

SELF ASSESSMENT EXERCISES

Self-Assessment Exercises - Dental Emergencies

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Dental problems account for a large percentage of consultations both in an operational environment and also in everyday practice if there is no immediate access to a dental facility. The following exercises illustrate some common dental emergencies and the discussions attempt to give the accepted best practice for their management. Table 1 summarises the differential diagnoses of toothache, and gives a basic outline to the treatment options available.

You are the Medical Officer to a unit on operational deployment. There is no dental facility immediately accessible, although advice can be sought by telephone. The following patients may present to you with dental or maxillofacial problems.

1. A 19 year old private presents to you about half an hour after sustaining a direct blow to his mouth whilst playing football. His upper right central incisor (UR1) has been knocked out and he has brought it with him in a glass of milk. Examination of the avulsed tooth reveals that it is intact. The socket is filled with a blood clot, and there appears to be no damage to the soft tissues, and no retained root fragments.

- If he had called for advice at the time of the incident, what advice would you have given over the phone about transport of the tooth?
- What are your immediate management priorities now?
- In what circumstances would you not re-implant an avulsed tooth?

2. A second player presents to you after sustaining a head butt from your first patient. He has a chipped upper left central incisor (UL1), but could not find the missing tooth fragment. On examination there is a large fracture to the corner of the tooth, with exposed enamel and dentine but with no obvious pulpal exposure. The tooth is very sensitive to cold air, producing a sharp pain lasting only as long as the stimulus. The UL1 tests positive to ethyl chloride and is not tender to percussion. He has a laceration to the centre of his lower lip.

- What are your treatment priorities?
- What are your concerns regarding the lower lip laceration?

c. What would you do if there were small (approximately 1mm diameter), frank pulpal exposure on the broken tooth?

3. The referee of the same match, who was trying to calm things down, presents to you the following day having sustained a punch to the right side of his face during the fracas. He says that the initial dull pain has persisted, he is having difficulty eating and is finding it hard to open his mouth or chew properly. He complains that his bottom lip feels tingly on the right side, and the right side of his face is swollen.

- What diagnosis would you suspect before examining the patient?
- What other classic signs might you expect to see if this is the case?
- What special tests would you order to confirm your diagnosis?
- What should your initial management be?

Box 1. Specific dental tests.

Vitality Test: in order to assess the vitality of the pulpal tissue within the tooth, ethyl chloride on cotton wool may be placed on the tooth. If the tooth responds to the cold, this crude test suggests that the tooth remains vital.

Tenderness to Percussion (TTP): if when the tooth is gently tapped with the handle of a mouth mirror a painful response is elicited, it is suggestive of a periapical infection. It is due to the tooth being pushed marginally out of the socket by inflammatory exudate.

Temperature: sensitivity to a cold stimulus is suggestive of pain originating from dentine, and sensitivity to a hot stimulus is suggestive of pulpal pain. An exaggerated response to heat suggests that the pulpal tissue within the tooth is becoming non-vital.

4. A 21 year old chef presents to you complaining of a dull ache in the right side of his mouth. He admits to several episodes of pain over the last few weeks, and volunteers that it feels like a new tooth is poking through the gum. His symptoms are exacerbated by eating, especially when biting his teeth together, and he is having difficulty fully opening his mouth. He has a constant bad taste in his mouth and notices that he has halitosis. The only other relevant history is that he is a heavy smoker.

Examination reveals a moderate pyrexia of 38°C, sub-mandibular lymphadenopathy on the right side, moderate trismus, and slight soft tissue swelling over right angle of mandible. The lower right third molar (LR8) is partially erupted and the soft tissue

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covering over the distal aspect of LR8 is swollen and erythematous. Pus is expressed from under the operculum (the flap of gum partially covering the tooth) with gentle manipulation.

- What is your diagnosis?
- What treatment options are available to you?
- Which is the antibiotic of choice for this condition and why?
- What condition are you worried about the patient developing if a severe case of this remains untreated?

5. A 38 year old sergeant presents with a 4 day history of a painful, swollen face on the left side, which is getting progressively worse and now his eye is closing over. He had toothache a couple of weeks before this episode, but it resolved without treatment. He is feeling generally unwell. Examination reveals a pyrexia of 38.5°C. There is gross facial swelling infra-orbitally extending over the zygomatic arch on the left side of his face, with submandibular lymphadenopathy on the same side. His upper left canine (UL3) is grossly carious and slightly mobile, with swelling in the buccal sulcus adjacent to the tooth. UL3 has a negative response to ethyl chloride and is tender to percussion.

- What is your diagnosis?
- What is your immediate treatment for this patient?

6. A 25 year old corporal attends having lost a filling in his lower left second premolar (LL5) 3 weeks ago. Initially he had a sharp pain in the tooth, but this resolved with no treatment. Now he has a constant dull throbbing pain in the same area, which lasts hours, makes the whole jaw ache and radiates to the left ear. He cannot eat on the left side of his mouth, and the pain is much worse after drinking hot tea. He has tried simple analgesics with no effect, and it is now disturbing his sleep.

Examination reveals a large cavity in the LL5, and on testing the tooth there is a negative response to ethyl chloride and it is tender to percussion. There is no soft tissue swelling, and the patient is afebrile.

- What is your diagnosis?
- What treatment options are available to the patient for relief of symptoms?

Answers to self assessment exercises

Question 1

- Do not touch the root – hold it by the crown. Wash gently under the tap to remove any debris. Options are to replace it in the socket (the right way around), transport it in the patient's buccal sulcus to

the surgery, or transport it in milk. If replaced, bite gently on a clean handkerchief to retain it.

- To replace the tooth in the socket and splint it in place (see below).
- The tooth should not be implanted in the following circumstances:
 - If it is a deciduous tooth, as any resultant apical infection may damage the permanent tooth germ developing underneath.
 - A tooth that has been damaged whilst being avulsed.
 - A tooth that has been excessively handled whilst out of the socket.
 - A tooth that has been stored dry out of the mouth for more than one hour since avulsion. In this case the periodontal ligament will be non-vital. Prompt referral to a dental surgeon is therefore required.

Discussion

Most injured teeth can be successfully treated if treatment is prompt and appropriate. Emergency principles include retaining the vitality of the fractured or displaced tooth, treating exposed pulp tissue, reduction and mobilization of exposed teeth, and the use of antiseptic mouthwash, prophylactic antibiotics and tetanus prophylaxis (1,2). An initial management plan in this situation could be summarised as follows:

- Do not handle the root. If the patient has re-implanted the tooth remove it gently from the socket. Rinse the tooth and store in normal saline.
- Infiltrate the soft tissues around the socket with local anaesthetic.
- Irrigate the socket with saline and remove the blood clot and any foreign material. Push the tooth gently but firmly into the socket.
- Splint the avulsed tooth to the two adjacent teeth by whatever means are available for 7-10 days (3).
- Check that the teeth occlude together normally.
- Where possible, take baseline radiographs (periapical or anterior occlusal), which will also exclude any pathology to the adjacent teeth.
- Prescribe prophylactic antibiotics (amoxicillin or penicillin V unless penicillin allergic), chlorhexidine mouthwash and advise a soft diet.
- Check tetanus status.
- Arrange an appointment with a dental surgeon as soon as possible.

Question 2

- Pain relief, temporary filling or dressing over the fracture.
- To exclude the possibility of the lost fragment of tooth being retained within

the lip and risk of associated risk of infection.

- c. Calcium hydroxide lining cement (such as Dycal) should be placed over the exposure before temporarily restoring the tooth. An alternative would be to cover the defect with a temporary crown.

Discussion

This injury represents an uncomplicated crown fracture, as the pulpal tissue has not been exposed. The symptoms of short, sharp pain on exposure to a thermal stimulus (cold>hot) are due to dentine exposure. The exposed dentine should have a calcium hydroxide lining placed where possible over the deepest aspect of the fracture over the pulp horn, and a temporary restoration (zinc-oxide eugenol) placed over the exposed dentine (1,2). Referral to a dental surgeon is then indicated for definitive treatment. If the pulpal tissue is exposed (the pulpal tissue is visible through the dentine or the pulp tissue is patently exposed – pink or red vascular material evident within the dentine) then the treatment will depend upon the size of the exposure, whether the exposure is contaminated, how long the pulp has been exposed and if the exposure is bleeding. If it is a small (less than 1 mm diameter) exposure that is clean and has been exposed to the environment for less than a couple of hours, then the long term prognosis for the continued vitality of the tooth is reasonably good. In these conditions treatment as above is appropriate, but if it is a larger defect or there has been prolonged exposure, the patient should be referred to a dentist as soon as possible for definitive treatment

If there is a fracture involving the loss of tooth substance, and the missing fragment of tooth is unaccounted for, any lacerations must be explored to exclude a foreign body. A radiograph of the soft tissues should exclude the presence of any hard tissue foreign bodies. If a large fragment of tooth or a whole avulsed tooth cannot be accounted for, a chest X-ray may be indicated to exclude inhalation (4). The tetanus status of the patient should also be elucidated.

Question 3

- Fracture of the mandible.
- Classic signs of a fractured mandible include trismus, swelling, intra-oral bleeding, numbness of the lower lip, alteration in bite and a step deformity.
- The essential radiographs required are an orthopantomogram (OPG) and PA mandible. Right and left lateral obliques are indicated if an OPG is unavailable.
- Give analgesics, antibiotics (in open fractures), antibacterial mouthwash and refer for a surgical opinion. The definitive treatment required will depend on the location of the fracture.

Discussion

A fractured mandible may produce the following signs:

- Trismus (difficulty and limitation in opening the mouth)
- Intra and extra oral swelling
- Haematoma, particularly sublingually
- Bleeding, usually intra-orally
- Paraesthesia or anaesthesia of the lower lip on the affected side (the inferior dental nerve runs within the body of the mandible and branches to produce the mental nerve, which provides sensation to the lower lip after exiting through the mental foramen in the premolar region)
- Alteration in occlusion - the patient will often complain that their teeth don't meet together properly
- Step deformity of the inferior borders of the mandible
- Mobility of jaw fragments, possibly with crepitus

It is always important to exclude the possibility of more than one fracture, as bilateral condylar fractures and fractures involving both the condyle and angle of mandible are not uncommon (5). If the fracture does not involve the teeth, simple undisplaced fractures may occasionally be treated conservatively with a soft diet. The definitive treatment of displaced fractures will involve reduction and fixation (required for 4-6 weeks and then union tested), requiring the input of a maxillofacial surgeon (6).

Question 4

- Acute pericoronitis.
- Irrigation under the operculum with a chlorhexidene or salt water mouthwash, radiography to define complicating factors and systemic antibiotics.
- The antibiotic of choice is metronidazole as pericoronitis is predominantly an anaerobic infection.
- Ludwig's angina (cellulitis involving both the sublingual and submandibular spaces).

Discussion

The incomplete eruption of a wisdom tooth may produce an area of stagnation under the operculum. Within this, the mixture of food debris and bacteria commonly found in dental plaque may cause an infection leading to pericoronitis. Any food debris that is present under the operculum needs to be removed, and this is most readily achieved by irrigation with either warm salt water or chlorhexidene mouthwash using a blunt needle and syringe. When there are systemic symptoms such as lymphadenopathy, pyrexia and trismus, oral antibiotics should be prescribed in addition to the local measures (7,8).

In some cases, the severity of the pericoronitis affecting the lower third molar

may be exacerbated by the presence of the corresponding maxillary (upper) third molar. When an upper molar tooth is biting on the operculum associated with the lower molar, it is often preferable for a dentist to remove the upper tooth in order to relieve the acute symptoms.

Rarely, severe cases of pericoronitis (and other dental infections arising around the lower second and third molars) may lead to a deep fascial space infection and cellulitis. Ludwig's angina is a severe form of this involving both the sublingual and submandibular spaces bilaterally. It can spread into the lateral pharyngeal and pterygoid spaces and may extend into the mediastinum. It presents with painful swelling of the upper part of the neck and the floor of the mouth on both sides.

Swallowing and opening the mouth may be difficult, the tongue may be pushed up against the soft palate, and oedema of the glottis can lead to airway obstruction (9).

Question 5

- a. Acute periapical abscess.
- b. Antibiotic treatment should be commenced in view of the systemic symptoms. Definitive treatment should include drainage of the abscess by removal of the tooth or root canal treatment.

Discussion

Tooth decay may spread, causing the pulp tissue within the tooth to undergo necrosis. The infection can pass out through the apices of the tooth into the surrounding periapical tissues of the alveolar bone causing an abscess. In some cases a chronic low-grade infection will occur resulting in the formation of a granuloma within the bone associated with the tooth. In other cases, the infection may perforate the bony plate of the mandible or maxilla and spread into the soft tissues resulting in cellulitis. In the case of an upper canine tooth, the exudate can perforate the buccal bone spreading into the soft tissues, causing swelling of the face and eyelid. When there is systemic involvement

antibiotic treatment should be commenced. It is imperative to ensure drainage of the infection, which is most readily achieved by the removal of the source of the infection – the tooth (8). Once the tooth has been removed, the source has gone and the exudate will drain. The other alternative if the patient wishes to save the tooth is to refer to a dentist for root canal treatment, which will drain the infection via the root canal of the tooth. Where a localised collection of pus exists intra-orally, normally in the buccal or labial sulcus, the soft tissues should be anaesthetised and the swelling incised to ensure drainage of the pus.

Question 6

- a. The diagnosis is acute apical periodontitis (AAP).
- b. The definitive treatment involves removal (extirpation) of the pulp tissue and drainage of any exudate followed by root canal treatment. The alternative is extraction. Combination analgesic therapy may relieve symptoms in the short term.

Discussion

Toothache with no apparent infection is a common presentation to medical and dental officers alike. It is usually caused by irreversible pulpitis (early stages of death of the tooth) or acute apical periodontitis (later stages), which creates a problem for medical officers who do not have access to more sophisticated dental techniques such as root canal treatment. Antibiotic therapy is not indicated. Treatment should be aimed at controlling the symptoms with adequate pain relief using a combination of paracetamol based analgesia and NSAIDs, and seeking referral to a dentist.

The initial reaction of pulp tissue to any aggravating stimulus (caries, exposure of the pulp, trauma or a broken filling) is a pulpitis which if treated will often resolve. If left untreated the pulpitis will eventually be followed by the necrosis and loss of vitality of the pulpal tissues, and the spread of the inflammatory exudate through the apical

Table 1. Presentation of dental pain, possible differential diagnoses and treatments.

	Dentine Sensitivity	Reversible Pulpitis	Irreversible Pulpitis	Acute Apical Periodontitis	Periodontal Abscess	Cracked Cusp Syndrome
Pain	Sharp	Sharp or dull	Dull ache	Dull ache	Dull ache	Sharp
Duration	Seconds	Seconds to minutes	Hours	Hours	Hours	Seconds
Hot or cold	Cold>hot	Cold >hot	Hot>cold	Hot>cold	Neither	Both
TTP	No	No	Yes (in later stages)	Yes	Sometimes	No
Vitality test	Vital	Vital	Either	Non-vital	Either – normally vital	Vital
Swelling	No	No	No	Occasionally	Yes – intraoral	No
Spontaneous pain	No	No	Yes	Yes	Yes	No – only on biting
Sleep disturbed	No	No	Yes	Yes	Yes	No
Treatment (simplified)	Fluoride varnish over exposed dentine.	Removal of caries (decay) or broken filling. Place new restoration.	Root canal therapy or extraction of tooth.	Root canal therapy or extraction of tooth.	Debridement of pocket with ultrasonic scaler and chlorhexidene. Antibiotic therapy.	Remove undermined cusp and placement of new filling.

Key: TTP = tenderness to percussion

foramina into the periapical tissues. This condition is then termed periapical periodontitis. The treatment of AAP is based on the removal of the pulpal tissue from the tooth. This is achieved by either root canal therapy or extraction of the tooth (8).

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