MANAGEMENT OF THE PAINFUL RED EYE

Patients present with a wide range of conditions characterized by a red eye. These conditions can be assigned to two broad diagnostic categories according to the rate of onset. It is usually possible to diagnose conditions causing painful red eye from a carefully taken history and simple external eye examination. The author explains the important factors in taking the history and examining the patient, and describes the injuries and disorders with which patients may present.

The eye is easily accessible for clinical examination and a diagnosis of acute red eye can usually be made from only a simple history and external examination. Generally, correct management can be instituted without recourse to further investigation.

TAKING THE HISTORY

Taking the history should enable the doctor to distinguish between acute and gradual onset of the condition; the diagnostic classifications described here are broadly divided into these two groups (Box 1).

It is particularly important to make enquiries regarding the circumstances in which eye trauma was sustained, in order to assess the likelihood of an intraocular foreign body that might not otherwise be noted on clinical examination. In the absence of a history of trauma or foreign body, enquiry regarding the nature and severity of pain or discomfort in the eye is helpful in the differential diagnosis.

EXAMINATION IN ACUTE RED EYE

Visual acuity

The measurement and recording of visual acuity is mandatory for doctors examining patients with eye...
symptoms. This can be achieved using a Snellen's test type with the distance spectacle correction, or a pin-hole. The last line on which most of the letters are read correctly is recorded, and visual acuity is expressed as a fraction, which can range from 6/60 (the top letter of the chart) to 6/6 or better (the normal level achieved).

Examination of the external eye

Eyelids

Inflammatory swelling of the eyelids caused by infection is readily apparent because of tissue laxity. Palpation of the eyelids is important to define any localized lesion, such as chalazion. Severe unilateral swelling of an eyelid may often track over the bridge of the nose to cause bilateral signs, but there is obvious asymmetry of the swelling in such cases. Bilateral, symmetrical eyelid oedema is usually caused by acute allergy from topical contact with, or systemic ingestion of, an allergen.

Anterior segment

Occasionally, this examination is impossible to perform because of intense swelling of the eyelid caused by haematoma or cellulitis. The application of topical anaesthetic (for example, oxybuprocaine; Minims benoxinate), which takes effect immediately, allows proper examination to be performed if the pain of ocular trauma has caused blepharospasm.

The upper and lower eyelids are retracted in turn while the patient looks in the opposite direction. This enables appraisal of most of the conjunctival surface and all of the corneal surface. The pattern of redness should be noted so that the disease process can be localized. Inspection of the underside of the upper eyelid may be required, as in the case of a retained foreign body (Figure 1).

Cornea and iris

Inflammation focused around the cornea is termed 'ciliary congestion', and may be caused by pathology in the cornea or iris (Figure 2). Although lesions are sometimes difficult to see directly because the cornea is transparent, the pattern of light from a pen torch reflected from the surface of the cornea can be examined. Focal disturbance of the light reflex is seen in corneal abrasions and ulcers. When concentrated fluorescein (Minims fluorescein 2%) is applied in such situations, the break in the protective barrier of the epithelium allows dye to accumulate in the stroma. After allowing 1–2 min for the dye to penetrate, the eye is examined with a blue light for maximum contrast (Figure 3).

In the absence of corneal problems, pathology of the iris must be
suspected. The condition of the iris is reflected by the size of the pupil, which should be observed in dim light. A small pupil (miosis) indicates spasm of the iris sphincter in association with inflammation of the iris (iritis). An abnormally dilated pupil is seen following blunt injury to the iris sphincter (tumastic mydriasis) and in third nerve palsy.

RED EYE OF SUDDEN ONSET
Spontaneous subconjunctival haemorrhage
In this painless condition, the eye appears alarmingly red (Figure 4). If trauma and overdose of anticoagulant have been excluded, a cause is rarely found. The patient should be reassured that the condition will improve in 2-3 weeks.

Foreign body
Intraocular foreign body
In a case of suspected intraocular foreign body, the history is of paramount importance. The use of a hammer and chisel on metal, or working with a metal that fractures, produces fragments with sufficient kinetic energy to pierce the eye-ball. The entry wound into the eye may have resealed and may not be noticeable on clinical examination (Figure 5).
Intraocular foreign bodies may cause severe late visual consequences, including blindness or loss of the eye. With a history of foreign body in the eye from a hammer and cold chisel, an X-ray of the eye is necessary, and the patient should be referred urgently to an ophthalmologist. Larger foreign bodies perforating the anterior segment typically cause distortion of the pupil because the iris becomes trapped in the wound (Figure 6).

Other foreign bodies
Retention of a foreign body on the surface of the eye is more common

Figure 6. Larger foreign bodies perforating the anterior segment typically cause distortion of the pupil because the iris becomes trapped in the wound. This is a perforating injury at the limbus with prolapse of the iris and distortion of the pupil.

Figure 4. Spontaneous subconjunctival haemorrhage. If trauma and anticoagulant overdose have been excluded, a cause is rarely found.

Figure 5. Metal intraocular foreign body embedded in the lens. The corneal wound has resealed, and the particle became visible only after dilatation of the pupil.
Larger foreign bodies may strike the eye, lacerating the conjunctiva or abrading the cornea; such damage can be confirmed by staining with fluorescein. Staining of the superior half of the cornea indicates whether or not a foreign body is retained under the upper eyelid. When the eye is clear of retained matter, chloramphenicol ointment (OcGhloromycetin) can be prescribed and the eye is padded for 24 h to facilitate re-epithelialization. If extensive abrasion appears likely to require longer healing, a mydriatic should also be prescribed.

Arc-eye

Exposure to ultraviolet light from welding (arc-eye) or sun lamps can cause delayed necrosis of the corneal epithelium (about 8 h after exposure). Intense pain, photophobia and lacrimation are characteristic features. There may be fine punctate staining of the epithelium on application of fluorescein. A single application of topical anaesthetic may be necessary for the examination to be performed, but repeat doses delay re-epithelialization and are contraindicated. Such eyes usually recover within 24 h following treatment with prophylactic antibiotic ointment, pads and simple analgesia.

Chemical burns

Contamination with acid often causes loss of corneal epithelium. The eye should be irrigated with saline and treated as for an abrasion.

Alkali has a devastating effect on the eye, requiring urgent irrigation and immediate ophthalmic referral. Plaster and cement often become embedded in the tarsal conjunctiva and must be removed mechanically. This procedure may require topical anaesthesia and firm debridement using cotton-tipped swabs on the everted tarsal plate. The underside of the upper eyelid must be cleared to prevent further damage to the cornea. Any residual chemical must be flushed away with copious saline, the full effects of alkali damage are not immediately apparent, and inpatient treatment is usually required.

Acute glaucoma

Acute glaucoma is unrelated to chronic glaucoma, which is asymptomatic. Growth of the lens throughout life causes progressive shallowing of the anterior chamber. In an eye predisposed to acute glaucoma, dilatation of the pupil (by dim illumination or mydriatic drops) can cause a sudden complete obstruction of the aqueous drainage channels in the trabecular meshwork. The intraocular pressure then rises rapidly to 60 mmHg causing corneal oedema and blurring of vision. There is reflex pain, inflammation and systemic upset, including nausea and vomiting. Such symptoms may overshadow the eye signs; for example, a diagnosis of acute glaucoma should be suspected in a sick elderly woman with a poor history and a unilateral red eye with corneal haze and a fixed mid-dilated pupil (Figure 8).

Acute glaucoma should be treated with intravenous acetazolamide (Diamox) 500 mg and topical pilocarpine 4%, and the patient should be referred urgently to an ophthalmologist for surgical management.
**Blunt trauma**

Extensive haematoma on the eyelid often indicates an associated fracture, most commonly a blow-out fracture of the orbital floor (Figure 9). A test should be made for hypoaesthesia of the lower eyelid resulting from involvement of the infraorbital nerve. Entrapment of the inferior rectus muscle may limit upgaze and cause diplopia, but ocular motility may be generally impaired and difficult to assess in the acute stage because of extensive periorbital haematoma. The need for surgical repair is determined by ophthalmological follow-up.

Bleeding into the anterior segment causes hyphaema (Figure 10), and there may be damage to the iris with traumatic mydriasis or disinsertion of the iris root (Gliodiolysis). Such trauma is often associated with damage to the posterior segment (for example, retinal oedema and choroidal rupture), and referral to an ophthalmologist is necessary.

Extensive hyphaema may be associated with secondary glaucoma and pain. Complete hyphaema is associated with a high risk of glaucoma, although it often indicates a ruptured globe, in which case the intraocular pressure is low and the corneal shape is distorted.

**RED EYE OF GRADUAL ONSET**

**Problems of the eyelid**

**Stye**

A stye is an acute bacterial infection of a lash follicle. The abscess will point and discharge, and the condition is self-limiting. Bathing the affected area in hot water expedites the natural course.

**Meibomian cyst/chalazion**

More deep-seated infection of the eyelid in the Meibomian glands causes diffuse swelling of the eyelid around the infected gland. Spontaneous discharge is rare because of the tough surrounding tarsal plate. A chronic granulomatous reaction may leave a residual cyst (chalazion), which may require incision and curettage (Figure 11). In the acute infective stage, topical antibiotics may be prescribed, but hot bathing is not indicated.
Orbital cellulitis
Tense inflammatory swelling of the eyelids is often caused by orbital cellulitis, which usually originates from an underlying acute sinusitis. The condition is treated with parenteral antibiotics, and admission for intravenous treatment is appropriate, particularly in children, in whom complications such as meningitis might rapidly ensue. X-ray of the paranasal sinuses and referral to an ear, nose and throat surgeon for surgical drainage is appropriate.

Decracyoatitis
Obstruction of the nasolacrimal duct may lead to secondary infection of the lacrimal sac. Inflammatory changes are focussed at the medial canthus and spread into upper and lower eyelids (Figure 12). The infection is treated with systemic antibiotics. Drainage of lacrimal abscesses should be avoided because it may cause a fistula to form.

Conjunctivitis
In conjunctivitis, uniform inflammation of the conjunctival mucous membrane leads to an even distribution of redness over the eye. The type of inflammatory discharge varies with the type of infection.

Bacterial conjunctivitis
Infectious conjunctivitis is a major cause of red eye, and almost all patients respond to treatment with topical chloramphenicol (G Chloromycetin, 2-hourly) or fusidic acid (G Fucithalmic, twice daily).

Viral conjunctivitis
Viral conjunctivitis is often associated with upper respiratory tract infections, and may be epidemic. No specific treatment is available, except for herpes simplex infection (see viral keratitis below).

Chlamydial conjunctivitis
Nearly all acute conjunctivitis presents bilaterally, but chlamydial conjunctivitis may often initially be unilateral. The associated genital infection is often subclinical. Diagnosis should be suspected when infection persists in spite of conventional antibiotic therapy, and patients should be referred for further investigation.

Allergic conjunctivitis
Signs are minimal in allergic conjunctivitis, but there may be conjunctival oedema or chemosis. The diagnosis is usually made from the history. Treatment is with sodium cromoglycate (G Opticrom, four times daily).

Keratitis
Acute infectious disease of the cornea (keratitis) is often a sight-threatening condition, and urgent ophthalmic referral is indicated.

Bacterial keratitis
Bacterial ulceration of the cornea is associated with abscess formation (Figure 13). The condition is com-

Figure 12. Acute dacryocystitis. Obstruction of the nasolacrimal duct should be avoided because it may cause a fistula to form.

Figure 13. Ulceration of the cornea with micro-abscess formation is usually a result of bacterial infection.

Figure 14. Primary herpes simplex infection may present with blepharitis. A typical herpetic corneal ulcer has a branching dendritic pattern that is best seen when stained (Figure 15).
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Figure 15. Herpes simplex keratitis is typically dendritic in pattern.

Figure 16. Marginal keratitis. Corneal abscesses located near the limbus may indicate an allergic type of reaction often caused by staphylococcal antigens.

Figure 17. Focal conjunctival swelling and redness in episcleritis. There is a constant, aching pain and marked tenderness.

Herpes keratitis

Herpes simplex may initially affect the eye with a blepharitis (Figure 14) or conjunctivitis, either of which may be associated with a keratitis.

A typical herpetic corneal ulcer has a branching dendritic pattern that is best seen when stained with fluorescein.
fluorescein or Rose Bengal (Figure 15). Treatment of the ulcer is with vidarabine (Oc Vira-A, five times daily) or acyclovir (Oc Zovirax, five times daily).

**Marginal keratitis**

Corneal abscesses located near the limbus may indicate an allergic type of reaction, often caused by sensitivity to staphylococcal antigens from an associated marginal blepharitis, and require treatment with topical steroids (Figure 16). However, other types of keratitis may be significantly exacerbated by steroids, and it is advisable to seek the opinion of a specialist before treatment.

**Iritis/anterior uveitis**

Ciliary congestion (Figure 2) without apparent corneal abnormality and with a miotic pupil may indicate acute iritis. Both keratitis and iritis produce photophobia, but in iritis there is little excess lacrimation. Inflammation causes the iris to adhere to the lens capsule (posterior synechiae), and dilatation of the pupil with a mydriatic agent (for example, homatropine 2%, four times daily) is therefore indicated. Treatment with topical steroids is necessary for suppression of the inflammation, but the patient should be treated in the eye department because both the condition and the treatment may cause secondary glaucoma.

**Episcleritis/scleritis**

In this disorder, there is focal redness of the conjunctiva with swelling and inflammation of the underlying tissues (Figure 17). The patient experiences constant, aching pain and marked tenderness. Treatment is with topical steroids and anti-inflammatory agents, with ophthalmological follow-up.

**CONCLUSION**

It is usually possible to diagnose conditions that cause painful red eye with sufficient accuracy to start appropriate treatment from a carefully taken history and simple external eye examination. Bacterial infections respond well to the topical application of antibiotics, which achieves high local tissue concentrations of drug. Most viral infections are self-limiting, apart from herpes simplex infection, which is controlled by specific antiviral therapy. Conditions requiring steroid treatment should be followed up by an ophthalmologist because of possible side-effects associated with these drugs, such as glaucoma.

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**REFERENCES**


Practical points...

- A case history is essential in the diagnosis of an intraocular foreign body.
- Visual acuity must be measured in every patient with eye symptoms.
- Retraction of the eyelids to observe the pattern of redness is an essential aid to the diagnosis of the red eye.
- Fluorescein will demonstrate corneal damage, which might otherwise be difficult to detect.
- Acute glaucoma may present with severe systemic upset, with nausea and vomiting overshadowing the eye signs.

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