

The Acute Red Eye in the Elderly

Robert J. Campbell MD, MSc and William G. Hodge MD, PhD, FRCSC,
University of Ottawa Eye Institute, Ottawa, ON.

The differential diagnosis of the red eye involves structures ranging from the periorbital, lids and conjunctiva, to the surface sclera and episclera, to the cornea and uvea and to acute angle closure glaucoma. The history and physical examination can usually differentiate these entities from one another. The most important part of the examination is the visual acuity, which can usually distinguish the serious red eye from more benign causes.

Key words: orbital cellulites, conjunctivitis, blepharitis, keratitis, acute glaucoma, red eye.

An acute red eye often causes much anxiety for patients and physicians alike. For the clinician, this stems from the fact that the underlying diagnosis may range from innocuous, minor problems to potentially sight-threatening etiologies. Moreover, while in many cases specific clinical signs are present that can greatly help in the differential diagnosis, they are often subtle and may require specialised equipment not readily available in many clinical settings. However, armed with an appropriate understanding of the potential causes, a thorough history and some readily available clinical signs, the non-specialist clinician can make a sound diagnosis and initiate appropriate therapy or make a timely referral.

Clinical Approach

The key to making a proper diagnosis, as always, rests on an appropriately thorough history and a careful physical examination. Perhaps the most important element of the history is the presence of a recent decline in visual acuity. Additionally, the onset, duration and laterality of the red eye must be determined and the possibility of trauma should be explored carefully. Important associated features include pain, burning sensation, foreign body sensation, itching, and discharge which may be watery, mucoid or purulent in nature. The patient's medical and ocular histories may be very relevant, particularly histories of allergy, upper respiratory tract infection or recent ophthalmic surgery. Finally, the use of topical

medications is an important historical element.

Physical examination should begin with a careful assessment of visual acuity using the patient's appropriate distance refractive correction or a pinhole aperture. Next, one can proceed "from outside to in", beginning with an examination of the periorbital and orbital tissues while paying special attention to any signs of proptosis and ocular motility deficits. The globe itself may then be examined beginning with the conjunctiva, noting the predominant focus of vessel injection—forniceal or circumcorneal, focal or diffuse. The presence of discharge may be noted in the fornices or on the lids. The cornea may be examined both with white light and, ideally, with fluorescein and cobalt blue illumination as well. Finally, the iris and pupil should be examined. In particular, the ease with which iris details can be viewed provides an index of corneal clarity. The size, shape and reactivity of the pupil also furnish important diagnostic clues. Elements of the history and physical examination that increase the likelihood of a serious disorder are highlighted in Table 1.

Important Elements of the Differential Diagnosis

Armed with clues from the clinical history and physical examination, we can proceed to a logical anatomical and mechanistic breakdown of the causes of the red eye (clinical entities summarised in Table 2). From a mechanistic view-

point, the eye will assume a red appearance whenever there is an increased presence of blood in or under the normally transparent conjunctival membrane. This blood may be intravascular, may be in dilated blood vessels that have become congested secondary to inflammation or may be a consequence of increased venous pressure. Alternatively, this blood may be extravascular in the form of subconjunctival hemorrhage.

Inflammatory Blood Vessel Injection

Inflammatory processes underlie the majority of acutely red eyes. The specific anatomic sites involved fundamentally determine the likely diagnosis and treatment approach. Thus, an anatomic breakdown of the differential diagnosis seems logical.

Table 1
Red Flags in the Red Eye

History
Trauma
Recent ocular surgery
Contact lens overuse
Symptoms
Severe pain
Severe photophobia
Nausea/vomiting
Signs
Decreased vision
"Orbital signs"
– severe periorbital edema/erythema
– decreased ocular motility
– proptosis
Abnormal pupil shape, size or reactivity
Circumcorneal injection ("ciliary flush")
Severe tenderness of globe or eyelids
"Corneal signs"
– fluorescein staining
– white spot
– poor view of anterior chamber/iris

Table 2

A Summary of the Clinical Red Eye Entities

	History	Clinical Signs	Therapy
Orbital Cellulitis	– periocular pain	– decreased vision – decreased eye movement – proptosis – periorbital swelling	– broad spectrum IV antibiotics, such as second generation cephalosporin – referral
Periorbital Cellulitis	– periocular pain	– periorbital swelling	– broad spectrum oral antibiotic efficacious against gram positives, such as cephalexin or cloxacillin
Blepharitis	– morning stickiness – the “burny itchies”	– lid margin debris and erythema – vision is normal	– lid cleaning with baby shampoo
Dry Eye	– the “itch-burnies” worse late in the day	– decreased tear film – vision usually normal	– tear supplements
Viral Conjunctivitis	– constant red irritated eye – watery discharge	– vision usually normal – small follicles on lower bulbar conjunctiva	– cool compresses
Bacterial Conjunctivitis	– constant red eye with purulent discharge	– vision usually normal – discharge can be significant	– broad spectrum topical antibiotic, such as Polysporin™ or Polytrim™
Episcleritis	– mild eye ache	– normal vision – sectoral inflammation	– no treatment usually needed
Scleritis	– severe eye pain with radiating headache	– decreased or normal vision – diffuse bluish/purple hue to eye – pain on touch	– systemic steroids usually needed – referral
Infectious Keratitis (bacterial)	– severe pain and decreased vision	– decreased vision – white pus on cornea	– topical ceftazolin and tobramycin, both fortified – referral
Infectious Keratitis (herpes simplex)	– pain and decreased vision	– decreased vision – dendrite or stromal edema	– topical antiviral such as trifluridine if only epithelium involved; topical steroid necessary if stroma involved – referral
Iritis	– pain and decreased vision	– decreased vision – small pupil, perilimbal erythema, cells in anterior chamber	– topical steroid every hour, topical dilator twice a day – referral
Acute Glaucoma	– severe pain and headache	– decreased vision – cornea edema – high intraocular pressure (> 50mmHg)	– topical beta-blocker – oral acetazolamide or mannitol to break attack – referral

Orbit and Periorbital Structures

Signs of orbital involvement, including proptosis, decreased ocular motility and periorbital swelling and erythema, indicate a serious problem requiring the care of physicians familiar with such entities as orbital cellulitis, orbital inflammatory pseudotumour or acute Graves' orbitopathy. Inflammation of the periorbital structures centred primarily inferonasally with respect to the eye suggests the possibility of dacryocystitis. This may be confirmed by inducing a reflux of purulent material from the punctum following pressure on the distended lacrimal sac. Dacryocystitis may lead to spreading periorbital cellulitis and should be treated with systemic antibiotics. Referral to a specialist who is capable of assessing the lacrimal system for patency also should be arranged.

Eyelids, Tearfilm and Conjunctiva

These sites are the most common sources of the red eye. Often the inflammatory process is an acute exacerbation of a chronic disorder. In particular, eyelid inflammation (blepharitis) and "dry eye", which may occur together or independently, are extremely common in the elderly. Both lead to chronic symptoms of bilateral itching, burning, tearing and mildly red eyes. However, these conditions often lead to what the patient describes as an acute episode of unilateral or bilateral redness, mild pain and discharge. Blepharitis and dry eye are by far the most common reasons for patients to present with red eye. Careful eyelid washing, warm compresses and topical antibiotic ointment before bedtime applied to the eyelid margins generally control blepharitis, while artificial tears can greatly help patients with dry eye.

The hallmarks of conjunctivitis are vessel injection that is generally worse in the inferior fornix, as well as the presence of discharge. While the diagnostic possibilities are myriad, infectious, allergic, toxic and degenerative causes are important to consider in the acute setting. Viral infections are common and may occur in epidemics. A history of contact with others suffering a red

eye can often be elucidated. Symptoms of an upper respiratory tract infection also suggest a viral etiology. Bacterial conjunctivitis tends to produce a more purulent discharge and tends to remain unilateral in most cases. Infectious conjunctivitis is generally a self-limited process that resolves over approximately one week. However, if signs and symptoms suggest a bacterial infection, topical broad spectrum antibiotics, such as Polytrim™ or Polysporin™, may hasten recovery and prevent spread.

Allergic conjunctivitis may stem from environmental allergens and often coexists with allergic rhinitis. Alternatively, the offending allergen may be topically applied medications, both over-the-counter and prescription. Environmental allergens classically induce severe ocular itching while topical medications cause a "toxico-allergic" reaction manifesting with less itching but much more severe periocular lid swelling and erythema. Topical antihistamines and mast cell stabilizers usually provide relief.

Finally, pinguecula and pterygia are degenerative conditions presenting as elevated thickenings of the conjunctiva in the interpalpebral regions. A pterygium differs from a pingueculum in that the blood vessels on the surface exhibit more aggressive invasion of the peripheral cornea. Both of these lesions may become acutely inflamed, and such inflammation generally responds to frequent use of artificial tears. However, mild anti-inflammatory therapy in the form of topical non-steroidal anti-inflammatory drugs or non-penetrating steroids may occasionally be indicated.

In their typical presentation, all of the diseases presented in this section are not vision threatening, and visual acuity will not suffer.

Sclera and Episclera

Focal or diffuse injection of bulbar regions deep to the conjunctiva suggest the presence of scleritis or episcleritis. Episcleritis usually presents with mild tenderness and foreign body sensation. This is usually an innocuous process that responds to topical non-steroidal anti-inflammato-

ry medications, if any treatment is needed at all. Further along the spectrum of inflammatory conditions of the eye's outer coats is scleritis, which is a much more painful condition with intense red or purple injection. While often idiopathic, scleritis can be associated with systemic collagen vascular disorders such as rheumatoid arthritis. If there is a suspicion of scleritis, timely ophthalmologic consultation is indicated. Both of these conditions are characterised by an absence of discharge. Vision is not reduced except in the most serious forms of scleritis.

Cornea and Uvea

The presence of injection primarily in a circumcorneal distribution indicates the likelihood of either keratitis or intraocular inflammation (uveitis). Keratitis may be superficial and diffuse and presents with mild corneal haze and punctate fluorescein staining. Superficial keratitis often coexists with conjunctivitis and the differential diagnosis is thus very similar. Treatment consists of removing any toxic or allergic components and treating any suspected infection. A more serious form of keratitis involves a focal infiltrate of white blood cells that presents as a white spot on the cornea. This may be infectious or immunologic in nature. However, the distinction can be difficult to make and thus rapid initiation of topical antibiotic therapy and referral to an ophthalmologist is indicated. Peripheral keratitis will not result in a decrease in vision whereas central keratitis will.

Similar circumcorneal injection is often seen in acute iritis and other forms of uveitis. Patients usually complain of photophobia, and the pupil on the affected side is often smaller than the unaffected side. The majority of these cases are idiopathic in nature; however, some are associated with systemic inflammatory or infectious diseases. Treatment usually requires the supervision of an ophthalmologist. Onset of acute intraocular inflammation with a recent history of intraocular surgery suggests the possibility of a serious infection, such as endophthalmitis, and

Acute Red Eye

urgent consultation is required. Most cases of uveitis will result in a decrease in visual acuity.

Acute Glaucoma

Acute angle-closure glaucoma is a much publicised but relatively rare event. The classic presentation involves a red, painful eye with a mid-dilated, poorly-reactive pupil and a hazy cornea. The eye is rock hard to palpation because of the very high intraocular pressure. While this condition is rare in the population at large, the elderly population is at a higher risk. Urgent ophthalmologic examination is warranted in highly suspicious cases. Most cases will result in decreased vision.

Non-inflammatory Blood Vessel Congestion

Congestion of blood vessels of the ocular surface can occasionally occur secondary to increased periocular venous pressure. A spontaneous or trauma-induced fistula between the arterial circulation and the cavernous sinus leads to arterialisation of the blood vessels of the conjunctiva which assumes a characteristic dilated, corkscrew configuration. The patient also may complain of other symptoms, including a bruit and headache. Fortunately, this diagnosis is rare and is included only for the sake of completeness.

Subconjunctival Hemorrhage

The diagnosis of this common condition is usually straightforward, with blood clearly seen as an extravascular plaque. These hemorrhages are often secondary to trauma. There is no discomfort experienced by the patient and there is no discharge. Vision is not reduced. However, even very mild "trauma", such as eye rubbing, may be enough to induce subconjunctival hemorrhages, especially in the elderly.

Summary

The number of potential diagnoses in a patient with an acutely red eye is, at first glance, quite daunting. However, the clinical history and physical exam-

ination provide helpful clues. These often lead to a solid diagnosis and, at a minimum, allow appropriate triage of potentially sight- and life-threatening disorders. ◆

No competing financial interests declared.

Suggested Reading

1. Trobe JD. The physician's guide to eye care. 2nd ed. San Francisco: The Foundation of the American Academy of Ophthalmology, 2001.
2. Roper-Hall MJ. Eye emergencies. New York: Churchill Livingstone, 1987.
3. Galloway NR, Amiak WMK. Common eye diseases and their management. 2nd ed. London: Springer-Verlag, 1999.
4. Kanski JJ. Clinical ophthalmology: a systematic approach. 4th ed. Oxford: Butterworth-Heinemann, 1999.