasion, contusion, and laceration. If these are not treated they can place the underlying bony tissue at risk of exposure and devitalisation. The aim of treatment is therefore to re-establish soft tissue bony cover.

**Fig. 26.13** Root fracture

- (i) Abrasions are superficial wounds. These require saline rinsing and/or irrigation of the gingiva. Antibiotics are seldom necessary. Check the wound for grit or fractured filling material as this can lead to unsightly tattooing later. If this is present it should be removed within 12 h.
- (ii) Contusions are similar to bruising in the skin. Treatment includes cleansing and observation. Antibiotics are usually unnecessary.
- (iii) Gingival lacerations may indicate an underlying fractures. If there are none, treatment involves early cleansing and re-approximation. Consider antibiotic and tetanus prophylaxis. Exposure of any bony defect will require a local flap to cover it.

**Fig. 26.14** Repositioning teeth under LA



**Fig. 26.15** Dentoalveolar fracture



### 26.1.9 Tooth Damage During General Anaesthesia

Trauma to the teeth (usually the incisors) can occur during laryngoscopy and intubation. Significant damage is more likely to occur if the patient has crowns, caries or pre-existing periodontal disease. Patients should therefore always be warned of this during their anaesthetic assessment. Accidental damage can happen to anyone, but is especially likely in difficult airway cases where there is limitation in mouth opening. It can also occur during the surgical procedure, hence the use of throat packs in some cases. If a tooth is fractured during intubation or surgery, the broken fragment should be kept and a careful record in the notes made. Ensure no fragments have slipped into the airway. Occasionally large fragments can be re-cemented back on to the tooth, but this is not always possible. Sometimes a loosened tooth can be salvaged, but this is also not always possible, especially if it was already grossly decayed, or already loose from pre-existing periodontal disease. If any broken or avulsed teeth cannot be accounted for, the patient will require imaging to exclude



aspiration. These scenarios need to be carefully documented, especially if gross dental or periodontal disease is noted before treatment. Unfortunately there are those who will try to litigate and get a new set of implants at someone else expense. A good defence will include evidence of an 'at risk' tooth or dentition pre treatment.

### 26.1.10 Bleeding Extraction Sockets

Bleeding following dental extraction is a common problem. It is often seen in the Emergency Department in the late evening or night when the patient is unable to contact their Dentist. Bleeding that occurs within a few hours of the extraction is often due to the wearing off of the vasoconstrictor effect of the local anaesthetic. Direct pressure over the bleeding site (by having the patient bite down on a folded piece of moist gauze) almost always controls post-extraction bleeding. If bleeding continues a careful history is important, noting the time from extraction until the onset of bleeding. Enquire if the patient has been touching the extraction site with their tongue, resulting in disruption of the clot. Ask also about any significant medical history, such as a history of bleeding, liver disease, hypertension, or known haematologic disorders. Aspirin, anticoagulants, broad-spectrum antibiotics, alcohol, and antineoplastic medications can all contribute to prolonged bleeding. It is important to remember that post-extraction bleeding can be a sign of an undiagnosed coagulopathy. The timing of onset of bleeding may give an indication of the underlying cause

- (i) Extensive bleeding which commences at the time of extraction and does not stop usually indicates an underlying anatomical disorder (most notably an AVM). In such cases the tooth should be immediately replaced and the patient instructed to bite hard on some gauze. Urgent referral is then required.
- (ii) Bleeding that commences approximately 2 h following extraction is usually secondary to the wearing off of the vasoconstrictor effect of the local anaesthetic and a reflex vasodilation. Most dental local anaesthetics contain adrenaline and bleeding can occur once this wears off. In most cases local pressure by biting on a gauze pack for 20–30 min will control bleeding. Additional measures such as surgical, sutures or bone wax may occasionally be required. Gelfoam is a commonly used agent for the control of minor bleeding. It is a porous, pliable sponge made from dried and sterilised porcine skin gelatin. Topical thrombin is derived from bovine sources. This converts fibrinogen into fibrin and helps in clotting. It is available as powder and applied in combination with gelfoam on the bleeding surface.
- (iii) Late onset bleeding, within the first 24 h, is often a sign that the blood clot has been mechanically disrupted, for example by the patient sucking on the socket, or by aggressively rinsing the mouth. The area should be gently cleansed to remove any blood and the patient asked to bite on a gauze pack for 20–30 min. This usually stops the bleeding. Advise the patient to be careful not to disturb the socket over the next 24 h.

- (iv) Bleeding which does not begin until the second or third post-operative day may be a sign of infection. Patient often have pain and signs of infection in the surrounding tissues. In severe cases there is lymphadenopathy and trismus. An x-ray should be taken to exclude retained roots and a fracture of the jaw, and the socket explored and cleaned, if necessary under general anaesthesia. The patient should be given chlorhexidine mouthrinse, antibiotics and advised not to smoke. Any bleeding should settle as the infection resolves.
- (v) Bleeding which does not resolve despite these measures, or which has continued over many days may be a sign of an underlying clotting or haematological disorder. The patient should be given a gauze pack soaked in tranexamic acid to help stabilise any clot and control the bleeding. FBC, LFTs and a coagulation screen should be urgently sent for assessment. Always consider the possibility of a retained root in any socket which fails to heal uneventfully.

### **26.1.10.1 Management of a Bleeding Socket**

- (i) Take a full history paying careful attention to the site, when and why the bleeding started and the amount of potential blood loss. Remember blood loss in the oral cavity is often exaggerated by mixing with saliva.
- (ii) Dependant on the history and time of presentation an x-ray may be beneficial to determine the cause of bleeding.
- (iii) With assistance good light and suction examine the site and assess the type and rate of blood loss and whether there is a blood clot present and whether it has disturbed. Most cases can be controlled with pressure, time and a gauze soaked in tranexamic acid or adrenalin.
- (iv) If not controlled by simple pressure. Anaesthetise the area with a local infiltration of 2% lignocaine with 1:80000 adrenalin. Suction the socket if there is a soft or disturbed blood clot present. Irrigate the socket with saline if necessary.
- (v) Pack the socket with surgicel or a similar material. Then suture the socket closed with either a horizontal mattress or simple interrupted sutures.
- (vi) Ask the patient to bite on a moistened gauze, if available and if there are no contraindications biting on a tranexamic acid soaked gauze swab is useful.
- (vii) Observe the patient for any bleeding or oozing from the socket for at least 1 h and warn the patient that as the adrenalin inside the local anaesthetic wears off there may be an ooze from the socket, this will be resolved by biting on a gauze for 20 min.