

SELF ASSESSMENT EXERCISES

Self-Assessment Questions In The Management Of Ophthalmic Emergencies

LA Wallis, JE Smith, AR Gibson

Emergencies involving the eye make up a disproportionately large amount of a Medical Officer's operational workload. The following examples illustrate some principles that should be employed when dealing with eye problems.

Questions

1. You are on deployment with your unit in the Middle East. A 23-year-old soldier presents with a painful left eye that has felt gritty for the last couple of days. He volunteers that his eyelids were stuck together on waking this morning. He is otherwise well.

- What are the important factors in the history to distinguish between the possible diagnoses?
- What are the important aspects of examination?
- What is your differential diagnosis of this painful red eye?
- How should you manage this patient?

2. You see a 34-year-old engineer in your afternoon clinic. He was working on something in his workshop an hour ago and thinks something went into his left eye. He has the sensation of something in his eye, which is watering and painful, and worse when he blinks.

- What questions are important in the history?
- What are the priorities in management of this case?
- On examining the eye you identify a metallic foreign body. How should you manage this?

3. Back in the UK you are doing a shift in the local Emergency Department when one of your soldiers (a 22-year-old private) is brought in having been involved in a fight. A witness states that he saw him being hit repeatedly around the face. On examination he smells of alcohol and appears confused. You note multiple abrasions around both eyes. There is swelling and bruising around the eye on the left and some bruising below the right eye.

- What are your priorities in management?
- What specifics should you look for in the examination of the eye?
- What investigations will you request?

4. You are deployed to Norway with your unit during the winter. A 26-year-old corporal comes to see you as an emergency. He has

been on patrol for the day and now has intense pain and watering from both eyes. He is very distressed and thinks he has permanently damaged his vision.

- What is the differential diagnosis of this presentation?
- How should you manage this patient?

5. Back in the UK, a middle aged warrant officer presents to you with sudden loss of vision in his right eye. He has a past history of high blood pressure, and has smoked twenty cigarettes a day for the last 30 years. Examination reveals total loss of visual acuity in the right eye.

- What else is important in the examination?
- What are the differential diagnoses?
- How would you manage this case?

6. A 44-year-old sergeant presents to you with a gradually worsening pain in his right eye. It started a couple of days ago, and is causing him increasing amounts of discomfort such that he was kept awake during the night. He complains that his vision has recently become blurred. While waiting for you to see him he feels sick and vomits. On examination his right eye is red and painful. The pupil is mid-sized and ovoid in shape.

- What is the likely diagnosis?
- How can you confirm this?
- What treatment are you able to give him?

7. A 34-year-old sergeant presents to you with a gradually worsening pain and decreased vision in his right eye. It started a couple of days ago, and is causing him increasing amounts of discomfort such that he was kept awake during the night. He is a contact lens wearer.

- What is the likely diagnosis?
- How can you confirm this?
- What treatment are you able to give him?

Answers to self-assessment questions

Question 1

- Systemic symptoms, a history of trauma, any previous episodes, general medical history, family history.
- Examination should include visual acuity, assessment of the pupils, visual fields, funduscopy, and examination of

L A Wallis
MBChB FRCS(A&E)
FFAEM
Consultant in
Emergency Medicine
University of Cape
Town, South Africa.
Email
leewallis@bovinevalleyretreat.co.za

Surg Lt Cdr J E Smith
MBBS MSc MRCP
FFAEM RN
Specialist Registrar in
Emergency Medicine,
Emergency Department,
Derriford MDHU,
Plymouth,
PL6 8DH.
Email
jasonesmith@doctors.org.uk

Surg Lt Cdr A R
Gibson BSc MBBS
MRCS(Ed)(Ophth)RN
Specialist Registrar in
Ophthalmology,
Oxford Eye Hospital,
Oxford
Email
agibson@tinyonline.co.uk

the front of the eye (ideally with a slit lamp). The lids should be everted to examine for evidence of sub tarsal foreign bodies. Fluorescein staining helps to identify defects on the anterior aspect of the cornea. Intra-ocular pressures will need to be measured if there is any suspicion of acute closed-angle glaucoma.

- c. Conjunctivitis (viral, bacterial, allergic), trauma or foreign body, acute closed angle glaucoma, acute iritis (anterior uveitis), keratitis, scleritis or episcleritis.
- d. Take a full history and perform a complete examination. The likely diagnosis is conjunctivitis.

Discussion

Patients often present with an acute red painful eye, and it is important to be aware of the likely diagnoses given the situation you are in, but also to be wary of the rarer causes such as acute glaucoma and iritis. If you are in the desert, a foreign body may be the most obvious cause, but other potential diagnoses should not be overlooked. The majority of these causes can be distinguished from the history and examination (see Table 1). While a full examination should be performed in all cases, the visual acuity is particularly important from both a clinical and medico-legal perspective. Local anaesthetic drops are often necessary to facilitate the eye examination.

In this simple case of what sounds like conjunctivitis, a topical antibiotic should be prescribed (e.g. chloramphenicol eye ointment to be applied 4 times daily) as this has been shown to reduce time to clinical remission in patients with acute bacterial conjunctivitis (1,2). The patient should then be reviewed to assess recovery. Chlamydia can cause conjunctivitis and so in patients not responsive to treatment, this diagnosis may need to be considered. This is made clinically due to the present of large conjunctival follicles in the fornices, and following appropriate swabs and laboratory culture. If this diagnosis is confirmed, complete management will require the input of the genitourinary team.

Question 2

- a. Quantify risk of penetrating eye injury from high-energy work e.g. hammering or chiselling.
- b. Full eye examination including visual acuity. Exclude intra-ocular foreign body if necessary.
- c. Removal of the foreign body under local anaesthesia.

Discussion

It is important in the history to establish the exact circumstances of the incident. For example, he may be at risk of a penetrating eye injury, so establish what work he was doing at the time of the injury. If he was undertaking high-energy work (grinding, hammering) then he may have sustained a penetrating eye injury (3). The use of safety goggles should be established and may be a health and safety issue. In addition to the usual medical history, tetanus status is important to establish. Examination of the eye should include a record of visual acuity. Check the range of motion and pupillary reactions. When examining the surface of the eye for foreign bodies, check all areas of the surface. Remember to evert the upper lid using a cotton bud. The process will be facilitated by (and the patient will thank you for) the installation of topical local anaesthetic (amethocaine drops). Fluorescein drops stain any abrasions green in the presence of blue light and are an essential step in this examination. If there is any doubt as to the mechanism of injury, orbital X-rays are required to look for an intra-orbital foreign body. This may necessitate referral to the local hospital for the X-rays and subsequent management.

The foreign body must be removed by first anaesthetising the eye with amethocaine drops and gently removing the object with a moistened cotton wool bud (3). If this fails, the bevelled surface of a green needle (not the point) should be used to remove the object. The patient must be in a position to co-operate fully with this procedure, as any sudden movement puts them at risk of corneal penetration. This should never be performed with the patient supine, as they should always be able to withdraw from the

Table 1. Differential diagnosis of the painful red eye.

Condition	Signs & symptoms
Bacterial conjunctivitis	Gritty sensation, red eye, sticky discharge. Eyes may be stuck together in the morning.
Viral conjunctivitis	Red, watering ++, photophobia. Possibly pre-auricular lymphadenopathy.
Allergic conjunctivitis	Red, watering ++. History of hay fever or other allergies. Rhinitis. Conjunctival oedema.
Foreign body	History of something going into eye. Windy day. Painful, red, watering.
Corneal abrasion	Painful, red, watering. Often history of something hitting eye. Sensation of FB in eye.
Photokeratitis	Intense pain, watering, blepharospasm.
Acute iritis	Painful ++, watering. Floaters (hypopyon), photophobia, reduced vision. Small pupil. Ciliary injection (conjunctival hyperaemia at corneal-conjunctival border).
Acute closed angle glaucoma	Reduced vision, haloes around lights. Painful +++, headache, nausea, vomiting. Fixed oval semi-dilated pupil.
Episcleritis and Scleritis	Localised redness, dull ache.
Herpes simplex ulceration	Pain, photophobia. Vesicles in trigeminal distribution. Ulcer visible on fluorescein staining.

needle if they are feeling uncomfortable.

Once the foreign body is removed, re-examine the eye with fluorescein for the presence of an abrasion, which will require treatment with antibiotic cream or drops. Iron foreign bodies often leave rust rings – these should also be treated with antibiotic ointment but the patient should attend the local eye clinic within 48 hours for removal of the ring to prevent permanent staining of the eye.

Question 3

- a. An assessment of Airway (with cervical spine control), Breathing, Circulation and Disability, followed by a full secondary survey.
- b. Examine the eye as above. Specifically look for signs of fracture of the base of skull (see table 2).
- c. Consider X-rays of the cervical spine, facial views, and CT head.

Discussion

As with any injury, Advanced Trauma Life Support principles should be applied, and he should be assessed and treated using a structured approach, remembering the possibility of cervical spine injury in the presence of trauma above the clavicles. Consideration should then be given to the head injury and the eyes. Peri-orbital haematomas are associated with base of skull fractures, orbital floor fractures and soft tissue injuries. Signs of base of skull (BOS) fracture (Table 2) should be sought. Examine the function of the infra-orbital nerve (sensation of the skin overlying the maxilla, and upper central teeth). After palpating the orbital rim, full examination of the eye must be undertaken. In the presence of gross swelling, this may be limited to merely opening the lids and visualising an intact globe with pupillary reflexes. Ideally, however, visual acuity should be recorded, as should range of eye motion. Ophthalmoscopy should be undertaken, looking for blood in the anterior chamber (hyphaema), vitreous haemorrhage and retinal detachment.

Consider the need for cervical spine X-rays. The head injury may necessitate investigation with CT scan and appropriate neurosurgical referral (see the recent NICE guidelines on head injury management) (4). To exclude orbital margin fractures, a series of facial X-rays is required. Pay particular attention to the maxillary sinus where a fluid level is suggestive of blood, and the presence of a teardrop sign from the roof of the sinus indicates prolapse of infra-orbital fat into the sinus (a blowout fracture). This leads to tethering of the inferior orbital muscles with restricted upward gaze and vertical diplopia. Maxillo-facial referral will be necessary for definitive treatment if this is suspected.

Table 2. Signs of base of skull fracture.

<ul style="list-style-type: none"> ◆ Bilateral periorbital haematomas (Raccoon eyes) ◆ CSF rhinorrhoea ◆ CSF otorrhoea ◆ Battle’s sign (bruising over mastoid process) ◆ Sub-conjunctival haemorrhage with no posterior margin ◆ Sub-hyaloid haemorrhage
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Question 4

- a. Ultraviolet light induced photokeratitis (snow-blindness).
- b. Topical and systemic analgesia. Cycloplegic drops.

Discussion

The most likely diagnosis is photokeratitis as a result of ultraviolet light causing damage to the cornea. It is sometimes seen in people who choose to wear designer sunglasses in favour of military issue eye protection but more commonly seen in climbers who have lost their eye protection. Establish what, if any, protective eyewear has been worn through the day, and exclude other causes of a painful red eye (Table 1) by taking a full history and performing a full examination.

Management involves control of symptoms, with topical anaesthesia (amethocaine) initially, followed by adequate oral (or parenteral) analgesia. Additionally, a topical antibiotic should be prescribed (e.g. chloramphenicol eye ointment to be applied 4 times daily) for 3 days to prevent infection and lubricate the eye. The patient should if possible be kept in a dark room and avoid bright lights for at least 24 hours. Dilatation of the pupils may be necessary to control painful ciliary spasm, using cyclopentolate 1% or homatropine 2% drops, which dilate the pupil for about 6 hours (5). Usually the condition is temporary and will recover in 48 hours. It is similar in nature to arc eye seen in welders.

Question 5

- a. Full examination of the eye is essential, starting with visual acuity in both eyes. Examine the other cranial nerves. Test for jaw claudication and palpate over the temporal arteries. Record the blood pressure.
- b. See Table 3.
- c. Refer urgently to an ophthalmologist.

Discussion

If the patient is unable to read a Snellen chart, assess ability to count fingers held in front of the eye. If unable to see any fingers, assess the ability to see a light flashed in front of the affected eye. Examine the range of eye movements, pupil reactions including assessment for an afferent pupillary defect,

Table 3. Differential diagnosis of sudden visual loss.

NAAION	Non-arteritic anterior ischaemic optic neuropathy, most common in 46-65 year old overweight male smokers with diabetes and high blood pressure
CRAO	Usually embolic in nature. Vision down to counting fingers or worse. Afferent pupillary defect. Pale retina, cherry red spot. Cattle trucking in arteries. Rx digital massage, aspirin, refer urgently.
CRVO	Commoner. Low VA with afferent pupillary defect. Stormy sunset fundus. Flame haemorrhages, dilated veins. Refer urgently.
Giant Cell Arteritis	Headaches, jaw claudication, malaise, muscle pain. Acutely causes a unilateral swollen disc. Rare in patients under 60 years old.
Vitreous bleed	Diabetics, bleeding disorders. Retinal tears. No red reflex, low VA. Nurse upright. Refer urgently.
Retinal detachment	Flashing lights / floaters with decreased vision or presence of curtain in field of vision. Most commonly seen in myopes.
Optic neuritis	Loss over a few days. Pain on eye movement. Afferent pupillary defect, usually normal disc exam. Some develop multiple sclerosis.

and then undertake ophthalmoscopy. This, when combined with the history, should allow differentiation between the possible causes.

The mostly likely diagnosis is a non-arteritic anterior ischaemic optic neuropathy. The patient will have decreased vision, an afferent papillary defect and a swollen disc. Management includes controlling systemic risk factors, including the use of aspirin 325mg to reduce the risk of a similar event occurring in the fellow eye (up to 25% fellow eye involvement over 5 years in untreated patients).

Another potential cause is central retinal artery occlusion (CRAO), typically presenting with sudden painless loss of vision, and may result in total lack of light perception. The aim of treatment is to restore perfusion to the retinal circulation by dislodging the embolus, reducing intra-ocular pressure or dilating the retinal arteries (6). If it is suspected, get the patient to manually massage the globe for 5 in every 10 seconds, and have them re-breathe into a paper bag. A stat dose of intravenous acetazolamide 500mg has also been recommended (6).

Lack of red reflex on ophthalmoscopy suggests a vitreous bleed. Other causes to consider include migraine (typically a history of similar events is present), cerebrovascular event (usually associated with other neurological signs) and disciform macular degeneration (a sudden loss of central vision). If there is the possibility of Giant Cell arteritis with a raised CRP and ESR, 80mg of oral prednisolone should be given before referral.

Question 6

- Acute closed angle glaucoma
- Checking intra-orbital pressure is the only accurate means of establishing the diagnosis.
- Give strong analgesia and a parenteral anti-emetic if necessary. Instil pilocarpine drops (2%) and consider the use of intravenous acetazolamide. Refer for ophthalmological opinion if acute closed angle glaucoma is suspected.

Discussion

Acute closed angle glaucoma is an ophthalmologic emergency and warrants immediate referral for specialist opinion. The history is typically of preceding blurring of vision or haloes around lights, caused by corneal oedema. This is followed by intense pain with headache, nausea and vomiting when the blockage occurs (often in the evening as the pupil becomes semi-dilated). Examination reveals a red eye with fixed semi-dilated pupil, which is often ovoid in shape. The eye is tender to palpate and feels hard through the upper eyelid. Vision may be impaired depending on the degree of corneal oedema. Examination through an ophthalmoscope or slit lamp may reveal a shallow anterior chamber.

Pilocarpine 2% drops should be instilled into both eyes while waiting for an ophthalmological opinion. If the opinion will be delayed, 500mg of intravenous acetazolamide should be given to reduce intra-ocular pressure. Delay in treatment can lead to the development of adhesions between the iris and cornea. Many patients go on to have bilateral iridotomy to prevent recurrence of the disease (7,8)

Question 7

- Microbacterial keratitis
- Careful inspection of the cornea will reveal signs of infection, usually an opaque area which takes up fluorescein stain intensely.
- Intensive topical fluoroquinolone antibiotic (every hour day and night), cycloplegia for comfort and urgent referral for ophthalmic review.

Discussion

Microbacterial keratitis associated with contact lens wear is an important cause of preventable visual loss in the working population. Any patient with a red eye and a history of contact lens wear requires careful assessment as the consequences of missed infection can be severe visual loss. Poor

hygiene and extended wear contact lenses increase the risk of developing this condition. Service personnel, due to the unique demands of military duty, may be unable to follow the appropriate cleaning protocols and may use their lenses for longer periods than recommended. In the last year, seven personnel have returned from Operation Telic with this condition.

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