# CHAPTER 1 – EYES

First Nations and Inuit Health Branch (FNHIB) Clinical Practice Guidelines for Nurses in Primary Care.
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ASSESSMENT OF THE EYES

HISTORY OF PRESENT ILLNESS AND REVIEW OF SYSTEMS

The following characteristics of each symptom should be elicited and explored:
- Onset (sudden or gradual)
- Chronology
- Current situation (improving or deteriorating)
- Location
- Radiation
- Quality
- Timing (frequency, duration)
- Severity
- Precipitating and aggravating factors
- Relieving factors
- Associated symptoms
- Effects on daily activities
- Previous diagnosis of similar episodes
- Previous treatments
- Efficacy of previous treatments

CARDINAL SYMPTOMS

In addition to the general characteristics outlined above, additional characteristics of specific symptoms should be elicited, as follows:
- Vision changes (recent)
- Blurring
- Halos
- Flashing lights
- Floaters
- Pain
- Irritation
- Foreign-body sensation
- Photophobia
- Diplopia
- Lacrimation
- Itching
- Discharge
- Corrective measures (glasses, contact lenses)

Other Associated Symptoms

- Ear pain
- Nasal discharge
- Sore throat
- Cough
- Nausea or vomiting
- Urethral, vaginal or rectal discharge
- Pain or inflammation of the joints (or both)

MEDICAL HISTORY (SPECIFIC TO EYES)

- Eye diseases or injuries
- Eye surgery
- Use of corrective eyeglasses or contact lenses
- Concurrent infection of the upper respiratory tract
- Sexually transmitted diseases
- Immunocompromise
- Exposure to eye irritants (environmental or occupational)
- Allergies (especially seasonal)
- Current medications
- Systemic inflammatory disease (inflammatory bowel disease, Reiter’s syndrome)
- Diabetes mellitus
- Hypertension
- Chronic renal disease
- Bleeding disorders

PERSONAL AND SOCIAL HISTORY (SPECIFIC TO EYES)

- Occupational exposure to irritants
- Use of protective eyewear
- Housing and sanitation conditions
- School or daycare exposure to contagious organisms (for example, pinkeye)
GENERAL PHYSICAL EXAMINATION

EYES
Examine the bony orbit, lids, lacrimal apparatus, conjunctiva, sclera, cornea, iris, pupil, lens and fundi.

Note the following:
- Visual acuity (which is decreased in keratitis, uveitis and acute glaucoma)
- Redness
- Swelling
- Discharge or crusting
- Discolouration (erythema, bruising or hemorrhage)
- Lipid deposits
- Arcus senilis (white circle) around iris
- Position and alignment of eyes
- Reaction of pupil and its accommodation to light
- Extraocular movements (which are associated with pain in uveitis)
- Visual fields to confrontation (which is decreased in glaucoma)
- Corneal clarity, abrasions and lacerations
- Corneal light reflex
- Lens opacities (cataracts)
- Red reflex (which indicates intact retina)
- Hemorrhage or exudates of retina
- Optic disk and retinal vasculature
- After application of fluorescein stain, corneal cells that have been damaged or lost will stain green; cobalt blue light allows easier visualization of the abrasion. Note: Remove contact lenses prior to application
- If eye lid spasm is severe, it may be necessary to instill a topical eye anesthetic such as tetracaine hydrochloride. Do not force the lid open or instill any drops if there is concern of a laceration. The dosage for tetracaine 0.5% (Pontocaine) is 2 drops, stat dose only

Palpate the bony orbit, eyebrows, lacrimal apparatus and pre-auricular lymph nodes for tenderness, swelling or masses.

Do not palpate the globe if rupture injury is suspected or if the client has recently undergone eye surgery.

The ear, nose and throat should also be examined if there are symptoms of an upper respiratory tract infection or if sexually transmitted disease (for example, gonorrhea) is suspected.

LYMPHATIC SYSTEM
Assess the lymph nodes of the head and neck if a systemic condition, such as a viral infection of the upper respiratory tract or a sexually transmitted disease, is suspected.

Assess for pre-auricular adenopathy, which might indicate chlamydial, viral or invasive bacterial infection of the eye (for example, gonorrhea).

ABDOMEN
Assess liver for tenderness and enlargement if eye symptoms are associated with symptoms of a sexually transmitted disease (for example, disseminated gonorrhea) (see “Examination of the Abdomen” in Chapter 5, “Gastrointestinal System”).

GENITOURINARY SYSTEM AND RECTAL AREA
Assess for urethral, cervical or vaginal discharge if eye symptoms are associated with symptoms of a sexually transmitted disease (for example, disseminated gonorrhea) (see Chapter 11, “Communicable Diseases”, “Physical Examination” section).

MUSCULOSKELETAL SYSTEM AND EXTREMITIES
Examine the joints to assess for warmth, redness, pain or swelling if eye symptoms are associated with joint symptoms (for example, disseminated gonorrhea) (see Chapter 7, “Examination of the Musculoskeletal System”).
DIFFERENTIAL DIAGNOSIS OF EYE SYMPTOMS OR OCULAR PAIN

- Hordeolum
- Chalazion
- Acute dacryocystitis
- Exposure to irritants
- Conjunctival infection
- Corneal abrasion
- Foreign-body irritation
- Corneal ulcers
- Ingrown lashes
- Misuse of contact lens
- Scleritis
- Inflamed pterygium
- Inflamed pinguecula
- Acute angle-closure glaucoma
- Uveitis (iritis)
- Referred pain from extraocular sources such as sinusitis, tooth abscess, tension headache, temporal arteritis or prodrome of herpes zoster

COMMON PROBLEMS OF THE EYE

AGE-RELATED MACULAR DEGENERATION

Age-related macular degeneration (AMD) is a degenerative condition of the macula (the central retina). It is the most common cause of vision loss in those 65 years of age or older.

Macular degeneration varies widely in severity. In the worst cases, it causes a complete loss of central vision, making reading or driving impossible. In other cases, it may only cause slight distortion. Macular degeneration does not cause total blindness because it does not affect the peripheral vision.

TYPES

Atrophic (dry) macular degeneration (non-neovascular)
- Most common type of AMD (90% of cases)
- Characterized by a less severe, more gradual, loss of vision

Exudative (wet) macular degeneration (neovascular)
- Rare and more severe type of AMD
- About 10% of people who suffer from macular degeneration have the wet type
- May progress rapidly causing significant central vision loss
- Clients with wet macular degeneration develop new blood vessels under the retina, which cause hemorrhage, swelling and scar tissue

CAUSES

- No conclusive evidence exists pointing to any one cause
- Heredity may play a part

Risk Factors

- Female gender
- Family history
- Incidence increases with age
- Ultraviolet (UV) light exposure
- Prolonged or frequent exposure to UVA and UVB rays
- Smoking
- Hypertension

HISTORY

- Blurred or fuzzy vision (onset may be gradual or acute)
- Straight lines (such as sentences on a page or telephone poles) appear wavy
- Intermittent shimmering of lights
- Central blind spot in visual field may occur (gradual with the dry type, sudden with wet type)
- Difficulty reading or performing tasks that require the ability to see detail

PHYSICAL FINDINGS

- Decreased visual acuity
- Peripheral vision normal (unless another eye problem affecting peripheral field vision exists)
- Drusen (small, yellowish deposits that form within the layers of the retina)
− Loss of pigment in the retina (a yellow-white area of atrophy may occur)
− Subretinal or intraretinal blood or serous fluid may be present
− Subretinal blood may appear greenish or gray
− Retinal detachment may occur (due to blood or serous fluid)
− Amsler grid distortion may occur; an Amsler grid is a chart with horizontal and vertical lines that is used to detect distortion or blind spots in the central 10 degrees of the visual field

DIFFERENTIAL DIAGNOSIS
− Retinal detachment
− Diabetic retinopathy

COMPLICATIONS
− Blindness

DIAGNOSTIC TESTS
Visual acuity, including peripheral vision by an optometrist.

MANAGEMENT
Goals of Treatment
− Primary preventive measures
− Secondary prevention of further visual loss

Primary Prevention
Regular eye exams over age 40 years by an optometrist or an ophthalmologist. The earlier problems are detected, the better the chance of preventing vision loss.

Secondary Prevention
− Smoking cessation
− Control of hypertension

Current Available Therapies
Dry form: There is no proven effective treatment. Low-vision rehabilitation can help those with significant vision loss to maintain excellent quality of life.

Wet form: Laser surgery or photodynamic therapy may help, as may low-vision rehabilitation.

Consultation
Consult a physician for any client with suspected undiagnosed macular degeneration, or if there are significant changes in symptoms in a previously diagnosed client.

Nonpharmacologic Interventions
Nutrition and diet:
− Advise client to incorporate dark leafy green vegetables into diet (for example, spinach, collard greens, kale and turnip greens). Research on the link between diet and AMD risk has shown that intake of a variety of food types may positively alter the risk of developing AMD. For example, a high consumption of linoleic acid, monounsaturated, polyunsaturated and vegetable fats – fats commonly found in many snack or “junk” foods – was associated with double the risk of developing AMD. People with limited intake of linoleic acid, and who ate two or more servings per week of fish high in omega-3 fatty acids, had a lower risk for developing AMD. Other studies have shown that intake of fruits may reduce the risk of AMD, as would diets rich in carotenoids, such as lutein and zeaxanthin, found in dark green leafy vegetables and some berries1
− Advise regular monitoring of vision with an Amsler grid (demonstrate its use)
− Protect eyes with sunglasses that have ultraviolet protection
− Advise client to quit smoking (smoking impairs the body’s circulation, decreasing the efficiency of the retinal blood vessels)
− Advise client to exercise regularly (cardiovascular exercise improves the body’s overall health and increases the efficiency of the circulatory system)
− Provide emotional support; adjusting to vision loss can be difficult
− Recommend available support groups for people with low vision (for example, CNIB programs)
− Encourage support from friends and family by encouraging them to provide help (such as rides to appointments) when needed

Client Education
Tips to make reading easier:
− Use a halogen light (these have less glare and disperse light better than standard light bulbs)
− Shine the light directly on reading material (this improves the contrast and makes the print easier to see)
− Use a hand-held magnifier, which can increase the print size dramatically
− Try large-print or audio books
Pharmacologic Interventions

ASA therapy may be initiated by a physician to slow progression of the disease.

Monitoring and Follow-Up

- Clients with AMD should have regular eye exams by a physician and ophthalmologist; frequency of follow-up is usually set by the consulting physician/ophthalmologist
- Advise clients with AMD to report any changes in vision immediately

Referral

For acute vision changes, consult a physician about the need for an ophthalmology referral.

BLEPHARITIS

Inflammation of the eyelid margins. It can be a chronic problem as well as acute.

Types

- Anterior affects the skin, cilia follicles and/or the accessory glands of the eyelids
- Posterior involves inflammation or infection of the meibomian glands

Causes

Anterior

- Seborrhea or bacterial infection (with *Staphylococcus aureus*)
- Rosacea, dry eye syndrome, lice infestation of the lashes

Posterior

- A build-up of keratin plugging the glands

History

- Burning, itching or irritation of lid margin
- Condition commonly chronic, with frequent exacerbations
- Usually bilateral
- History of seborrhea (of the scalp, brows or ears)
- Loss of lashes

Physical Findings

- Lid margin red, scaly
- Crusting at base of lashes may be present
- Lashes may grow inward
- Visual acuity normal
- PERRLA (pupils equal, round, reactive to light; accommodation normal)
- Conjunctival redness may be present

Bacterial Form

- Dry scales
- Lid margin red
- Ulceration may be present
- Lashes tend to fall out

Seborrheic Form

- Greasy scales
- Lid margins less red
- No ulceration

Mixed Form

- Dry and greasy scales
- Lid margins red
- Ulceration may be present

Differential Diagnosis

- Allergic blepharitis
- Dry eye syndrome (keratoconjunctivitis sicca)
- Hordeolum (stye)
- Chalazion
- Conjunctivitis
- Skin cancer (unilateral) (for example, sebaceous cell carcinoma)

Complications

- Secondary bacterial infection common in seborrheic form
- Recurrence, possibly chronic
- Hordeolum (stye)
- Chalazion

Diagnostic Tests

- Swab exudate for culture and sensitivity (do only if there is no response to empiric treatment)
MANAGEMENT

Goals of Treatment
- Keep lid margin clean and free of scaly build-up
- Prevent infection

Appropriate Consultation
Consult a physician if the inflammation or infection is extensive (that is, includes more than the lid margins), as in orbital cellulitis.

Treat for several weeks, until the blepharitis is completely gone, to reduce chance of recurrence.

Nonpharmacologic Interventions
Lid hygiene (to be performed twice daily). First, apply warm compresses for 5 minutes to soften the scales and crusts. Next, gently scrub the eyelid margin and the bases of the eyelashes with a solution of water and baby shampoo (90 mL [3 oz] water and 3 drops of shampoo). Rinse with clear water and then remove lid debris with a dry, cotton-tipped applicator.

If nits and lice are present in the eyelashes, they can be carefully removed with tweezers followed by application of white petrolatum two to four times daily for 10 days.3

Client Education
- Counsel client about appropriate use of medications (dose, frequency, application)
- Instruct client in proper hygiene of eyelids
- Recommend that client avoid rubbing or irritating eyelids
- Recommend avoidance of cosmetics, wind, smoke and other irritants
- If chronic blepharitis is present, daily eyelid hygiene is recommended.4

Pharmacologic Interventions
Apply a topical antibiotic eye ointment to the lid margins and into the lower conjunctival sac:
- erythromycin 0.5% eye ointment, once to four times daily for 1–2 weeks, then hs for 4–8 weeks

Identify and manage underlying seborrhea (scalp, eyebrows or other skin areas).

Monitoring and Follow-Up
Follow up in 10–14 days.

Referral
Usually not necessary unless there is no response to therapy or if infection becomes more extensive (for example, orbital cellulitis).

CATARACTS
A decrease in the transparency of the crystalline lens to the degree that vision is impaired.

CAUSES
Protein coagulates in opaque areas in the lens for unknown reasons. Ninety-five percent of people over age 65 have some degree of lens opacity. Most cases (90%) occur as a natural process of aging. Other cases are metabolic, congenital or drug-induced, or are the result of ocular trauma or an ocular condition such as chronic anterior uveitis.

Factors that influence the risk of cataract development include exposure to ultraviolet B radiation; diabetes mellitus; use of alcohol; use of medications such as systemic corticosteroids, diuretics and certain antipsychotics; and lack of antioxidant vitamins.

HISTORY
- Diminished vision
- Increased perception of glare from lamps or sun or when driving at night
- Altered perception of colour (loss of contrast sensitivity)
- Presence of risk factors (see “Causes”)

PHYSICAL FINDINGS
- Visual acuity may be decreased in affected eye
- Funduscopic exam reveals opacities of the lens (with ophthalmoscope set at +10, these appear as dark areas against the background of the red-orange pupillary light reflex)

DIFFERENTIAL DIAGNOSIS
- Macular degeneration
- Diabetic retinopathy

COMPLICATIONS
- Risks associated with loss of vision (for example, falls, trauma)
Eyes

DIAGNOSTIC TESTS
- None

MANAGEMENT

Goals of Treatment
- Maintain optimal vision
- Prevent accidents (for example, falls)

Appropriate Consultation
Consult a physician on a non-urgent basis, unless vision is significantly diminished and there is risk of visual impairment, or cataract is related to ocular trauma or other eye disease process.

Nonpharmacologic Interventions
Non-surgical management includes changing lens prescription and using strong bifocal eyeglasses, magnification and appropriate illumination.

Client Education
- Counsel client that progression of cataract formation may be slowed by decreasing sun exposure or quitting smoking
- There is some suggestion that increasing the ingestion of antioxidant vitamins (if diet is deemed deficient in this area) may be of benefit. This is not supported by significant research evidence as yet
- Educate client regarding prevention of falls and accidents in the home
- Recommend use of magnification and appropriate illumination

Monitoring and Follow-Up
Follow-up (by physician) should be done at least annually.

Referral
Referral to an ophthalmologist for evaluation is necessary if client experiences increasing functional impairment. Decision concerning surgery is based on the degree of functional impairment.

MANAGEMENT AFTER CATARACT SURGERY

Goals of Care
- Control inflammation
- Detect raised intraocular pressure
- Prevent infection
- Maintain eye comfort
- Promote early visual rehabilitation

History
- Post-operative pain is usually minimal, with mild foreign-body sensation
- Increased pain may be due to inadvertent trauma, infection or increased intracranial pressure
- Itchy red eye
- Changes in vision: darkening or loss of detail (any significant post-operative change could indicate hemorrhage, retinal detachment, acute glaucoma or infection)
- Visual phenomena such as flashing lights or dark shadows require investigation

Eye Examination
- Redness or swelling of the conjunctiva or lids suggests infection or allergic response to medications
- Red reflex (confirm with ophthalmoscope)
- Corneal opacity
- Hyphema (blood in the anterior chamber)

Post-Operative Medication Review
- Antibiotics (such as ciprofloxacin or ofloxacin) are commonly used post-operatively to prevent infection
- Dilators such as tropicamide or phenylephrine drops are used to ease discomfort and to keep the iris away from the implant during the early healing period
- Glaucoma medications are often temporarily used post-operatively
- Anti-inflammatory agents such as ketorolac or diclofenac drops are used to reduce post-operative inflammation

Analgesic agents are used for discomfort:
- acetaminophen (Tylenol), 325 mg, 1 or 2 tabs q4h prn

No changes to eye medications should be made without consulting the treating ophthalmologist.
Eyes

Client Education
- Counsel client about appropriate use of medication and side effects
- Patient may engage in activity as tolerated, except no lifting, bending or other activities that strain the intra-abdominal muscles

Monitoring and Follow-Up
Client should be seen by a physician in 6 weeks.

CHALAZION
Chronic inflammatory lipogranuloma of a meibomian gland. It occurs deeper within the lid than a stye.

CAUSES
Results from obstruction of the meibomian gland duct. Secondary bacterial infection from *Staphylococcus aureus* may develop.

HISTORY
- Lump on the eyelid area
- Redness, swelling and pain, if secondary infection develops, otherwise usually painless
- Blurry vision if chalazion is large (pressure on the eye globe may cause astigmatism)
- Conjunctival injection (if associated with conjunctivitis)
- Tearing may be present (if conjunctiva irritated)

PHYSICAL FINDINGS
- Hard, non-tender nodule on the middle portion of the tarsus, away from the lid border; may be pointing to the inner surface of tarsus and causing pressure on the globe
- Inflammation of the lids and conjunctiva may be seen if secondary infection present

DIFFERENTIAL DIAGNOSIS
- Hordeolum (stye)
- Blepharitis
- Sebaceous-cell carcinoma (rare)

COMPLICATIONS
- Secondary infection
- Astigmatism

DIAGNOSTIC TESTS
- None

MANAGEMENT

Goals of Treatment
- Prevent infection and visual disturbances
A small asymptomatic chalazion does not require treatment and usually resolves spontaneously in a few months. If the chalazion is large, or if there is secondary infection, treatment is needed.

Nonpharmacologic Interventions
Apply warm, moist compresses qid.

Client Education
- Stress importance of not squeezing the chalazion
- Teach the client eyelid hygiene: wash lid with mild soap and water; use a separate area of washcloth for each eye
- Stress importance of washing hands to prevent spread if infection occurs
- Recommend avoidance of cosmetics during acute phase (current eye cosmetics should be discarded because they may harbour bacteria and cause recurrent infection)
- Client should not wear contact lenses until infection clears
- Counsel client about appropriate use of medications (dose, frequency, application)
- Stress importance of follow-up if symptoms do not improve with treatment

Pharmacologic Interventions
If secondary bacterial infection suspected:
- erythromycin 0.5% eye ointment, 1.25 cm bid for 2–5 days

Antibiotic eye drops (for example, Polysporin) can be used, but they require more frequent dosing, every 3–4 hours, and are generally less effective.

Monitoring and Follow-Up
Follow up in 1–2 weeks.

Referral
Refer to a physician if a large chalazion does not respond to medical therapy. Incision and drainage with excision may be necessary if the chalazion does not resolve spontaneously within 2 or 3 months. An intralesion injection of a corticosteroid may be tried by the physician before surgery.
CONJUNCTIVITIS
Inflammation of the conjunctiva. Conjunctival erythema is caused by injection and hyperemia of tortuous superficial vessels.

CAUSES
Conjunctivitis is usually one of three types:
- Bacterial: *Chlamydia, Hemophilus influenzae, Neisseria gonorrhoeae, Staphylococcus aureus, Streptococcus pneumoniae, moraxella, corynebacterium*
- Viral: adenovirus, coxsackievirus, ECHO virus
- Allergic: seasonal pollens or environmental exposure

Predisposing Factors
- contact with another person who has conjunctivitis
- exposure to a sexually transmitted disease
- other atopic (allergic) conditions

HISTORY
Bacterial Conjunctivitis
- Acute redness and purulent discharge
- Burning, gritty sensation in eyes
- Recent contact with others with similar symptoms

Viral Conjunctivitis
- Acute onset of redness
- Watery discharge
- Foreign-body sensation
- Lasts 7–12 days; may be infectious for up to 2 weeks
- Systemic symptoms (for example, sneezing, runny nose, sore throat)
- Recent contact with others with similar symptoms

Allergic Conjunctivitis
- History of seasonal allergies, eczema, asthma, urticaria
- Watery, red, itchy eyes, without purulent drainage

PHYSICAL FINDINGS
- Vital signs normal (unless associated with systemic illness)
- Visual acuity usually normal
- PERRLA; extraocular eye movements normal
- Unilateral or bilateral diffuse conjunctival redness
- Discharge: purulent in bacterial form, thin and watery, possibly purulent in viral form, watery in allergic form
- Crusts on lashes in viral and bacterial forms
- Eyelids red or edematous
- Pre-auricular adenopathy may be present in viral and gonococcal conjunctivitis

DIFFERENTIAL DIAGNOSIS
- Blepharitis
- Corneal abrasion
- Uveitis (iritis)
- Herpetic keratoconjunctivitis

COMPLICATIONS
- Spread of infection to other eye structures
- Spread of infection to other household members

DIAGNOSTIC TESTS
- Measure visual acuity
- Swab and culture exudate only if there is no resolution of symptoms after an empiric course of treatment
- Fluorescein stain if symptoms do not respond to treatment in 2–3 days

MANAGEMENT
Goals of Treatment
- Identify corneal ulcer
- Rule out more serious infections such as gonorrhea or herpes infection
- Prevent household spread
Appropriate Consultation
Consult a physician if any of the following pertain:

- Significant associated eye pain
- Any loss in visual acuity or colour vision
- Suspicion of keratoconjunctivitis or other more serious cause of red eye
- Client has periorbital cellulitis
- No improvement with treatment in 48–72 hours
- Client wears contact lenses (and would thus be at high risk for Pseudomonas conjunctivitis and keratitis)
- Suspicion of gonorrhea or chlamydial conjunctivitis, either of which requires systemic antibiotics (see also the most recent Canadian STI Guidelines)6

Nonpharmacologic Interventions
Apply cool, clean compresses to eyes, lids and lashes as frequently as possible.

Client Education
- Counsel client about appropriate use of medications (dose, frequency, instillation)
- Advise client to avoid contamination of tube or bottle of medication with infecting organisms
- Suggest ways to prevent spread of infection to other household members
- Instruct client about proper hygiene of hands and eyes
- For bacterial form: client may need school, daycare or work restrictions for 24–48 hours after treatment is initiated
- For viral form: contagious for 48–72 hours but may last for 2 weeks
- For allergic form: recommend that client avoid going outside when pollen count is high and that protective glasses be worn to prevent pollen from entering the eyes
- Do not allow client to use an eye patch

Pharmacologic Interventions
Never use steroid or steroid-and-antibiotic combination eye drops, because the infection may progress or a corneal ulcer may rapidly form and cause perforation.

Bacterial Conjunctivitis
Topical antibiotic eye drop:
- polymyxin B/gramicidin (Polysporin) eye drops, 2 or 3 drops qid for 5–7 days if the infection is mild
  or
- erythromycin eye ointment 1.25 cm qid. The dose can be reduced from qid to bid if there is improvement after a few days7

An antibiotic eye ointment may be used at bedtime in addition to the antibiotic eye drops during the day when clear vision is required.

Viral Conjunctivitis
Cool compresses often provide excellent symptomatic relief (antibiotics are not helpful and are not indicated).

If you suspect a viral conjunctivitis from herpes zoster lesions around the eyes, also consider a keratitis with corneal ulcer (see “Foreign Bodies, Conjunctival, Corneal or Intraocular” for pharmacologic treatment options).

Allergic Conjunctivitis
Cool compresses often provide excellent symptomatic relief (antibiotics are not helpful and are not indicated). Artificial tears used during the day can help to remove and dilute allergens.

Topical antihistamines or mast cell stabilizer drops may be helpful if symptoms are not relieved by cool compresses. Topical antihistamines have a quicker onset than mast cell stabilizers which can take up to 5 to 14 days for effect.

Consult a physician before using any of the following:
- Antihistamine: levocabastine (Livostin) 0.05% ophthalmic solution, 1 drop bid
  or
- Mast cell stabilizer: sodium cromoglycate (Cromolyn) 2% ophthalmic solution, 2 drops qid

Oral antihistamines may also be tried if symptoms are severe:
- cetirizine (Reactine), 5–10 mg PO once daily prn

Other second generation antihistamines would also be appropriate choices (for example, loratadine [Claritin]).
**Monitoring and Follow-Up**

Clients with moderate or severe symptoms should be seen for follow-up at 24 and 48 hours.

**Referral**

Refer to a physician if condition deteriorates, if symptoms persist despite treatment or if symptoms recur.

**DIABETIC RETINOPATHY**

Damage to the retinal blood vessels that threatens vision. It is a distinctive manifestation of both type 1 and type 2 diabetes. It is the most common cause of new cases of legal blindness in people of working age in North America.\(^8,9\)

**Types**

**Nonproliferative**
- Early stage of diabetic retinopathy, characterized by dilation of veins, microaneurysms, hemorrhages and retinal/macular edema and hard exudates

**Proliferative**
- Advanced stage of diabetic retinopathy, caused by retinal ischemia
- Characterized by neovascularization of the retina and fibrous proliferation, which may produce complete blindness through vitreous or blood hemorrhage or retinal detachment
- The prevalence rate of proliferative retinopathy is 23\% in patients with type 1 diabetes, and 14\% in people with type 2 diabetes taking insulin and 3\% in people with type 2 diabetes not taking insulin\(^8\)

**CAUSES**
- Uncontrolled blood sugar levels
- Uncontrolled hypertension

**HISTORY**
- Blurring of distance vision with rising blood sugar (early)
- Decreasing visual acuity (slow or sudden onset)
- Visual floaters (may indicate vitreous hemorrhage) in proliferative type
- Blind spots in visual field

**PHYSICAL FINDINGS**
- Decreased visual acuity
Some clients with retinopathy may have normal vision and be unaware of any symptoms; therefore, all clients with diabetes should be screened regularly.

**Early Nonproliferative**
- Dot and blot hemorrhages
- Retinal edema
- Microaneurysms
- Hard exudates (lipid deposits)

**Advanced Nonproliferative**
All of the signs of early nonproliferative disease, plus:
- Macular edema
- Preretinal hemorrhages (boat shaped) located anterior to the retina
- Cotton wool spots (nerve fibre layer infarcts)

**Proliferative**
- Venous beading, dilation or engorgement
- Dilated leaky vessels within the retina
- Dot and blot retinal hemorrhages
- Neovascularization (new, fine, lacy blood vessels appear on the retina, optic nerve or surface of the iris)
- Loss of red reflex, inability to see fundus (possible if vitreous hemorrhage occurs)
- Areas of tractional retinal detachment may be seen
- Whitish fibrovascular tissue on the retinal surface

**DIFFERENTIAL DIAGNOSIS**
- Central or branch retinal vein or artery occlusions
- Blood dyscrasias (sickle cell retinopathy, anemias, leukemias, thalessemias, polycythemias)
- Retinal emboli
- Uveitis
- Hypertensive retinopathy
- Age-related macular degeneration

**COMPLICATIONS**
- Blindness
- Retinal detachment
Eyes

DIAGNOSTIC TESTS
- Fasting blood sugar
- Glycosylated hemoglobin (HbA1c)
- Visual acuity screening

MANAGEMENT

Goals of Treatment
- Prevention of this diabetic complication
- Early detection and treatment

Primary and Secondary Prevention
Regular eye exams by an optometrist. The earlier problems are detected, the better the chance of preventing vision loss. Glycemic, blood pressure and lipid control are very important to help prevent and slow the progression of retinopathy.


Screening Guidelines for Diabetic Retinopathy
- Screening and evaluation for retinopathy should be performed annually, starting 5 years after the onset of diabetes for those ≥ 15 years of age with type 1 diabetes
- Screening and evaluation for retinopathy should be performed at the time of diagnosis for anyone with type 2 diabetes
- Subsequent interval for follow-up is based on the severity of the retinopathy (1 year or less)
- For those with type 2 diabetes who have no or minimal retinopathy, the recommended interval is 1–2 years
- Preconception screening in women with type 1 or 2 diabetes who are planning a pregnancy
- In pregnant women with diabetes, screen in the first trimester and as needed during the pregnancy and during the first year postpartum (pregnancy can exacerbate diabetic retinopathy up to 1 year postpartum)

Appropriate Consultation
Consult a physician for all suspected cases of diabetic retinopathy as soon as possible.

Nonpharmacologic Interventions
- Protect eyes with sunglasses that have ultraviolet protection
- Advise client to quit smoking (smoking impairs the body’s circulation, decreasing the efficiency of the retinal blood vessels)
- Advise client to exercise regularly (cardiovascular exercise improves the body’s overall health and increases the efficiency of the circulatory system)
- Provide emotional support; adjusting to vision loss can be difficult
- Recommend available support groups for people with low vision (for example, CNIB programs)

Pharmacologic Interventions
To prevent the onset and delay the progression of diabetic retinopathy, patients with diabetes should be treated pharmacologically, by the physician, to control their glucose, blood pressure and lipid levels.

Monitoring and Follow-Up
- Clients should have regular eye exams by a physician, optometrist or ophthalmologist; frequency of follow-up is usually set by the consulting physician/ophthalmologist
- Advise clients to report any changes in vision immediately

Referral
For acute vision changes, the patient should see an ophthalmologist, as arranged by a physician.

HORDEOLUM OR STYE
Acute infection of a hair follicle of an eyelash, a Zeis (sebaceous) gland or a Moll (apocrine sweat) gland of the eyelid.

Types

Internal
- Points inward toward the palpebral conjunctiva
- Usually larger than external hordeolum

External
- Most common presentation
- Points to skin surface at the lid margin

CAUSES
Bacterial infection (Staphylococcus aureus).
**Eyes**

**HISTORY**
- Pain
- Swelling of eyelid
- Redness of eyelid
- Vision not affected
- Similar eyelid infection in the past

**PHYSICAL FINDINGS**
- Localized redness and swelling of eyelid
- Mild conjunctival injection
- Possible purulent drainage along the lid margin
- Acutely tender
- Pre-auricular adenopathy may be present

**DIFFERENTIAL DIAGNOSIS**
- Chalazion
- Blepharitis
- Dacryocystitis
- Orbital cellulitis

**COMPLICATIONS**
- Conjunctivitis
- Orbital cellulitis

**DIAGNOSTIC TESTS**
- Swab any drainage for culture and sensitivity if recommended by a physician

**MANAGEMENT**

**Goals of Treatment**
- Relieve symptoms
- Prevent spread of infection to other eye structures

**Appropriate Consultation**
Usually not necessary for simple stye.

**Nonpharmacologic Interventions**
Apply warm, moist compresses for 15 minutes qid (more effective with external type).

**Client Education**
- Avoid squeezing the hordeolum
- Teach the client eyelid hygiene: wash lid with mild soap and water; use a separate area of washcloth for each eye
- Stress importance of washing hands to prevent spread of infection

- Recommend avoidance of cosmetics during acute phase (current eye cosmetics should be discarded because they may harbour bacteria and cause recurrent infection)
- Client should not wear contact lenses until infection clears
- Counsel client about appropriate use of medications (dose, frequency, application)
- Stress importance of follow-up if symptoms do not improve with treatment or if inflammation extends to involve the periorbital tissues

**Pharmacologic Interventions**
There is little evidence that topical medications help with healing. Those experiencing frequent hordeola that are associated with blepharitis of rosacea may benefit from a topical antibiotic/corticosteroid ointment combination. Discuss this with a physician.

Systemic antistaphylococcal antibiotics may be needed to treat the internal type because they rarely drain spontaneously. Consult a physician for direction.

**Monitoring and Follow-Up**
Follow up in 3–4 days if symptoms do not respond; follow up sooner if infection spreads.

**Referral**
Consult a physician if the lesion does not respond to nonpharmacologic interventions or if there is evidence of infection of the periorbital soft tissue.

**OPEN-ANGLE GLAUCOMA**

A glaucomatous optic neuropathy with or without an increase in intraocular pressure. Progressive damage occurs to the optic disk with an open angle between the iris and cornea. It is often asymptomatic. It results in damage to the optic nerve that can lead to loss of vision. Open-angle glaucomas are the most common type of glaucoma.

A complete understanding of the pathogenesis of glaucoma remains unknown; some people with high intraocular pressure do not have glaucoma, whereas others have glaucoma without elevated intraocular pressure.

Note: acute angle-closure glaucoma usually presents with acute symptoms and is a medical emergency (see “Acute Angle-closure Glaucoma”).
CAUSES
In primary open-angle glaucoma, there is no structural abnormality in the angle between the iris and cornea to occlude the outflow tract.\textsuperscript{12}

- The secretion of aqueous and its flow between the lens and the iris through the pupil into the anterior chamber is normal; however, an obstruction of the aqueous outflow through the drainage pathways of an open angle, resulting in an elevation in pressure
- Prevalence of primary open angle glaucoma is about 2\%\textsuperscript{13} of the population; affects men and women equally

\textbf{Risk Factors}\textsuperscript{14}

\textbf{Primary}
- Elevated intraocular pressure
- Advanced age
- Family history of condition
- Myopia
- Diabetes mellitus
- Systemic hypertension
- Inuit heritage
- Black African or Hispanic heritage

\textbf{Secondary (Acquired)}
- Blunt or penetrating trauma
- Previous intraocular surgery
- Previous intraocular inflammation
- Corticosteroid use
- Migraine
- Drugs that cause or worsen glaucoma: corticosteroids (commonly); antihistamines, decongestants, antispasmodics, antidepressants (rarely)

\textbf{Congenital}
- Family history of condition

\textbf{HISTORY}
Symptoms do not arise until disease is very advanced.

- Loss of vision (gradual and painless)
- Peripheral vision affected first (tunnel vision)
- Halos around lights
- Presence of risk factors

\textbf{PHYSICAL FINDINGS}
- Peripheral fields of vision decreased (early)
- Central visual acuity decreased (late)
- Increased cup-to-disk ratio
- Cupping of the optic disk
- Flame-shaped disk hemorrhages

\textbf{DIFFERENTIAL DIAGNOSIS}
Vascular occlusive disease of the eye.

\textbf{COMPLICATIONS}
Blindness.

\textbf{DIAGNOSTIC TESTS}
- Measure visual acuity
- Determine extent of peripheral fields
- Measure intraocular pressure with a tonometer; if pressure > 21 mm Hg, investigations should be initiated, especially if patient is symptomatic
As many as 50\% of patients with glaucoma may have a normal intraocular pressure. Patients with intraocular pressure > 21 mm Hg may have ocular hypertension and most of these patients may never develop glaucoma. Unless tonometry is performed frequently and accurately with precise instruments, the results may be inaccurate. The detection of glaucoma may be more appropriately based on the periodic screening of high-risk individuals with a thorough ophthalmological assessment.\textsuperscript{15}

\textbf{MANAGEMENT}

\textbf{Goals of Treatment}
- Prevent, slow or stop progressive vision loss
- Preserve a healthy optic nerve
- Early detection of those at risk

\textbf{Appropriate Consultation}
Consult a physician if new-onset glaucoma is suspected or symptoms of previously diagnosed glaucoma have worsened.

\textbf{Nonpharmacologic Interventions}

\textbf{Screening}
The Canadian Ophthalmological Society\textsuperscript{16} recommends that anyone with risk factors for glaucoma undergo screening for glaucoma by an optometrist or ophthalmologist.

No lifestyle modifications have proven helpful either before or after the use of drug therapy. Surgical and laser procedures are options if drug therapy fails.
**Pharmacologic Interventions**

Drug treatment for glaucoma is prescribed by an ophthalmologist. The classes of drugs that may be used include topical beta blockers (for example, timolol), topical carbonic anhydrase inhibitors (for example, dorzolamide [Trusopt]), prostaglandin analogues (for example, latanoprost [Xalatan]), topical cholinergic agonists (for example, pilocarpine [Isopto Carpine]) and topical adrenergic agonists (for example, brimonidine [Alphagan]). A stepped-up approach is used if the symptoms progress. The main aim of all drug therapy is to reduce intraocular pressure. Any visual loss is usually irreversible.

**Monitoring and Follow-up**

Ensure regular follow-up by a physician at least annually when stable.

**Referral**

The physician should refer the client for follow-up by an ophthalmologist annually, or sooner if symptoms progress. Laser therapy and glaucoma surgery may also be used to control the disease.

---

**PTERYGIUM**

A triangular winglike growth of tissue that is a proliferation of the nasal or (rarely) the temporal bulbar conjunctiva. It can grow toward the cornea and over its surface.

**CAUSES**

Chronic irritation of the eye from ultraviolet light, dust, sand or wind.

**HISTORY**

- Usually painless
- Blurred vision if pterygium extends over cornea
- Usually occurs in people who spend a lot of time outdoors

**PHYSICAL FINDINGS**

- Visual acuity normal
- Bilateral or unilateral lesions may be present
- A mounded, injected triangular mass of conjunctival tissue arising from either canthus and possibly extending across cornea
- Blood vessels may present within the tissue

**DIFFERENTIAL DIAGNOSIS**

- Pinguecula (inflamed)

**COMPLICATIONS**

- Recurrent conjunctivitis

**DIAGNOSTIC TESTS**

- Measure central and peripheral visual acuity

**MANAGEMENT**

**Goals of Treatment**

- Identify asymptomatic lesions
- Prevent further growth

**Appropriate Consultation**

Arrange a non-urgent consultation with the physician.

**Nonpharmacologic Interventions**

**Client Education**

- Stress importance of preventing chronic irritation
- Educate those at high risk
- Recommend use of protective eyewear in both summer and winter
- Explain course of disease and expected outcome
- Ask client to return to the clinic for reassessment when signs of conjunctivitis are noticed or if lesion interferes with vision

**Pharmacologic Interventions**

If patient has irritation or dry eye symptoms:

- topical lubricant such as hydroxypropylmethylcellulose (Eyelube), 1 drop in affected eye qid and prn

**Monitoring and Follow-Up**

- Follow annually; note any changes in size
- Test central and peripheral vision

**Referral**

Referral to a physician for definitive treatment (surgical removal) may be necessary if lesion interferes with vision.
**RED EYE**

Red eye is common in a wide variety of ocular conditions, some of which are a serious threat to vision and require immediate referral to an ophthalmologist.

**Table 1 – Partial Differential Diagnosis of Red Eye**

<table>
<thead>
<tr>
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<th>Conjunctivitis*</th>
<th>Corneal Injury or Infection</th>
<th>Uveitis (Iritis)</th>
<th>Angle Closure Glaucoma</th>
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<td><strong>History</strong></td>
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<td>Sudden onset, exposure to infection</td>
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<td>Trauma, pain</td>
<td>Fairly sudden onset, may be recurrent</td>
<td>Fast onset, possible previous diagnosis</td>
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<td>Moderately diluted and fixed, oval</td>
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+, present (to various degrees); -, absent; +/-, may be present.

* Hyperthyroidism may cause conjunctival injection.
CAUSES
- Infection: conjunctivitis, keratitis (bacterial, viral [herpetic or non-herpetic] or other)
- Ocular inflammation: uveitis, iritis, episcleritis, scleritis
- Dry eyes (keratoconjunctivitis sicca) related to conditions such as normal aging, Sjogren's syndrome, vitamin A deficiency, rheumatoid arthritis
- Blepharitis with secondary conjunctivitis or keratitis (or both)
- Allergy (for example, allergic conjunctivitis)
- Glaucoma (for example, acute angle-closure glaucoma)
- Toxic, chemical or other irritants such as topical eye drugs, contact lens solution, acids or alkalis, smoke, wind or ultraviolet rays
- Traumatic injury (for example, corneal abrasion, foreign-body irritation, hyphema, subconjunctival hemorrhage)
- Pterygium or inflamed pinguecula
- Infection of lacrimal system (for example, dacyrocystitis)

FEATURES OF DANGEROUS RED EYE
The first step is to differentiate major or serious causes of red eye from minor causes. The following danger signs call for referral to an ophthalmologist.
- Severe ocular pain (especially if unilateral)
- Ocular pain associated with headache/vomiting
- Photophobia
- Persistent blurring of the vision
- Proptosis (exophthalmos)
- Reduced ocular movement
- Ciliary flush/injection
- Irregular corneal reflection of light
- Pupil unreactive to direct light
- Pupil irregular in shape
- Coloured halos or lights around objects
- Recent trauma to eye
- Corneal epithelial defect or opacity
- Worsening of signs after 3 days of pharmacologic treatment for conjunctivitis
- Compromised host (for example, neonate, elderly, immunosuppressed patient, user of soft contact lenses)

EMERGENCY PROBLEMS OF THE EYE

ACUTE ANGLE-CLOSURE GLAUCOMA
A sudden increase in intraocular pressure due to obstruction of flow of aqueous from the posterior chamber to the anterior chamber. It is one kind of optic neuropathy where high intraocular pressure causes loss of retinal nerve fibres and optic disk changes.19

The pathogenesis of glaucoma remains unknown; some people with high intraocular pressure do not have glaucoma, whereas others have glaucoma without elevated intraocular pressure (IOP).

CAUSES
The iridocorneal drainage angle is closed, meaning that the iris is adhered or apposed to the trabecular meshwork so as to not allow normal aqueous outflow.19

Its prevalence is 0.1% of the general population. It occurs more in older adults.13

Risk Factors
- Pre-existing narrow angle of anterior chamber
- Increased intraocular pressure19
- Hyperopia (small eye, big lens that crowds angle)
- Age > 70 years, female
- Mature cataracts present
- Family history
- Asian or Inuit heritage
- Spontaneous dilatation of pupil by drugs or darkened environment
- Complication of penetrating intraocular foreign body
- Trauma such as a chemical burn

HISTORY
- Sudden onset of severe unilateral eye pain
- Vision blurred, reduced or absent
- Nausea and vomiting, abdominal pain
- Tearing
PHYSICAL FINDINGS
- Heart rate may be elevated
- Blood pressure may be elevated
- Client may be in acute distress (from pain or fear)
- Visual acuity reduced in affected eye
- Conjunctiva diffusely injected red
- Perilimbal flush may be present
- Cornea appears steamy
- Pupil mid-dilated and non-reactive to light
- Funduscopic exam of affected eye may reveal increased cupping of the disk
- Peripheral fields of vision decreased in affected eye
- Intraocular pressure elevated on tonometry (normal range is 10–20 mm Hg)

DIFFERENTIAL DIAGNOSIS
- Rule out other causes of red eye (see Table 1, “Partial Differential Diagnosis of Red Eye”)
- Uveitis (iritis)
- Macular degeneration

COMPLICATIONS
- Loss of vision
- Loss of eye
- Development of glaucoma in other eye

DIAGNOSTIC TESTS
- Measure central and peripheral visual acuity
- Measure intraocular pressure with tonometer (normal range is 10–20 mm Hg); if pressure > 21 mm Hg, investigations should be initiated, especially if patient is symptomatic

As many as 50% of patients with glaucoma may have a normal IOP. Patients with intraocular pressure > 21 mm Hg may have ocular hypertension and most of these patients may never develop glaucoma. Unless tonometry is performed frequently and accurately with precise instruments, the results may be inaccurate. The detection of glaucoma may be more appropriately based on the periodic screening of high-risk individuals with a thorough ophthalmological assessment.15

MANAGEMENT

Goals of Treatment
- Identify condition quickly
- Relieve pain
- Preserve vision by reducing intraocular pressure

If the intraocular pressure is not reduced, glaucoma may develop in the unaffected eye because of a sympathetic response.

Appropriate Consultation
Consult a physician immediately for advice and medication orders.

Nonpharmacologic Interventions
- Keep client at rest in supine position
- Support and reassure client to minimize anxiety
- Explain disease process and management

Pharmacologic Interventions
It is important to control nausea, vomiting, pain and IOP, should these symptoms be present.

Consult a physician for medications to reduce IOP, nausea and pain.

Physician-initiated treatment choices for IOP may include drugs such as miotics (for example, pilocarpine), topical beta-blockers (for example, timolol), topical steroids (for example, prednisolone) and systemic carbonic anhydrase inhibitors (for example, acetazolamide).

Referral
Medevac. An ophthalmologist’s care is required because surgical intervention may be needed.
BLUNT OR LACERATING OCULAR TRAUMA

Traumatic injury to the eye or surrounding structures.

Types
- Contusion of globe and/or orbital tissues
- Orbital fracture (contusions limited to the orbital tissues and fractures of the orbits are much less threatening to vision but may be associated with significant coincident facial and intracranial injuries)
- Laceration of the ocular adnexa or globe, one of the more serious injuries (a ruptured globe is the most dangerous outcome of either blunt or lacerating trauma)
- Intraocular hemorrhage
- Retinal detachment
- Complicated eyelid lacerations

Lacerations of the globe may be hard to find. Presume rupture of the globe if there is history of severe forceful trauma.

CAUSES
Blunt or lacerating trauma may cause a variety of injuries to the eye and its surrounding structures. Blunt trauma associated with fights, sports injuries or motor vehicle crashes can also result in serious damage. Most often, blunt trauma causes a contusion, but a strong impact may cause tissues to be torn.

HISTORY
- Note mechanism of injury: What hit the eye? Where did it hit (eye, forehead or cheek)?
- How hard was the blow? When did it occur?
- Determine whether a penetrating injury is possible or whether the injury is limited to the structures around eye
- Pain deep in the eye may be present

PHYSICAL FINDINGS
Limit examination to inspection and observation. Do not palpate the globe. It may be difficult or impossible to examine the globe because of associated swelling. Do not force the lid open. Avoid putting direct pressure on globe and bony structures.
- Moderate to severe distress
- Pulse may be elevated
- Swelling and pain around eye
- Reduced vision due to lid edema, retinal damage, corneal damage, dislocated lens, ruptured globe
- Blood pressure may be elevated
- Swelling and bruising around the eye
- Deformity of the bone may be present
- Tenderness of bony structures
- Extraocular movement should be normal; if abnormal, suspect a fracture of the bony orbit
- Visual acuity may be diminished (do not test if doing so requires forcing the lid open or instilling drops)
- Ask about diplopia
- Conjunctival ecchymosis and swelling
- Pupil reaction to light should be normal
- Note presence of hyphema (blood in the anterior chamber)

COMPLICATIONS
- Loss of vision
- Retinal detachment
- Dislocation of lens
- Acute angle-closure glaucoma
- Rupture of globe
- Fracture of orbital bone
- Laceration of eyelid

DIAGNOSTIC TESTS
If possible, measure visual acuity in both eyes (do not perform this test if pain is present and doing so requires forcing open the lid or use of anesthetic drops).

MANAGEMENT

Goals of Treatment
- Identify serious injuries to the eye or orbital bone
- Protect the eye from further damage

Appropriate Consultation
Consult a physician immediately with a goal of protecting the eye from further damage.

Nonpharmacologic Interventions
- Cover the eye loosely with a sterile gauze and apply an eye shield to prevent further injury; do not instill any medications into the eye
- Keep the client at rest in a semi-sitting position
Pharmacologic Interventions

To control pain:

- acetaminophen (Tylenol), 325 mg, 1–2 tabs PO q4h prn
- or acetaminophen with codeine (Tylenol #3), 1–2 tabs PO q4h prn for moderate or severe pain

Referral

In some cases, after initial ophthalmologic evaluation, client should be medevaced to a facility with an ophthalmologist or retinal specialist; such a decision should be made by the consulting physician but would be considered if any of the following are suspected or confirmed after your ophthalmologic evaluation:

- Severe pain
- Subnormal visual acuity
- Severe conjunctival ecchymosis
- Hyphema (blood in the anterior chamber)
- Irregular pupil
- Corneal or scleral laceration
- Deformation or laceration of globe
- Laceration of lid

CHEMICAL BURNS

Ocular injury from acidic or alkaline liquids or powders.

Alkali burns can be more serious because tiny particles may be left behind even after the agent has been removed; these residues can cause progressive damage to the eye.

CAUSES

Improper protection of the eyes while working with these substances.

HISTORY

Institute first-aid treatment immediately upon learning that a chemical has come in contact with the eye (see section on Nonpharmacologic Interventions).

The detailed history can be obtained later.

- Name of the material (alkaline burns are more serious than acidic burns)
- Time when accident occurred (as accurate as possible)
- Was irritation attempted? With what solution? For how long?

- Was exposure bilateral or unilateral?
- Did material enter the eye or was it only splashed on the lids?
- Severe pain and burning of the eye (there may be no pain if burn is severe)
- If the client inhaled or swallowed any of the substance, assess other body systems (for example, gastrointestinal, respiratory)

PHYSICAL FINDINGS

- Heart rate may be elevated (because of pain or fear)
- Blood pressure may be elevated (because of pain or fear)
- Client may be in acute distress
- Lid spasm
- Photophobia
- Reduced vision
- Haziness or opacity or marked edema and haze of cornea
- Blurring of iris detail
- Injection of conjunctiva, or minimal ischemic necrosis of conjunctiva and sclera (partial blanching), or blanching of conjunctiva and sclera (marked whitening of the external eye)
- Blurring of pupillary outline
- With alkaline burns, there is often an immediate, rapid rise in intraocular pressure

The extent of injury can be assessed as mild to severe in nature.

COMPLICATIONS

- Various degrees of permanent loss of vision
- Loss of eye
- Acute angle-closure glaucoma

DIAGNOSTIC TESTS

- Measure visual acuity of both eyes
- Apply 1 to 2 drops of fluorescein stain to determine extent of damage. It may be necessary to instill tetracaine first (see Pharmacologic Interventions below)
- Determine pH (Litmus paper)

MANAGEMENT

Goals of Treatment

- Dilute the toxic chemical immediately
- Minimize corneal damage
**Appropriate Consultation**
Consult physician about further care once emergency first-aid irrigation has diluted the chemical.

**Nonpharmacologic Interventions**
- Irrigate the eye immediately with large amounts (1–2 litres) of normal saline IV solution; continue irrigation for 20 minutes. Direct a forceful stream across the cornea and into the conjunctival cul-de-sac. A Morgan’s lens can be used if available.
- Have client shift gaze so that the entire cul-de-sac can be flushed.
- After the eye has been well irrigated, inspect it for any residual chemical particles (for example, small pieces of lime in the conjunctival sacs); try to remove these with further irrigation or with a moistened cotton-tipped applicator. Always wipe from medial to lateral canthus.

**Pharmacologic Interventions**
It may be necessary to instill a topical eye anesthetic if lid spasm is severe. Do not force lid open or instill any drops if there is concern of a laceration:
- tetracaine 0.5% (Pontocaine), 2 drops, stat dose only

To control pain:
- acetaminophen (Tylenol), 325 mg, 1–2 tabs PO q4h prn
- acetaminophen with codeine (Tylenol #3), 1–2 tabs PO q4h prn if pain moderate or severe

**Monitoring and Follow-up**
Ophthalmology to monitor for the development of post-burn glaucoma. An optometrist may assist in follow-up.

**Referral**
Consult physician immediately if you even suspect a chemical burn; ophthalmologist should be consulted.

**CORNEAL ABRASION**
Superficial corneal defect due to scraping or rubbing of the corneal epithelium.

**CAUSES**
Usually trauma or a foreign body in the eye.

**HISTORY**
- Foreign-body sensation
- Sudden unilateral eye pain (sharp or worse with blinking)
- Moderate to profuse tearing
- Mild photophobia
- Mild blurred vision (due to tearing) may be present
- Use of contact lenses

**PHYSICAL FINDINGS**
- Vital signs normal
- Visual acuity may be slightly blurred in affected eye
- Diffuse conjunctival injection
- Pupils react briskly to light
- Presence of a foreign body under the upper or lower eyelid must be ruled out; evert the lids and inspect carefully

**DIFFERENTIAL DIAGNOSIS**
Rule out other causes of red eye (see Table 1, “Partial Differential Diagnosis of Red Eye”).

**COMPLICATIONS**
- Corneal ulceration
- Secondary bacterial infection
- Corneal scarring if abrasion recurs
- Uveitis (iritis)

**DIAGNOSTIC TESTS**
- Measure visual acuity
- Apply 1 to 2 drops of fluorescein stain to determine extent of damage. It may be necessary to instill tetracaine first (see “General Physical Examination”)

**MANAGEMENT**

**Goals of Treatment**
- Prevent secondary bacterial infection
- Prevent development of corneal ulceration

**Appropriate Consultation**
Consult a physician if:
- Pain is present
- Ulceration is large
- Abrasion does not respond to therapy after 48 hours
- A residual rust ring is evident
Nonpharmacologic Interventions

Client Education
- Advise client that daily follow-up is important to ensure proper healing
- Counsel client about appropriate use of medications (type, dose, frequency, side effects)
- Instruct client to return to clinic immediately if pain increases or vision decreases before 24-hour follow-up
- Suggest that client wear protective glasses while working to help prevent similar incidents in future
- Do not patch the eye

Pharmacologic Interventions
Instill topical anesthetic eye drop:
- tetracaine 0.5% eye solution (Pontocaine), 2 drops, stat dose only
Complaints of irritation and foreign-body sensation should resolve in 1 or 2 minutes.
Instill a generous amount of antibiotic eye ointment in the lower conjunctival sac:
- erythromycin (Diomycin) eye ointment, 1.25 cm ribbon qid for 5–7 days

Monitoring and Follow-Up
- Follow-up at 24 hours to assess healing is imperative
- If no symptoms or signs, patient can be sent home with advice on preventing corneal abrasions
- If client is still symptomatic but improving, the eye should be re-treated as above with antibiotic ointment or drops and re-examined daily with fluorescein. The uptake of dye should be less than on the previous day. Re-examine daily until the abrasion has healed completely

Referral
Referral to an ophthalmologist is required within 24 hours for large or central defects and in 48–72 hours if there is no response to therapy.

CORNEAL ULCER
An infection of the cornea results in breakdown of the protective epithelial barrier. The ulcer may be central or marginal.

CAUSES
- Bacterial (usual); viral or fungal invasion (rare)
- Common bacteria include Pseudomonas, Staphylococcus, Streptococcus
- Common virus is herpes simplex
- Risk factors include any abrasive corneal injury, wearing of soft contact lenses, dry eyes, thyroid disease, diabetes mellitus, immunosuppressive conditions, long-term topical use of eye steroid medication

HISTORY
- Eye pain (gradual onset)
- Blurred vision
- Tearing
- Foreign-body sensation
- Photophobia
- Red eye
- Use of contact lenses

PHYSICAL FINDINGS
- Conjunctiva inflamed
- Eyelid may be inflamed
- Mucopurulent discharge
- Hypopyon possible
- Ulcer visible on cornea, but usually only after fluorescein staining
- Decreased visual acuity (if ulcer is central)

DIFFERENTIAL DIAGNOSIS
- Corneal abrasion
- Conjunctivitis
- Blepharitis
- Keratitis

COMPLICATIONS
- Scarring of cornea
- Permanent loss of vision
- Extension of infection to other ocular structures

DIAGNOSTIC TESTS
- Measure visual acuity
- Apply 1 to 2 drops of fluorescein stain to determine extent of damage. It may be necessary to instill tetracaine first (see “Pharmacologic Interventions” above or “General Physical Examination”)

MANAGEMENT

Goals of Treatment
- Alleviate infection
- Prevent permanent loss of vision
Appropriate Consultation
Consult a physician immediately if an ulcer is detected or suspected.

Nonpharmacologic Interventions
- Explain diagnosis and disease process
- Provide reassurance and support
- Do not patch the eye

Pharmacologic Interventions
Instill topical anesthetic eye drop:
- tetracaine 0.5% eye solution (Pontocaine), 2 drops, stat dose only
Complaints of irritation and foreign-body sensation should resolve in 1 or 2 minutes.
Instill a generous amount of antibiotic eye ointment in the lower conjunctival sac:
- erythromycin (Diomycin) eye ointment, 1.25 cm ribbon one dose stat
Arrange a consultation with physician immediately about choice and amount of topical eye antibiotic to use.
For patient with herpes zoster lesions around the eyes, suspect a keratitis with corneal ulcer. A physician may suggest the use of:
- trifluridine (Viroptic) eye drops, 1 drop q2h while awake to a maximum of 9 drops per day until re-epithelialization of corneal ulcer. Then 1 drop q4h to a maximum of 5 drops per day for 7 days

Referral
Urgent referral to an ophthalmologist should be arranged.

FOREIGN BODIES, CONJUNCTIVAL, CORNEAL OR INTRAOCULAR
- Presence of a foreign object on the conjunctiva or cornea or intraocularly (within the globe)
- May be organic or inorganic

CAUSES
Improper protection of eyes.

HISTORY
Get an accurate description of the material and the circumstances under which it entered the eye (slow speed or high velocity); a rapidly moving projectile object may penetrate the globe of the eye. This typically occurs when metal is hammered upon metal. With a penetrating eye injury, the eye may appear deceptively normal.
- Sudden onset of unilateral eye pain
- Irritation (foreign-body sensation)
- Tearing
- Photophobia
- Visual disturbance may be present

PHYSICAL FINDINGS
- Visual acuity usually normal
- PERRLA (pupils equal, round, reactive to light; accommodation normal)
- Tearing
- Foreign body may be found in lower conjunctival sac or under the upper lid; may need to evert upper lid to find object
- Fluorescein stain may reveal associated corneal abrasion
- If foreign body is metallic, look for a rust ring around material

DIFFERENTIAL DIAGNOSIS
- Other causes of red eye (see Table 1, “Partial Differential Diagnosis of Red Eye”)
- Intraocular foreign body

COMPLICATIONS
- Corneal ulcer
- Secondary infection

DIAGNOSTIC TESTS
- Measure visual acuity of both eyes
- Apply 1 to 2 drops of sterile fluorescein stain to determine if there is associated corneal damage. It may be necessary to instill tetracaine first (see “General Physical Examination”)

MANAGEMENT

Goals of Treatment
- Remove foreign body
- Identify associated corneal abrasion
- Identify residual corneal rust ring
- Identify embedded corneal foreign body

Appropriate Consultation
Consult a physician immediately if the foreign body cannot be dislodged with the nonpharmacologic treatments suggested, if there is suspicion of an intraocular foreign body or if there is continued foreign-body sensation (lasting 24 hours or longer) when no foreign body has been detected.

Nonpharmacologic Interventions
Remove a superficial, non-embedded conjunctival foreign body by gently irrigating with normal saline or by gently wiping with a sterile cotton-tipped applicator moistened with a topical anesthetic (tetracaine) or sterile saline.

After removing the superficial foreign body, use fluorescein stain to detect any remaining fragments, a rust ring or corneal abrasion.

Do not try to remove an obviously embedded foreign body, because it may have penetrated more deeply than expected.

Client Education
- Suggest that client wear protective glasses while working to help prevent similar incidents in future
- Stress that close follow-up is very important to ensure proper healing

Pharmacologic Interventions
Instill a topical anesthetic eye drop:
- tetracaine 0.5% (Pontocaine), 2 drops, stat dose only

Monitoring and Follow-Up
Follow up in 24 hours to ensure resolution of symptoms.

Referral
Consult a physician about immediate referral to an ophthalmologist for any client with a foreign body that cannot be dislodged with the nonpharmacologic treatments suggested, if there is a large or central corneal abrasion or if there is any concern that the globe has been penetrated by a high-speed object.

Refer within 24 hours any client who continues to experience a foreign-body sensation even though no foreign body is detected.

KERATITIS
Inflammation of the cornea.

CAUSES
- Herpes simplex type 1
- Herpes zoster
- Trauma

Predisposing Factors
- Prolonged, unprotected exposure to ultraviolet light (for example, welders not using protective eyewear, people suffering from snow blindness)
- Overuse of contact lenses
- Immunosuppressed condition

HISTORY
- Symptoms range from moderate to severe
- May be first episode or latest in a series of episodes
- Often preceded by upper respiratory tract infection with fever
- Acute onset with unilateral pain
- With recurrence, pain becomes less severe
- Photophobia
- Blurred vision
- Foreign-body sensation

PHYSICAL FINDINGS
- Moderate to acute distress
- Various degrees of lid edema, spasm
- Purulent or mucoid discharge may be present
- Conjunctiva injected red, may have ciliary flush
- Pupils equal and reactive to light
- Visual acuity should be normal, although it may be blurred
- Fragmented corneal-light reflex
- Punctate roughening of cornea or dendritic ulcer seen with fluorescein staining (herpes zoster)
- Corneal opacification may be present (herpes simplex virus type 1)

DIFFERENTIAL DIAGNOSIS
- Conjunctivitis
- Uveitis (iritis)
- Corneal abrasion
- Corneal foreign-body irritation
Eyes

COMPLICATIONS

– Corneal scarring or loss of vision

DIAGNOSTIC TESTS

– Measure visual acuity of both eyes
– Apply 1 to 2 drops of sterile fluorescein stain to determine if there is associated corneal damage. It may be necessary to instill tetracaine first (see “General Physical Examination”). Determine the amount of uptake of the dye on the cornea (an indicator of the degree of corneal involvement); usually the cornea will have a punctate pattern of dye uptake across the lower half; dendritic lesions may be visible

MANAGEMENT

Goals of Treatment

– Relieve discomfort
– Prevent recurrence

Appropriate Consultation

Consult a physician immediately if this disorder is suspected.

Nonpharmacologic Interventions

Client Education

Advise client that condition can be prevented by wearing protective eyewear while outside, especially on sunny winter days, or when using welding equipment.

Pharmacologic Interventions

Instill a topical anesthetic eye drop to relieve discomfort:

- tetracaine 0.5% (Pontocaine), 2 drops, stat dose only

If there is a recent history of chicken pox or herpes infection, a nurse can initiate the first dose of an antiviral. Further doses may be given after physician consultation:

- trifluridine (Viroptic) eye drops, 1 drop q2h while awake to a maximum of 9 drops per day until re-epithelialization. Then 1 drop q4h to a maximum of 5 drops per day x 7 days

Manage pain with simple analgesics:

- acetaminophen (Tylenol), 325 mg, 1–2 tabs PO q4h prn
- ibuprofen (Motrin), 200 mg, 1–2 tabs PO q4h prn

Referral

Urgent referral to the care of an ophthalmologist is required because the diagnosis is complex. Expedient, specific treatment is imperative to prevent loss of vision.

MINOR SOFT-TISSUE CONTUSION

If serious injuries to the eyeball, eyelids or orbit have been ruled out, swelling or bruising of the soft tissues around the eye is not considered serious.

MANAGEMENT

Goals of Treatment

– Symptomatic care
– Prevent further injury

Nonpharmacologic Interventions

– Cold compresses several times daily to reduce the swelling
– Eye shield for 1–2 days to protect eye from further injury
– Use of protective eyewear when engaged in high-risk activities or occupations such as contact sports, carpentry or sheet-metal work

Pharmacologic Interventions

Analgesia to control discomfort:

- acetaminophen (Tylenol), 325 mg, 1–2 tabs PO q4h prn
- ibuprofen (Motrin), 200 mg, 1–2 tabs PO q4h prn

Monitoring and Follow-Up

See client in 2 or 3 days, once swelling goes down, to re-examine the eye thoroughly for injury. If in doubt, reassess earlier.

RETINAL DETACHMENT

Retinal detachment is the separation of the inner layers of the retina from the underlying choroid. The choroid is a vascular membrane situated between the retina and the sclera.

Types

– Rhegmatogenous/Spontaneous: After a break in the retina, vitreous fluid enters the break and separates the sensory retina from the underlying choroid, resulting in detachment
Eyes

- **Tractional**: Traction from fibrous membranes on the surface of the retina
- **Exudative**: Exudation of material into the subretinal space; local or systemic conditions damage the retinal pigment epithelium, which allows passage of choroidal fluid into the subretinal space

**CAUSES**

Retinal detachments can be associated with congenital malformations, metabolic disorders, trauma (including previous ocular surgery), vascular disease, high myopia or vitreous disease, or degeneration.

- **Rhegmatogenous/Spontaneous**: Most likely to occur traumatically (for example, after ocular surgery) or spontaneously in highly myopic people
- **Tractional**: Most common causes are proliferative diabetic retinopathy, sickle cell disease, advanced retinopathy of prematurity and penetrating trauma
- **Exudative**: Common causes are choroidal tumours, metastatic tumours and uveitis

**Risk Factors**

- Myopia (that is, nearsightedness); approximately 40% to 50% of all people with detachments have myopia
- Certain sports (for example, boxing and bungee jumping) have an increased risk of retinal detachment
- Retinal detachment in one eye (15% of people with retinal detachment in one eye develop detachment in the other eye)
- Cataract removal with lens implant (30% to 40% have undergone cataract removal)
- Bilateral cataract extraction (risk of bilateral detachment is increased by 25% to 30% in clients who have had bilateral cataract extraction)
- Trauma; 10% to 20% have encountered direct ocular trauma

**Gender**

- No predilection exists
- Of those younger than 45 years who have retinal detachment, 60% are male and 40% are female

**Age**

- As the population ages, retinal detachments become more common
- Retinal detachment usually occurs in people aged 40–70 years
- Traumatic detachments are more common in young people
- Myopic detachment occurs most commonly in people aged 25–45 years

**HISTORY**

- Sudden or gradual onset
- Flashing lights (photopsia) caused by separation of the posterior vitreous
- Visual floaters; sudden onset of one large floater in the center of the visual axis or the appearance of hundreds of tiny black specks before the eye indicates posterior vitreous detachment (this is pathognomonic for vitreous hemorrhage, resulting from disruption of a retinal vessel caused by a retinal tear or mechanical traction of a vitreoretinal adhesion)
- A few hours after the initial shower of black spots, the patient may note cobwebs (resulting from blood-forming irregular clots)
- Wavy distortion of objects (metamorphopsia)
- Shadow or darkness in a peripheral visual field (visual field defects are a late symptom of retinal detachment)
- Generally, the new onset of floaters associated with flashing lights should be considered a retinal tear until proven otherwise
- Ask about history of trauma, including whether it occurred several months before the symptoms or coincided with the onset of symptoms
- Note previous surgery, including cataract extraction, intraocular foreign body removal, and retinal procedures
- Ask about previous conditions, such as uveitis, vitreous hemorrhage, amblyopia, glaucoma and diabetic retinopathy
- Ask about family history of eye disease because, although retinal detachments are usually sporadic events, certain pedigrees may be prone to detachment
- Ask about the following systemic diseases associated with retinal detachment: diabetes, tumours (for example, breast cancer, melanoma), sickle cell disease, leukemia, eclampsia and prematurity

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PHYSICAL FINDINGS

- Check visual acuity
- Decreased visual acuity (if retinal detachment involves the macula, acuity is severely reduced)
- Conduct an external examination for signs of trauma, checking the visual field (usually a confrontation field examination is adequate)
- Check pupil reaction (a fixed dilated pupil may indicate previous trauma; a positive Marcus-Gunn pupil can occur with retinal detachment)

Conduct a fundus examination with ophthalmoscopy. The pupils must be dilated unless a panoptic ophthalmoscope is used. Some dilation can be achieved by darkening the room. To achieve further dilation a physician must be consulted and order a pharmacologic agent (for example, tropicamide 1% [Mydriacyl]). Ensure there is no pressure put on the globe during the exam. A fundus exam may detect vitreous hemorrhage and large detachment of the posterior pole, but it is inadequate for complete examination because of the limited view of the peripheral retina.

- An orange-peel appearance of the retinal surface can occur
- A pigmented or nonpigmented line may demarcate the limit of a detachment
- Check intraocular pressure measurement in both eyes by tonometry (hypotony, that is, > 4–5 mm Hg less than that in the unaffected eye is common)

DIFFERENTIAL DIAGNOSIS

- Retinal artery occlusion
- Posterior vitreous detachment
- Cataract extraction
- Trauma
- Intraocular inflammation/infection, for example, choroiditis (Harada disease)
- Colobomas of the choroid and retina or lens (giant retinal tears)
- Proliferative diabetic retinopathy
- Sickle cell disease
- Retinopathy of prematurity
- Primary tumours (for example, malignant melanoma of the choroid, hemangioma of the choroid, retinoblastoma)
- Metastatic carcinoma to the choroid (for example, breast cancer, lung cancer)
- Vascular disease of the retina (von Hippel-Lindau disease), retinal telangiectasia
- Retinal vein occlusion

- Optic nerve disease
- Age-related macular degeneration
- Choroidal detachment (for example, serous, hemorrhagic)

DIAGNOSTIC TESTS

- None

COMPLICATIONS

- Blindness
- Loss of vision to hand motion or light perception (a frequent complication of retinal detachments that involve the macula)

MANAGEMENT

Treatment Goals

Protecting the globe in cases of traumatic retinal detachment may be important to prevent extrusion of intraocular contents (that is, uveal tissue).

Indications for Consultation

An urgent physician consultation is required when retinal detachment is suspected.

Nonpharmacologic Interventions

- Protecting the globe in cases of traumatic retinal detachment can be achieved with goggles or an eye shield, if available

It is imperative to avoid pressing on the globe.

Pharmacologic Interventions

- None

Referral

- In some cases, after initial ophthalmologic evaluation, client should be transferred to a facility with an ophthalmologist or retinal specialist; such a decision should be made by the consulting physician
- Medevac; immediate ophthalmologic referral is mandatory
- Frequently, time is critical
- Ultimate outcome depends upon the time, type of retinal detachment, and whether the macula is involved; prognosis is inversely related to the degree of macular involvement and the length of time the retina has been detached
UVEITIS (IRITIS)
Inflammation of the uveal tract (iris, ciliary body or choroid). This may involve one or all three portions of the uveal tract. The most frequent form is acute anterior uveitis (iritis).

CAUSES
Usually idiopathic, but may be associated with systemic disease (Reiter’s syndrome, ankylosing spondylitis, sarcoidosis, juvenile arthritis, inflammatory bowel disease, herpes simplex, herpes zoster, TB) or may be a complication of ocular trauma such as corneal abrasion.

HISTORY
– Acute onset with moderate to severe unilateral periocular pain
– Photophobia
– Tearing
– Vision blurred and may be decreased
– New visual floaters may be present
– Possible history of similar previous episodes
– History of other associated systemic disease

PHYSICAL FINDINGS
– Patient may appear to be in acute distress
– Heart rate may be elevated
– Visual acuity reduced in affected eye
– Conjunctiva reddened
– Perilimbal (ciliary) flush present
– Cornea clear with white precipitates
– Border of iris may be blurred
– Pupil small, possibly irregular in shape and poorly reactive to light
– Hypopyon (pus in the anterior chamber) may be present

DIFFERENTIAL DIAGNOSIS
– Rule out other causes of red eye (see Table 1, “Partial Differential Diagnosis of Red Eye”); it is difficult to make this diagnosis in a primary health care setting

COMPLICATIONS
– Acute angle-closure glaucoma
– Posterior adhesions (synechiae)
– Reduced vision

DIAGNOSTIC TESTS
– Measure visual acuity, if possible
– Apply 1 to 2 drops of sterile fluorescein stain to determine if there is associated corneal damage (see also “General Physical Examination”). Determine the amount of uptake of the dye on the cornea (an indicator of the degree of corneal involvement); ulcerations or dendritic lesions may be visible

MANAGEMENT
Goals of Treatment
Early identification.

Appropriate Consultation
Consult a physician immediately for a management plan.

Nonpharmacologic Interventions
– Support and reassure client to reduce anxiety
– Use a plastic eye shield to cover and protect the eye
– Do not put any pressure on the eyeball
– Client should wear sunglasses if a shield is unavailable

Pharmacologic Interventions
Initial management usually consists of a fast-acting topical eye drop to dilate the pupil. This relieves pain (caused by spasm of ciliary and iris muscles) and prevents formation of a scar between the pupillary border and the anterior lens capsule (posterior synechia). This drug must be ordered by a physician.

1% tropicamide (Mydriacyl), 1 drop q6h

The dilating and antispasmodic effects are maximal in 30–60 minutes, and usually last from 3–6 hours.

These medications may increase the intraocular pressure and lead to acute glaucoma. This risk is greatest in older patients.

Monitoring and Follow-Up
Explain disease process and management plan.

Referral
Transfer urgently to the care of an ophthalmologist.
Internet addresses are valid as of January 2012.


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