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UPDATE IN OFFICE MANAGEMENT

Management of the Red Eye for the Primary Care Physician

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ABSTRACT

For the primary care physician, the occurrence of a red eye is a frequent and prominent finding of a disease process in patients. A careful history and simple examination with the observation of typical clinical signs are important for the management of this common disorder. The causes can be classified as painful red eye, trauma, and other common conditions. The most frequent causes of a red eye, such as dry eye, conjunctivitis, keratitis, iritis, acute glaucoma, subconjunctival hematoma, foreign bodies, corneal abrasion, and blunt or penetrating trauma, are described in this article. Simple diagnostic methods and an emergency management with some useful topical ophthalmic preparations are included. Although several conditions can be treated by the primary care physician the clinical signs that require an urgent ophthalmic consultation are chemical burns, intraocular infections, globe ruptures or perforations, and acute glaucoma. © 2006 Elsevier Inc. All rights reserved.

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A red eye usually mirrors the possible reactions of the eye to exogenous or endogenous irritations and trauma, and gives indications of possible systemic and ocular diseases. The primary aim of the management of this common disorder should be the differentiation of the symptom of red eye and the assessment of the underlying disease.

The causes of a red eye can be numerous and can occur as an ophthalmic emergency within minutes or hours but also as a chronic disease over weeks or months. In general, redness of the eye can be caused by hyperemia with dilation of the conjunctival, episcleral, or scleral vessels (trauma, chemical burns, immunologic reactions); inflammatory reactions from infections (bacterial, viral, fungal); or chronic reactions of the external eye from systemic causes (Sjögren's syndrome).

Most causes of eye redness can be recognized by taking a careful history and performing simple examinations with the following main questions:

- Association with pain
- History of preceding trauma
- Seasonal or recurrent occurrence (allergic reactions, iritis)
- Changes in the eye lid (contact dermatitis, ocular rosacea, pemphigoid)
- Use of eye drops (glaucoma, dry eye)

The assessment of clinical signs should include the anatomic location of redness (eyelids, conjunctiva, cornea, sclera and episclera, or intraocular); symptoms in one or both eyes; possible associated symptoms (pain, itching, visual decrease or loss); and further prominent ocular (mucopurulent discharge, watering, blepharospasm, lagophthalmus) or systemic (fever, nausea) findings.

In particular, the occurrence of ocular pain is an important indicator. Pain can have several sources, originating from the eye itself or the periocular region. Painful symptoms can be projected to the eye from other regions. Typical causes are changes of the eyelids, ocular muscles, cornea, sclera, uvea, or optical nerve. Frequent pain-associated syndromes are migraine, cluster headache, arteriitis temporalis (M. Horton), and zoster or trigeminus neuralgia.

The most frequent causes of a red eye (Table 1) are described here with simple diagnostic methods. Emergency

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management with some useful topical ophthalmic preparations are included (Table 2). The causes are grouped as painful red eye, trauma, and other common conditions.

PAINFUL RED EYE

Conjunctivitis

The causes to consider in patients with suspected acute conjunctivitis are allergic; bacterial (staphylococci, pneumococci, gonococci, haemophilus); viral (adenovirus, herpes viruses); and chlamydial. The most prominent signs are generalized conjunctival injection with gritty discomfort, mild photophobia, and variable discharge but no loss of visual acuity.

Allergic conjunctivitis usually presents with itching tearing, large cobblestone papillae under the upper lid, and conjunctival swelling (chemosis), which may assume alarming proportions. It usually responds rapidly to topical antihistamines and vasoconstrictors. Steroid eye drops also might be indicated but must be prescribed by an ophthalmologist. Secondary bacterial infection should be prevented with antibiotic eye drops.

The leading symptoms of bacterial conjunctivitis are conjunctival redness and mucopurulent discharge, which requires frequent antibiotic drops (as often as hourly in severe cases) and ointment at night. Clean away the discharge with moist cotton balls and refer the patient to an ophthalmologist if the infection does not settle. However, swabs for further bacterial diagnostics are rarely needed.

Viral conjunctivitis (epidemic keratoconjunctivitis) caused by adenovirus (type 8) presents with marked discomfort and is highly contagious with rapid person-to-person

spread unless scrupulous care is taken with hand washing. Watery discharge, often bilateral, and swollen preauricular and submandibular lymph nodes (lymphadenitis) confirm the viral infection. Give antibiotic drops to prevent secondary bacterial infection and treat with artificial

tears. Refer the patient to an ophthalmologist to monitor for the development of keratitis, which can develop after 1 week. The symptoms usually are relieved within 2 weeks.

A special case is herpes zoster conjunctivitis. The onset is similar but is presumed to originate in the nerve root. Therefore, it typically presents as uniocular involvement with a dermatitis similar to shingles in the distribution of the trigeminal nerve. This presents as a vesicular rash over the distribution of the ophthalmic division of the trigeminal cranial nerve. Pain and

tingling often precede the rash. The patient is usually unwell and in pain. The eye may be affected, resulting in blepharitis, conjunctivitis, keratitis, uveitis, secondary glaucoma, ophthalmoplegia, or optic neuritis. The cornea (keratitis) is involved in particular when the tip of the nose is involved (Hutchinson sign), because both regions are supplied by the nasociliary nerve. The associated keratitis with inflammation and disruption of the cornea or anterior uveitis (inflammation of the anterior segment of the eye) can lead to

CLINICAL SIGNIFICANCE

- Red eye symptoms are common.
- Most causes can be well managed with topical therapy, such as eye drops.
- The most serious causes are associated with pain or trauma.
- Chemical burns and penetrating injuries to the eye should be immediately referred to an ophthalmologist.

Table 1 Causes and Differential Diagnosis of the Red Eye

● Painful red eye - Conjunctivitis - Episcleritis and scleritis - Keratitis and corneal ulcer - Iritis and intraocular infections (endophthalmitis) - Glaucoma (acute and chronic) ● Traumatic conditions - Subconjunctival hematoma (hyposphagma) - Corneal and conjunctival foreign body - Corneal abrasion - Corneal flash burn - Chemical burns - Blunt or penetrating trauma to the eye ● Other common conditions - Dry eye - Blepharitis
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Table 2 Useful Topical Ophthalmic Preparations and Eye Patching

- Antibiotic eye drops or ointment, eg, 0.5% chloramphenicol, gentamicin, erythromycin, or ofloxacin. Usually first use a broad-spectrum antibiotic with an application four times per day to the lower conjunctival sac. Ointments are preferably used at night.
- Local anesthetic, eg, proparacaine. Do not use over longer periods because of corneal toxicity.
- Fluorescein corneal stain.
- Mydriatics, eg, tropicamide (short acting). Do not use in patients with suspected acute glaucoma to avoid precipitating effects.
- Miotics, eg, 1% or 2% pilocarpine.
- Steroid preparations should generally not be used without an ophthalmic consultation because of possible aggravation of inflammation or induction of glaucoma. However, a combined preparation of antibiotics and steroids is often useful.
- Eye patch: double-patch technique is common to immobilize lid margin to minimize pain and recurrent irritation of large abrasions.
- Eye shield: used to prevent pressure or contact to the eye when a globe rupture is suspected.

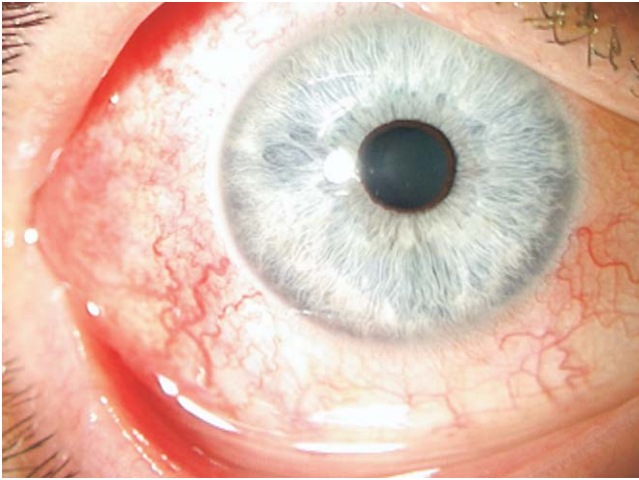


Figure 1 Typical clinical picture of redness caused by episcleritis (note the dilated conjunctival and episcleral vessels).

blindness if untreated. Therefore, always refer the patient to an ophthalmologist for consultation. Systemic treatment with acyclovir 800 mg orally 5 times daily with 3% acyclovir ophthalmic ointment decreases pain, corneal damage, and uveitis.

Chlamydial conjunctivitis usually occurs in young adults causing chronic bilateral conjunctivitis with mucopurulent discharge. The cornea may be involved (keratitis). The diagnosis is difficult but should be suspected when conventional antibiotic therapy fails. Associated urethritis or salpingitis may suggest the cause. Treat with oral tetracycline.

Episcleritis and Scleritis

Episcleritis is a localized inflammation beneath the conjunctiva adjacent to the sclera (Figure 1), whereas scleritis is a more painful localized inflammation of the sclera itself. Rheumatoid arthritis may be associated. The eye is locally red and sore with reflex watering but no discharge. Progression to eyeball perforation can occur in scleritis.

Test blood samples for white blood count, sedimentation rate, and rheumatoid factor. Start a nonsteroidal anti-inflammatory agent such as diclofenac 50 mg orally 3 times per day. Refer the patient to an ophthalmologist for definitive treatment, including nonsteroidal or steroid eye drops.

Keratitis and Corneal Ulcer

Keratitis is an inflammation of the cornea with many possible causes, including viruses such as herpes simplex and adenovirus, bacterial infection of a corneal ulcer, abrasion, exposure, or contact lens wear. The distinguishing feature from conjunctivitis is the prominent pain with diminution of vision if there is a central ulcer or exudate in the anterior eye chamber (hypopyon). The ulcer may be seen as white flocculent infiltrate. Cultures should be taken before starting local antibiotic therapy.

Fluorescein staining will demonstrate a marginal or central ulcer. In herpes simplex keratitis the ulcer is typically branching or dendritic, and corneal sensation is decreased.

Start antibiotic eye drops or acyclovir ointment, and refer the patient to an ophthalmologist. Steroid eye drops are absolutely contraindicated in these cases. Corneal destruction and perforation with visual loss or blindness are possible.

Iritis and Intraocular Inflammations (Endophthalmitis)

Iritis can be caused by exogenous infection from a perforating wound or corneal ulcer. Otherwise, it represents an ill-understood endogenous mechanism linked with human leukocyte antigen-B27 and seronegative arthropathy, as in ankylosing spondylitis, Reiter's syndrome, ulcerative colitis, Crohn's disease, and Still's disease. Other possible causes include sarcoidosis, toxoplasmosis, tuberculosis, syphilis, and herpes zoster ophthalmicus.

In acute iritis there is a marked ciliary injection, constant pain also into the brow or temple developing over hours, blurred vision, and photophobia. The pupil contracts (miosis) and tiny aggregates of cells may be seen on the inner surface of the cornea (keratic precipitates). In severe cases, an exudate can form in the anterior eye chamber (hypopyon), and the iris may adhere to the anterior lens surface, causing posterior synechiae.

In acute iritis the patient should be counseled by an ophthalmologist for treatment with steroid eye drops and cycloplegics to prevent posterior and anterior synechiae, which can lead to cosmetic and visual defects. Iritis may also become recurrent and further progress to secondary glaucoma.

Glaucoma (Acute and Chronic)

Acute glaucoma is associated with a narrowed anterior chamber with obstruction of the outflow of aqueous humor, which leads to a massive increase in intraocular pressure. It is more common in middle-aged or elderly hypermetropes (long-sighted persons) and East-Asians, and is precipitated by pupillary dilatation. There is severe throbbing, boring pain accompanied by nausea, vomiting, and prostration. Visual acuity is markedly reduced with halos around lights. On examination, the eye is reddened and the cornea becomes hazy with a fixed, semidilated oval pupil. On gentle palpation the eye feels hard because of increased intraocular pressure.

Acute glaucoma is an ocular emergency with impending blindness if untreated. This condition requires urgent referral to an ophthalmologist. If the symptoms are clearly defined, therapy can be started with miotic drops such as pilocarpine 1% or 2% every 5 minutes for up to 1 hour. Acetazolamide (carbonic dehydratase inhibitor) 500 to 1000 mg orally or slowly intravenously (IV), an antiemetic such as metoclopramide 10 mg IV, analgesia for severe pain, and in some cases hyperosmotic agents (1 mL/kg 50% glycerol by mouth if not vomiting, 1-2 g/kg mannitol IV, or both) may be needed. The definitive therapy consists of peripheral laser or surgical iridectomy.

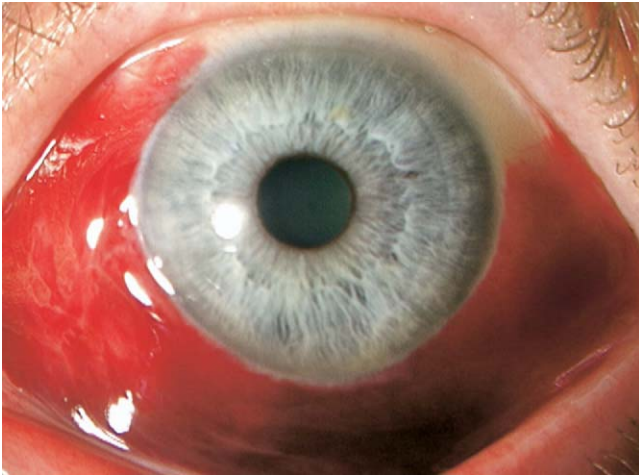


Figure 2 Typical clinical picture caused by a subconjunctival hematoma (hyposphagma).

Chronic open-angle glaucoma also leads to a mild increase in intraocular pressure and possible eye redness, but the changes occur over several months or years leading to optic nerve damage, scotomas, and loss of peripheral vision. This is not an emergency condition.

TRAUMATIC CONDITIONS

Subconjunctival Hematoma (Hyposphagma)

Two types of subconjunctival hematoma can be presented: spontaneous and traumatic. In spontaneous cases with no other subjective complaints, this may arise from coughing and straining or from atherosclerotic vessels, particularly in the elderly, and can be associated with hypertension or a bleeding diathesis (Figure 2). Check the blood pressure and reassure the patient that the blood will disperse within 2 weeks. No further treatment is needed.

In traumatic cases this may be the result of a blunt trauma, a surface conjunctival foreign body, or a penetrating injury. Gentle digital assessment may reveal reduced eyeball tone, such as in penetrating globe injuries. All patients with a suspected serious cause as mentioned above should immediately be referred to an ophthalmologist.

Corneal and Conjunctival Foreign Body

Usually a piece of grit blows in the eye causing pain, redness, and watering. The object might be easily seen by direct observation and can be removed with a moistened cotton tip after applying a local anesthetic. An eye pad is then worn until the return of normal sensation. If the object affects the upper subtarsal conjunctiva, nothing will be seen immediately, but the eye will be red and painful to blink. Fluorescein staining will reveal linear corneal abrasions. In these cases, the upper eyelid must be everted for full inspection and to remove the foreign body. Remember that eyelashes are common foreign bodies and should not be missed. However, deep or recalcitrant foreign bodies and

those with extensive rust rings should be removed by an ophthalmologist.

After foreign body removal, the application of antibiotic ointment is recommended, and the patient should be reviewed within 2 days to exclude an infection. In more severe cases, a short-acting cycloplegic to relieve ciliary spasm may be needed.

Corneal Abrasion

Corneal abrasion is usually caused by a foreign body or direct injury from a finger, stick, or piece of paper. There is intense pain, watering, and blepharospasm. Local anesthetic eye drops may be needed before the eye can be opened properly. Fluorescein staining can reveal the epithelial damage of the cornea. Although an eye patch is no longer recommended, antibiotic eye drops or ointment should be applied to prevent an infection.

The cornea should be healed within 1 to 2 days, but if there is delayed healing or a recurrence, refer the patient to an ophthalmologist.

Corneal Flash Burn

Corneal flash burn is a superficial keratitis that occurs after extensive exposure to ultraviolet light, from welding, skiing, or a sun lamp without using protective goggles. There is intense pain, burning, blurred vision, watering, and blepharospasm occurring after a delay of a few hours. Diffuse corneal haziness and fluorescein staining reveals a pitted corneal surface. Double-patch the eyes for pain relief. Dim lighting and systemic analgesics are recommended. Recovery usually occurs within 12 to 24 hours.

Remember that topical anesthetics should not be applied in repeated doses because most are also cellular toxins and will retard healing, as well as prevent natural reflexes of the cornea to protect against further damage.

Chemical Burns

In chemical burns, alkalis are far more dangerous than acids, and include common agents such as cement, plaster powder, oven cleaner, and drain cleaner. Alkali burns produce a liquefaction necrosis of the conjunctiva and cornea, which continue to dissolve soft tissue until completely removed. Acid burns produce a coagulation necrosis of the cornea, and further invasion of the eye structures is limited by this process. The treatment priority is immediate, copious, prolonged irrigation with normal saline, and local anesthetic eye drops may initially be needed. It is important to evert the upper eyelids to remove any particulate matter and to irrigate the superior fornix of the conjunctiva. Also, radial conjunctival incisions might be needed for faster removal of the agents. Refer the patient as soon as possible to an ophthalmologist for further examination.

Blunt or Penetrating Trauma to the Eye

Injury to the eye should always be considered in any trauma to the face. It must not be forgotten when other injuries

appear more dramatic or when periorbital edema obscures the eye. Blunt trauma may cause a sequence of minor or more relevant injuries, such as periorbital hematoma, subconjunctival hemorrhage, corneal abrasion or laceration, bleeding into the anterior chamber (hyphema), a fixed pupil (traumatic mydriasis) or torn iris (iridodialysis), a dislocated lens or traumatic cataract, vitreous hemorrhage, a retinal tear with retinal detachment, retinal edema, or optic nerve damage with unresponsive pupil to direct light. A ruptured globe with marked visual loss with a soft eye and a shallow anterior chamber, and an orbital fracture with a typical "blow-out" fracture of the orbital floor are possible. All of these conditions require immediate examination by an ophthalmologist. The patient should lie quietly semi-upright. Apply a sterile eye shield, and give appropriate analgesia.

Penetrating trauma is usually obvious, but on occasions it may initially be difficult to recognize. The following injuries are possible: corneal laceration, often with prolapse of the iris into the defect; scleral perforation with chemosis or local hemorrhage, which must be differentiated from a trivial subconjunctival bleed; collapse of the anterior chamber; hyphema or vitreous hemorrhage; pupil irregularity; and lens dislocation.

Intraocular foreign bodies are usually metal fragments from using a hammer and chisel, metal drill, or grinding wheel. Fragments of glass or wood may be involved. The symptoms are sudden sharp pain, which is followed by localized redness. In some cases, the outside of the eye may appear almost normal. In suspected cases, apply antibiotic eye drops and protect the eye from further damage with an eye shield. Provide analgesia and systemic antibiotics.

All cases of documented penetrating injury to the eye and actual or suspected foreign bodies should immediately be referred to an ophthalmologist. Eventually, radiography of the orbit with soft-tissue films or computed tomography should be performed, but never perform magnetic resonance imaging if a metal foreign body is possible.

OTHER COMMON CONDITIONS

Dry Eye

The typical sign of common dry eye is a foreign body sensation, and the feeling can be exacerbated by dry air such as air conditioning. Dry eye is found in patients with Sjögren's syndrome.

Artificial tear eyedrops can be used without prescription. If the symptoms persist, a consultation by an ophthalmologist is recommended.

Blepharitis

Blepharitis is a frequent chronic inflammation of the eyelid margin causing red, itchy, and crusted lids. Styes and chalazions can be associated.

In chronic cases, cleaning and scrubbing of the eyelids with mild soap or shampoo and a cotton tip twice per day can improve the symptoms. Topical antibiotics and steroids might be indicated.

Finally, remember that the clinical signs requiring an urgent ophthalmic consultation are chemical burns, intraocular infections, globe ruptures or perforations, and acute glaucoma.