

# CHAPTER 16

## EYE CONDITIONS

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### 16.1 EYE INFECTION, COMPLICATED (SEVERE EYE INFECTION)

H44

#### DESCRIPTION

Intensely painful eye infection characterised by a red eye with or without a discharge (excluding simple or non-painful conjunctivitis).

Assess clinically for:

- » Herpes conjunctivitis, indicated by vesicles on skin next to the eye.
- » Loss of vision.
- » Irregularity of the pupil.
- » Haziness of the cornea.

#### Investigations

Swab the eye for microbiological culture.

#### GENERAL AND SUPPORTIVE MEASURES

Patient education on personal hygiene to avoid spread.  
Educate patient on correct application of ophthalmic drops.

Advise patient:

- » to wash hands thoroughly before applying ophthalmic ointment,
- » not to share ophthalmic ointments or drops,
- » not to rub eyes, and
- » never to use urine or milk to wash the eyes.

#### MEDICINE TREATMENT

If herpes infection is suspected, treat as outlined in section 16.3: Herpes keratitis and conjunctivitis. If a bacterial cause is demonstrated or suspected:

During the day:

- Tobramycin, ophthalmic drops, instil 1 drop 4–6 hourly.
- OR
- Chloramphenicol, 0.5% ophthalmic drops, instil 1 drop 4–6 hourly.

#### AND

Apply at night:

- Tobramycin, 0.3% ophthalmic ointment.
- OR
- Chloramphenicol, 1% ophthalmic ointment.

**REFERRAL**

**To an ophthalmologist within 24 hours** if associated with any of the following acute signs:

- » Reduced vision.
- » A cloudy cornea.
- » A corneal opacity or a staining corneal ulcer.
- » Pus and blood level in the anterior chamber (hypopyon and hyphaema).
- » Cloudiness in the anterior chamber (poor view of iris details).
- » An irregular or dilated (including partially dilated) pupil.
- » A cloudy or poor view of the retina.
- » A poor or greyish red-reflex.
- » Proptosis.
- » Restricted ocular movements.
- » Severe ocular pain.

**Non-urgent referral:**

- » A unilateral red eye for more than one day.
- » No improvement after 5 days of treatment.

**16.2 CONJUNCTIVITIS**

H10.1

See Primary Healthcare Level Standard Treatment Guidelines and Essential Medicines List, Chapter 18: Eye Conditions, sections:

- » 18.1 Conjunctivitis:
  - > 18.1.1 Conjunctivitis, allergic.
  - > 18.1.2 Conjunctivitis, bacterial (excluding conjunctivitis of the newborn).
  - > 18.1.3 Conjunctivitis of the newborn.
  - > 18.1.4 Conjunctivitis, viral (pink-eye).

**16.3 HERPES KERATITIS AND CONJUNCTIVITIS**

B00.5

**DESCRIPTION**

Herpes infection of the cornea and/or conjunctiva.

**DIAGNOSTIC CRITERIA**

There are three most common forms of this disease.

**Blepharoconjunctivitis**

- » Primary ocular infection involving the eyelids and/or conjunctivae.
- » The condition is benign and self-limiting.
- » May be associated with keratitis: tiny punctuate stains on the cornea when stained with fluorescein and viewed with the cobalt blue light of the direct ophthalmoscope.

**Disciform keratitis**

- » Immune response to herpes virus.
- » Decreased visual acuity and corneal sensation.
- » Round, dull, swollen area in the central cornea.
- » Decreased sensation when compared to the other eye. (Use a thread of cotton from a cotton bud and touch the cornea from the side, away from the visual axis).
- » Refer to an ophthalmologist.

**Dendritic ulcer**

- » A linear branching ulcer (dendritic ulcer) when stained with fluorescein and viewed with the cobalt blue light of the direct ophthalmoscope.
- » Decreased sensation when compared to the other eye. (Use a thread of cotton from a cotton bud and touch the cornea from the side, away from the visual axis).

**GENERAL AND SUPPORTIVE MEASURES**

- » Pad the eye.

**MEDICINE TREATMENT**

- Aciclovir, ophthalmic ointment, applied 5 times per day for 10 days.

OR

- Aciclovir, orally, 20 mg/kg, 5 times per day for 10 days.

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If painful ciliary spasm is present:

- Atropine, ophthalmic drops, instil 1 drop, 12 hourly.

**REFERRAL****Urgent within 24 hours:**

- » If the corneal lesion is not clean/clear or has whitish areas within the bed of the epithelial ulcer.
- » If the area of corneal staining is not smaller within 24 hours of treatment.
- » If there is a history of recurrence.
- » Disciform keratitis for assessment and treatment.

**16.4 CYTOMEGALOVIRUS (CMV) RETINITIS**

B25.8

**DESCRIPTION**

Characteristic appearance: opacification of the retina with areas of haemorrhage, exudate and necrosis.

Occurs in immunocompromised patients and could be an important cause of visual impairment in HIV-infected patients.

**DIAGNOSTIC CRITERIA**

- » Confirm retinitis with ophthalmological assessment.
- » Confirm CMV disease with DNA PCR.

## MEDICINE TREATMENT

Ganciclovir, intravitreal, 2 mg, once a week (ophthalmologist treatment). Once immune function has been restored with antiretroviral therapy, i.e. CD4 > 100 cells/mm<sup>3</sup>, maintenance ganciclovir can be stopped but monitor for recurrence.

## REFERRAL

» All patients to confirm diagnosis and manage treatment.

## 16.5 CHEMICAL BURN TO THE EYE

T26.9

### DESCRIPTION

Damage to one or both eyes caused by contact with irritating chemical substances, either alkali or acid.

Presentation:

- » pain,
- » inability to open the eye(s),
- » blurred vision, and
- » excessive tearing.

### DIAGNOSTIC CRITERIA

To assess the extent of epithelial loss, after irrigating the eye(s), stain the cornea with fluorescein 2%.

**Note:** If the entire cornea stains, then all the epithelium has been removed by the chemical substance. Compare to fluorescein staining in the other eye.

### GENERAL AND SUPPORTIVE MEASURES

Try to ascertain the exact nature of the chemical agent (without causing a delay in management and referral) by checking the pH of the conjunctival sac with litmus paper. (Alternatively, the pH-square of a urine test-strip may be used.) Normal tear pH: 6.5–7.6.

Irrigate affected eye(s) immediately and continuously with copious amounts of sterile water (at least 2 L). Use an eye speculum and an IV fluid delivery set. If the chemical agent is alkaline, prolong irrigation.

**Note:** Do not attempt to neutralise alkali with acid or vice versa.

### MEDICINE TREATMENT

Anaesthetise eye(s) after rinsing the eye(s) and before instilling fluorescein.

- Topical anaesthetic, e.g. oxybuprocaine, ophthalmic drops, instil 1 drop. Repeat every 15 minutes, if necessary.

For pain:

- Paracetamol, oral, 15 mg/kg/dose 6 hourly as required.

## REFERRAL

### Urgent:

- » Any severe chemical burn producing any epithelial loss or cloudiness of the cornea and/or conjunctival blanching.

## 16.6 PENETRATING EYE INJURY WITH/WITHOUT A FOREIGN BODY

S05.5/S05.6

### DESCRIPTION

Penetration through the cornea or sclera to deeper structures with/without a foreign body still present.

### DIAGNOSTIC CRITERIA

Urgently refer the patient with a penetrating eye injury or a severely contused eye to an ophthalmic specialist to avoid endophthalmitis and loss of the eyeball.

### GENERAL AND SUPPORTIVE MEASURES

#### Note:

Use only preservative-free sterile eye drops if there is a possibility of an open eye injury. Do not apply ointment.

Apply a clean sterile eye shield that does not cause pressure on the globe and transfer the patient to the nearest specialist eye unit. If no eye shield is available, the bottom ⅓ of a paper cup may be used.

In cases of high velocity injury with radio-opaque material (metals, certain glass types), an orbital X-ray will reveal a suspected retained intra-ocular foreign body.

### SURGICAL TREATMENT

Should be done by an ophthalmic specialist with an operating microscope.

## REFERRAL

### Urgent

- » Any severe blunt trauma to the eye.
- » A penetrating eye injury with/without a foreign body.
- » Corneal or scleral laceration.
- » Distorted pupil.
- » Flat, shallow or deep anterior chamber (comparative to the other eye).
- » Blood inside the eye.

## 16.7 NON-PENETRATING EYE INJURY

S05.1

### DESCRIPTION

An intact cornea and sclera, but severely contused eye.

A foreign body on or embedded in the cornea of an intact eye.

### DIAGNOSTIC CRITERIA

Signs depend on the site affected and nature of the non-penetrating trauma.

#### Corneal injury

- » Contusion: hazy oedematous cornea.
- » A foreign body embedded on/in the cornea.

#### Iris injury

- » Sphincter rupture: dilated or irregular pupil margin.
- » Hyphaema: blood in the anterior chamber due to rupture of the blood vessels.

#### Lens injury

- » Cataract: reduced red-reflex.

#### Lens suspensory ligaments injury

- » Subluxed or dislocated lens: abnormal lens position.

#### Retinal injury

- » Blood vessel injury: blood in vitreous or blood on/in the retina.
- » Retinal breaks and tears.

#### Choroidal injury

- » Choroidal break: blood or sclera visible under the retina.

#### Optic disc

- » Disc swelling or pallor.

### MEDICINE TREATMENT

#### **Corneal injury**

A superficial corneal foreign body may be removed with a bud or hypodermic needle.

To anaesthetise the cornea for removal of a foreign body:

- Topical anaesthetic, e.g. oxybuprocaine, ophthalmic drops, instil 1 drop. Repeat every 15 minutes, if necessary.

To relieve discomfort caused by iris spasm:

- Atropine, 1% ophthalmic drops, 1 drop instilled immediately and 12 hourly until epithelialisation is complete.
- Chloramphenicol, ophthalmic ointment, applied 8 hourly for 5–10 days.

**Iris injury****Sphincter rupture**

Manage conservatively. Follow-up in four days to exclude hyphaema.

**Hyphaema (blood behind the cornea)**

Bed rest for five days.

Monitor for complications, i.e. increased intraocular pressure, corneal staining, secondary bleed.

- Atropine, 1% ophthalmic drops, instil 1 drop 12 hourly for 5 days.

**PLUS**

Topical corticosteroid drops:

- Dexamethasone, ophthalmic drops, instil 1 drop 4 hourly for 5 days.

**REFERRAL**

- » A deeply embedded or full thickness corneal foreign body.
- » Hyphaema, if unable to monitor for complications or if complications develop.
- » Any eye with severe trauma and decreased visual acuity.
- » Lens, retina and choroidal injuries – refer within 12 hours.

**16.8 RETINOPATHY OF PREMATURITY (ROP)**

H35.1

**DESCRIPTION**

ROP is a potentially preventable cause of blindness.

ROP is classified into five stages, ranging from mild (stage I) to severe (stage V):

**Stage I** – Mildly abnormal blood vessel growth.

- » Many children who develop stage I improve with no treatment and eventually develop normal vision.
- » The disease resolves on its own without further progression.

**Stage II** – Moderately abnormal blood vessel growth.

- » Many children who develop stage II improve with no treatment and eventually develop normal vision.
- » The disease resolves on its own without further progression.

**Stage III** – Severely abnormal blood vessel growth.

- » The abnormal blood vessels grow toward the centre of the eye instead of following their normal growth pattern along the surface of the retina.
- » Some infants who develop stage III improve with no treatment and eventually develop normal vision.
- » However, when infants have a certain degree of stage III and 'plus disease' develops, treatment is considered.
- » 'Plus disease' means that the blood vessels of the retina have become enlarged and twisted, indicating a worsening of the disease.
- » Treatment at this point has a good chance of preventing retinal detachment.

**Stage IV** – Partially detached retina.

- » Traction, from the scar produced by bleeding and abnormal vessels, pulls the retina away from the wall of the eye.

**Stage V** – Completely detached retina and the end-stage of the disease.

- » If the eye is left alone at this stage, the baby can have severe visual impairment and even blindness.

**TIMING OF SCREENING**

Screening should be done at 4-6 weeks' chronological age or 31–33 weeks' post conception age (whichever comes later).

**MEDICINE TREATMENT**

Dilation of the pupils for ROP screening by ophthalmologist:

- Cyclopentolate 0.5%/phenylephrine 2.5%, ophthalmic drops, instil 1 drop every 5 minutes for 3 doses 1 hour before examination.

**REFERRAL**

- » All neonates weighing less than 1250 g OR  $\leq 30$  weeks' gestational age OR those 1250 g–1500 g with high risk for ROP (on prolonged oxygen) should be screened for ROP by ophthalmological examination.

**16.9 CONGENITAL GLAUCOMA**

Q15.0

**DESCRIPTION**

Congenital glaucoma is caused by abnormal development of the draining angle of the eye.

**DIAGNOSTIC CRITERIA**

Symptoms:

- » Tearing
- » Photophobia
- » Blepharospasm

Signs:

- » Enlarged eye (buphthalmos or 'cow eye' appearance).
- » Corneal haziness (due to corneal oedema or scarring).
- » Optic disc cupping.
- » Raised intraocular pressure.

**REFERRAL**

**Urgent (to ophthalmologist):**

- » All patients.



## 16.10 LEUKOCORIA

H44.53

### DESCRIPTION

Common causes of leukocoria (white pupil) include:

- » retinoblastoma,
- » cataract,
- » persistent foetal vasculature, and
- » end-stage ROP.

### DIAGNOSTIC CRITERIA

- » A white appearance of the pupil instead of the usual black colour.
- » An absent or diminished red-reflex of the fundus of the eye when examined with a direct ophthalmoscope or on a photograph of the child.

### REFERRAL

#### Urgent (to ophthalmologist):

- » All patients.

## 16.11 STRABISMUS

H50.9

### DESCRIPTION

Strabismus (squint) is a misalignment of the two eyes.

**A non-paralytic squint (concomitant strabismus):** will not have restrictions of ocular movements in any of the eye positions.

**A paralytic squint (incomitant strabismus):** will have a restriction in one or more of the six cardinal eye positions. Consider cranial nerve palsy (III, IV or VI). Do a full neurological examination.

### Complications of strabismus

- » Amblyopia: a sensory state of an eye where abnormal visual development occurs if that eye is not being used by the brain. Untreated amblyopia leads to permanent visual impairment.
- » Diplopia: when a strabismus occurs after the development of binocularity, the child will perceive a sensation of double vision (diplopia). Binocularity develops during the first decade.

### DIAGNOSTIC CRITERIA

- » The corneal light reflex: Patient is asked to fixate on a light held by the examiner at a distance of 33 cm. The light glistening on the cornea is displaced relative to the pupil.
- » The cover test: Cover one eye and then the other. This elicits a re-fixation movement of the non-fixating eye.

## REFERRAL

- » All children with a squint.
- » **Urgent:** any acute onset of strabismus.
- » Within 24 hours: incomitant strabismus.
- » Within 1 week: if complications of strabismus are present.
- » Within 1 month: concomitant strabismus.

## 16.12 LOSS OF VISION

H53.1

### DESCRIPTION

Causes of sudden loss of vision in an outwardly normal eye include:

- » retinal detachment,
- » occlusion of the retinal artery or retinal vein(s),
- » vitreous haemorrhage,
- » optic and retrobulbar neuritis, and
- » choroiditis.

Causes of gradual loss of vision in an outwardly normal eye include:

- » refractive errors,
- » cataracts,
- » retinopathies,
- » malignancies, and
- » optic nerve and chiasmal disease.

Loss of vision may also be associated with trauma, inflammation or other abnormalities.

### REFERRAL

- » **Urgent:** all children with sudden visual loss for full ophthalmic assessment and management.
- » As soon as possible: all children with gradual visual loss, which is not fully corrected by refraction.

## 16.13 PRESEPTAL AND ORBITAL CELLULITIS

H05.019/H05.012

### DESCRIPTION

Preseptal cellulitis (cellulitis of the tissues anterior to the orbital septum) is generally a mild condition that rarely leads to serious complications, whereas orbital cellulitis (involving the tissues posterior to the orbital septum, including the fat and muscle within the bony orbit) may cause loss of vision and even loss of life.

## DIAGNOSTIC CRITERIA

Patients with local tenderness (lid erythema/oedema only) and a normal eye examination can be treated for preseptal cellulitis with oral antibiotics.

However, care should be taken to identify those at risk of orbital cellulitis, who require admission and intravenous antibiotics. CT scan is warranted in patients with central signs (drowsiness, vomiting, headache, seizures or cranial nerve lesions), where vision cannot be accurately assessed, gross proptosis, ophthalmoplegia, deteriorating visual acuity or colour vision, bilateral oedema, no improvement or deterioration at 24 hours, or a swinging pyrexia not resolving within 36 hours.

## MEDICINE TREATMENT

### Initial management:

- Ceftriaxone, IV, 50 mg/kg once daily.

### OR

If one month old or younger:

- Cefotaxime, IV, 50 mg/kg/dose 6–8 hourly.

If the diagnosis of **preseptal cellulitis is confirmed**, switch to:

- Amoxicillin/clavulanic acid, oral, 30 mg/kg/dose of the amoxicillin component, 8 hourly for 10 days.

If the diagnosis of **orbital cellulitis is confirmed**, continue on intravenous antibiotics.

## REFERRAL

- » Patients with central signs.
- » Patients where vision cannot be accurately assessed.
- » Patients with gross proptosis, ophthalmoplegia, deteriorating visual acuity or colour vision.
- » Patients with bilateral oedema.
- » No improvement or deterioration after 24 hours of therapy.
- » Swinging pyrexia not resolving within 36 hours.
- » Orbital cellulitis secondary to chronic sinusitis (may be at risk of multiple abscesses).

## References

<sup>1</sup> Aciclovir: Wilhelmus KR. (2015). Antiviral treatment and other therapeutic interventions for herpes simplex virus epithelial keratitis. The Cochrane database of systematic reviews, 1, CD002898. <https://doi.org/10.1002/14651858.CD002898.pub5>

<sup>2</sup> White ML, Chodosh J. Herpes Simplex Virus Keratitis: A Treatment Guideline. Hoskins Center for Quality Eye Care and American Academy of Ophthalmology Website; 2014. Available at: <https://www.aaopt.org/clinical-statement/herpes-simplex-virus-keratitis-treatment-guideline>